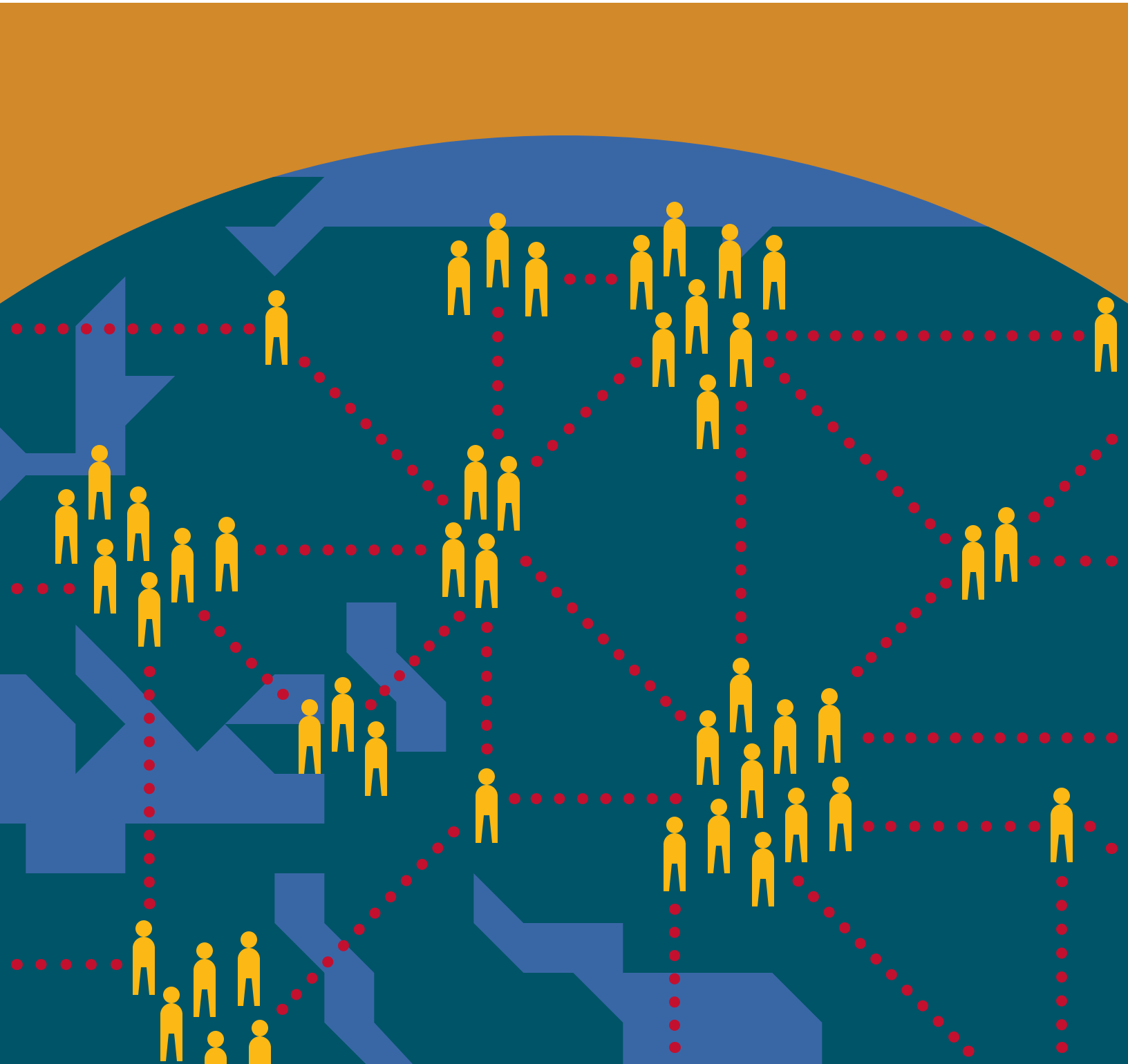
The Learning Society



Foreword

Leading Toward a *Learning Society*

I have long held the belief that education and technology are the two great equalizers in life. This next phase of the Internet—Web 2.0 and collaboration—provide a vision of what is possible. As we see this vision taking shape in the present—enabling collaboration, breaking down barriers across the globe and providing access to information anywhere, anytime—this belief continues to grow. Education and technology go hand in hand, with the network serving as the platform for what we call the *Learning Society,* which we outline in detail in the pages that follow.

Learning is critical to the future of our world and yet our current education systems are facing unprecedented challenges. I believe that the effectiveness of how the world achieves genuine lifelong learning is reliant, to a substantial degree, on how well we harness the power of the network to connect and engage learners and educators alike, and to provide access to our collective resources and knowledge. It comes down to scale. Traditional education systems alone, despite the essential role they have played, and will continue to play, in learning, are simply not capable of serving the world's growing and changing needs.

It's true that optimizing the effectiveness of traditional education systems to maximize the value we can derive from them is a vital element of any strategy moving forward. But this is not enough. Learning is an activity not a place and goes beyond the school and the university; it always has. The knowledge explosion, driven by the power of the network to connect people and spread ideas, has changed the very nature of learning. We must innovate and develop new modes of learning, both formal and informal, that meet the demands of knowledge-driven societies in this Information Age.

We need to embrace new approaches from nontraditional sources and foster truly open and collaborative partnerships between the public, private and non-profit sectors. In addition, those responsible for guiding learning must constantly move beyond their comfort zones and continually innovate to anticipate the needs of learners as the world around them changes. People need to learn and relearn throughout their lives. Learning must increasingly focus on interdisciplinary collaboration and 21st century skills such as critical thinking and problem solving.

The future of education is networked. Using the full power of video and mobility, people can collaborate to create and share knowledge as well as develop new ways of teaching and learning that captures the attention and imagination of learners anywhere, anytime on any device.

Meeting the evolving needs of learners throughout their lifetimes is a major challenge, and it's more urgent than ever before. But we should view it as a huge opportunity and one of our biggest obligations to future generations. By connecting and empowering learners and educators we can accelerate economic growth and improve social wellbeing worldwide.

This report is not an end in itself but rather the beginning of a global dialogue on how we think differently about education to transform all societies into learning societies. We hope that you will join us, and we look forward to your ideas.

John Chambers

Chairman & CEO, Cisco Systems, Inc.

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Executive Summary

Moving from Education Systems to the *Learning Society*

Learning is fundamental to the progress of humanity—for economic prosperity, social well-being, personal fulfillment, and to help ensure a sustainable planet.

In the future, learning will become substantially more important to every part of global society. This means that we need to reengineer our whole approach to learning: how we think about, organize, fund, and nurture it.

Some have concluded that the correct response is to engineer much bigger and more powerful traditional schools and universities. We disagree. Due to the enormous increase in demand for learning, these institutions will meet a still vital but relatively smaller proportion of a much larger global need for learning than they do today.

Learning needs to be organized on a different set of principles requiring a new learning system, one that is characterized by new ways of organizing learning, new forms of assessment and credentialing, different models of investment and funding, and a fit-for-purpose infrastructure.

We call this the *Learning Society.*

Educational "Climate Change" is Creating an Endless Demand for New Forms of Learning

Climate change is coming to education. Some have likened the pressures of globalization, technology and demography to a "perfect storm". But after a storm, life tends to return to a state of normality.[1] This will not be the case: education is experiencing long-term and irreversible climate change that is radically changing the level and nature of the demand for learning.

Globalization and new patterns of working and living are increasing the demand for specialist skills and knowledge. But to be "knowledgeable" will no longer be good enough: a new set of 21st century skills, confidently credentialed, will also be essential to flourish. Many more people than ever before need to have advanced capabilities for critical thinking, collaboration, and problem-solving.

At the same time, the social, economic and environmental challenges of the 21st century demand citizens with a global perspective and the capacity and passion to engage with the world's problems both at home and abroad.

All societies—those with aging populations and those with youth bubbles—will require more people to be economically active throughout their lives. This demands not only a lifelong learning infrastructure but also a renewed and repurposed investment in the earliest years of learning. It's critical that those years provide strong foundations for future knowledge and instill a love of learning that will motivate people for the learning journey ahead.

Running Out of Steam: Diminishing Returns on Educational Investment and Reform

Education systems have done a good job of responding to society's demands for learning. However, even the highest-performing ones will never be able to meet the rising and changing global demand for learning.

1 This concept is adapted with great respect from PA Consulting (2009) "Escaping the Red Queen Effect: Succeeding in the New Economics of Higher Education." London: PA Consulting.

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Despite reform and investment, advanced education systems still fail too many people; they often reproduce inequality, and they are too inefficient. Because of their industrial scale, they also tend to crush disruptive innovations that would help solve some of their problems but that challenge the way that established education systems work. Decades after first attempting, many systems still struggle to adopt innovative practices that have emerged in community learning, informal adult education, work-based learning, and peer learning.

To meet the new global demand for learning, established education systems will have to change dramatically. They cannot continue to just improve incrementally. For established systems to play their full part, a new model of formal education is needed. We call it "Education 3.0."

Creating Education 3.0 will be difficult and not on its own sufficient. Formal education systems have long proved hard to reform from within. To meet the present challenge, schools, governments, societies, and learners must look elsewhere, too—to other sectors and around the world, often in unlikely places.

Early Signals of the *Learning Society*

New technologies increase possibilities for learning throughout life, have the potential to improve access, and intensify and spread the process of knowledge creation. Some do more than this: they enable the creation of communities of connected learners of all ages without regard for geography.

William Gibson was right: the future is here, it's just not widely distributed. We can now see emergent examples of the *Learning Society* in:

- Leading-edge learning practice, where innovation is cutting across the old divides of formal education and informal learning.
- Wider society, particularly in the adoption of new technologies. Examples include the rise of social networking, edutainment, the open source movement, and new trends in educational technologies.
- Disruptive innovations at the margins of established education systems and in extreme environments in the developing world.

These emergent innovations help us create a new vision of learning—learning as an activity not a place, where it is wide open to new people with new ideas. Learners "pulling" learning toward themselves rather than teachers "pushing". And learning systems that spread far beyond school and involve learners and parents as contributors as well as customers.

The time is now ripe to generate insights and learning from these innovations and consider how they can be used to inform the principles of a new, widespread *Learning Society*.

The Principles of the *Learning Society*

The principles that characterize the *Learning Society* are informed by the demands of the 21st century, by emergent innovations at the very leading edge, and by what we now know about how learning happens. The result is the following set of principles designed to meet society's new demands for learning **and** to realize the learning potential of every part of society and every part of the globe.

The *Learning Society*:

1. Engenders a culture of learning throughout life.
2. Aims to develop motivated, engaged learners who are prepared to conquer the unforeseen challenges of tomorrow as well as those of today.
3. Takes learning to the learner, seeing learning as an activity, not a place.
4. Believes that learning is for all, that no one should be excluded.
5. Recognizes that people learn differently, and strives to meet those needs.
6. Cultivates and embraces new learning providers, from the public, private, and NGO sectors.

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7. Develops new relationships and new networks between learners, providers (new and old), funders, and innovators.
8. Provides the universal infrastructure they need to succeed—still physical but increasingly virtual.
9. Supports systems of continuous innovation and feedback to develop knowledge of what works in which circumstances.

Working Together to Build the *Learning Society*

For too long, we have considered learning in isolation. In most countries, "Education" is a separate branch of government policy, and a separate activity from our daily lives.

Building the *Learning Society* means assembling a new coalition that can draw innovations from all sectors of society for the benefit of learners. It needs to mobilize new structures, new approaches, and new technology to deliver a new balance of skills to a lifelong learning population.

With this in mind, we make the following recommendations:

1. The *Learning Society* needs strong stewardship from a **new coalition** of governments, businesses, NGOs, and social investors who together bring the legitimacy, innovation, and resources that can make it a reality. The membership of this movement will vary, but it must deliver a clear articulation of its collective purpose and goals, and be open to an ever-expanding group of supporters, innovators, and funders.
2. *Learning Societies* need **a mixture of learning providers**—public, private, and third sector organizations and individuals who provide content, learning opportunities, and instruction to learners of all ages. To drive innovation, a *Learning Society* must actively encourage new entrants and not allow monopolies to persist.
3. Telecom providers (supported by governments) must help ensure access to a **shared learning infrastructure**—the roads and rails of the *Learning Society*. Making learning easy to access is fundamental to encouraging uptake, and means providing seamless, high-quality, low-cost (and at times no-cost) connectivity at home, at work, on the move, and in public spaces. Governments and the international community should prioritize investment in backbone infrastructure and intelligently regulate to drive access to low-cost, high-bandwidth Internet connectivity. Service providers should work with existing educational institutions and community groups to develop new delivery models that ensure access for all.
4. All groups must be prepared to **invest more time and money** in learning. Employers and unions should encourage their staff, their members, and their communities to take advantage of learning opportunities, and provide funding and rewards for doing so. Individuals must be prepared to bear their share of the burden for learning that has private (personal and professional) benefits.
5. The mixed provision of lifelong learning demands **new funding models** to make it easier to invest in learning. Investing in learning should be tax-efficient for individuals and their employers. For those out of work, funds should be created to incentivize learning. Governments should use regulation and taxation to encourage financial institutions to develop new financial instruments that allow learners to access opportunities when they need them most. They can do this by lowering cost, reducing risk, and smoothing repayments.
6. International organizations and social investors should lead governments and businesses in a long-term process to develop **legitimate, standard credentialing systems** that offer the prospect of portable qualifications that are recognized around the world.
7. Credentials drive assessment and assessment drives learning by articulating what society values. Most current assessments measure the wrong things in the wrong way. **Global assessment regimes must be reformed** to support the *Learning Society*, rewarding skill development, as well as content knowledge, and restructuring themselves around stage, not age.

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8. Rapid progress and the avoidance of duplication require the development of a **standard framework for assessing the impact of innovations in learning.** This must be supported by substantial funding for rigorous independent evaluation of innovations and for the recording and dissemination of the results.

9. Without ongoing guidance from a teacher or professor, there is a danger that learners can become lost in the *Learning Society*. Existing models may not be able to bear the weight of lifelong relationships with learners, so the *Learning Society* must create **new ways of managing lifelong support relationships with the learner.** Learners should have access to an independent, trusted mentor to whom they can turn for advice, support, encouragement and information. This must, in turn, be supported by a private, permanent, secure, and independent storage space for recording achievement, much like a health record.

10. The *Learning Society* must **fund a diversity of innovators**—from spreading known models to experimental work on high-risk and high-reward projects. Governments should put considerable effort into developing learning systems as "good adopters"—proving porous to new ideas, hospitable to innovative individuals, and giving credit where it is due.

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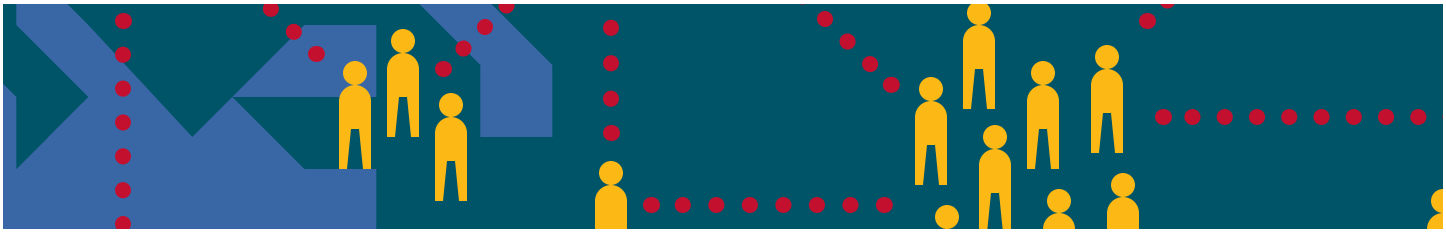

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The research that underpins the report draws from six main sources:

- *Learning from the Extremes,* by Charles Leadbeater and Annika Wong, published by Cisco, January, 2010.
- "Mapping the Current and Future Landscapes of Technology in Education", by Stephen Breslin, Gavin Dykes, Lizbeth Goodman, Celine Llewellyn-Jones, Will Pearson, and Dan Sutch (all Futurelab), unpublished study for Cisco, March 2009.
- "The Changing Role of Technology and Media in Learning", by Human Capital, unpublished study for Cisco, March 2009.
- "Challenges for Higher Education" by Alan Wilson, unpublished study for Cisco, March 2009.
- Independent research conducted by Philippe Schneider.
- Independent research conducted by Richard Halkett.

The shape and content of the final report was guided by a review process involving leading experts from around the world from the fields of education, children's services, business, policy, and social innovation:

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Professor Yong Zhao — University Distinguished Professor, Educational Psychology; Educational Technology Director, Center for Teaching; and Technology Director, U.S.-China Center for Research on Educational Excellence, College of Education, Michigan State University, United States.

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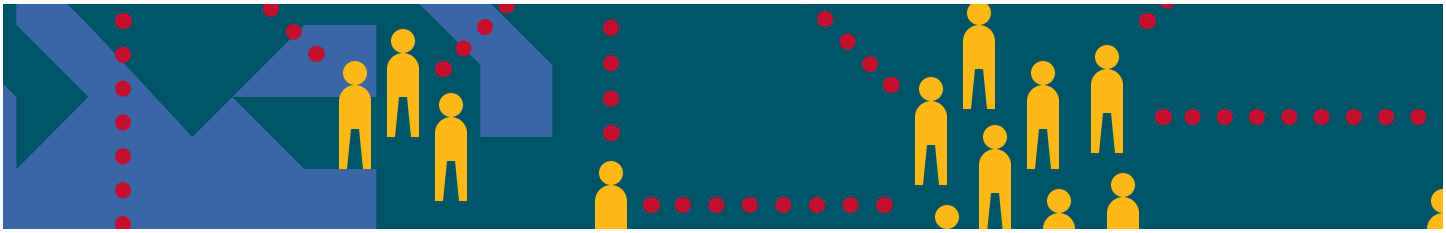

Part I:
From Education Systems to the *Learning Society*

Learning is Important, and Increasingly So

Learning has forever been fundamental to human progress. All around the world, learning is linked to higher wages, personal fulfillment, better health, and longer lives.

Those with higher levels of education earn more, work in more pleasant jobs, and are more productive.[2] When in work, people who are more educated are better-rewarded with fringe benefits like pensions, vacation, and healthcare, and they experience better health throughout their longer lives.[3] In older age, learning activity can protect against cognitive decline.[4]

However, the benefits of learning are not just individual, but societal. Learning creates wealth, builds resilience to economic shocks and technological change, reduces crime, and lowers welfare expenditure.

Higher levels of education lead to greater schooling for the next generation, improved child health, lower crime rates, higher social cohesion, informed consumers, and informed political and democratic choices.[5] There is also some evidence that schooling is positively associated with the diffusion of new technologies throughout society.[6]

The New Morality of Learning

The world of education is experiencing its own particular form of "climate change" that makes learning more important than ever.[7]

As the world becomes more interdependent and technological change accelerates, innovation, increased productivity, and improved learning migrate from being merely important to being mission-critical.

Moreover, society is likely to find highly skilled, innovative people even more important in the future as we wrestle with the seemingly intractable social and environmental challenges of the 21st century: sustainability, security, demographic change, migration, and global inequality. The world community needs to create new technologies and new methods of social organization that will alter behavior and spread good ideas.[8]

As a consequence, there is a new morality of learning. Whereas in the past, learning was competitive, coercive, and paternalistic, the new ethic of learning is collaborative, global, and universal. It is collaborative in that learners need to work with each other. It is global in the sense that every society has a contribution to make and a responsibility to each other. And it is universal because every part of a society must invest in learning and participate.

2 Hutton, W. and Schneider, P. (2008) "The failure of market failure." London: NESTA.

3 A full taxonomy of these benefits is provided by Wolfe, B. and Haveman, R. (2002) Social and nonmarket benefits from education in an advanced economy. In: Kodrzycki, Y. (Ed.) (2002) "Education in the 21st Century: Meeting the Challenges of a Changing World." Boston: Federal Reserve Bank of Boston.

4 Beddington, J. et al. (2008) The Mental Wealth of Nations. *Nature.* 455(7216), pp.1057-60.

5 Wolfe, B. and Haveman, R. (2002) Social and nonmarket benefits from education in an advanced economy. In: Kodrzycki, Y. (Ed.) (2002) "Education in the 21st Century: Meeting the Challenges of a Changing World." Boston: Federal Reserve Bank of Boston.

6 Nelson, R. and Phelps, E. (1966) Investment in Humans, Technological Diffusion, and Economic Growth. *American Economic Review.* 56(2), pp.69-70. In: Wykstra, R. (Ed.) (1971) "Human Capital Formation and Manpower Development." New York: Free Press; also Mansfield, E. (1982) "Technology Transfer, Productivity and Economic Policy." New York: Norton; also Wozniak, G. (1987) Human Capital, Information, and the Early Adoption of New Technology. *Journal of Human Resources.* 22(1), pp.101-112; also Foster, A.D. and Rosenzweig, M.R. (1996) Technical Change and Human Capital Returns and Investments: Evidence from the Green Revolution. *American Economic Review.* 86(4), pp.931-953.

7 This concept is adapted with great respect from PA Consulting (2009) "Escaping the Red Queen Effect: Succeeding in the New Economics of Higher Education." London: PA Consulting.

8 NESTA (2007) "Innovation in response to social challenges." London: NESTA.

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Local Challenges, but a Global Journey

Existing education systems are importantly different around the world, reflecting the distinctive challenges of different regions. Countries need to think differently about their route to economic success and social cohesion.

Some societies are building new identities from fragmented ethnic groups; others are striving to develop an international outlook from a homogenous population. Learning will be critical to all.

Looking to economic competiveness, the challenge is often subnational, and different solutions will be needed for different regions.[9] Those in the process of playing catch-up often do better by absorbing the latest technologies and industrial processes available from elsewhere rather than innovating themselves.[10] Here, investment in primary and secondary education will have a greater impact than investment in cutting-edge research. However, for economically advanced regions, innovation will be the main source of growth, so higher education and research become more important.[11]

Additional challenges combine to ensure that no two states face identical circumstances. Small states normally lack the critical mass of human or natural resources, and also have fewer universities, researchers, and companies; they therefore rely more on international flows of people, trade, and ideas. Those endowed with rich natural resources frequently struggle to draw people away from extractive industries and to develop a standalone, knowledge-based economy for when those resources run out. Perhaps most dangerously, many countries are trapped somewhere in the middle, with versions of all of these challenges and little immediate pressure to meet any of them.

However, as the world becomes more interconnected, regions and countries become less isolated and more interdependent and reliant on each other for people, resources, and ideas. One of the greatest risks to our collective success is that parts of the world or parts of a society will underinvest in learning, will fail to take responsibility for learning, and will fail to create a pervasive culture of learning—to the detriment of all.

Bigger is Not Better

Over the past decade, the world has "schoolified". In countries with large education systems, there has been a drive to improve test scores through enforcing standards and accountability; pushed from system leaders to school leaders and into the classroom. In countries that lag educationally, the goal has been to deliver universal education—to get all children into a school building. On their own terms, these efforts have been relatively successful.

In the face of a rising and changing demand for learning, one conclusion is that formal education systems need to become much bigger and more powerful. We disagree.

Globally, the growth in the demand for learning has already outstripped the ability of traditional education to supply it—and this is only the beginning. Ten million teachers will be needed to meet estimated demand in China, India, Indonesia, and Nigeria alone, and each new school will need buildings and infrastructure.[12]

Developed economies bring their own problems. In most, teaching is no longer a high-status, high-earning profession, and salaries inevitably cannot keep up with the accelerating private sector. In these societies, high-quality teachers are in short supply, particularly in subjects like science and mathematics.

And putting children in school doesn't mean that they're necessarily learning. Measures of educational achievement are highly correlated with economic growth, but just spending more time in school does not necessarily increase that achievement:

> *Increasing the average number of years of schooling attained by the labor force boosts the economy only when increased levels of school attainment also boost cognitive skills. In other words, it is not enough simply to spend more time in school; something has to be learned there.*[13]

9 Acemoglu, D., Aghion, P. and Zilibotti, F. (2006) Distance to Frontier, Selection and Economic Growth. *Journal of the European Economic Association.* 4, pp.37-74; see also Aghion, P., Boustan, L., Hoxby, C. and Vandenbussche, J. (2009) "The Causal Impact of Education on Economic Growth: Evidence from U.S." Washington, DC: Brookings Institute. Interestingly, this finding applies not only to countries but also to regions within countries, in particular, the performance of different U.S. states. Aghion et al. show that an additional thousand dollars per person in research education spending raises an at-the-frontier state's annual growth rate by 0.269 percentage points but raises a far-from-the-frontier state's growth rate by only 0.093 percentage points. On the other hand, an additional thousand dollars per person on two-year college type education reduces an at-the-frontier state growth rate by 0.055 percentage points, but raises a far-from-the-frontier state's growth rate by over 0.474 percentage points.

10 Cohen, W. and Levinthal, D. (1990) Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly.* Vol. 35, No. 1, Special Issue: Technology, Organizations, and Innovation (March 1990), pp.128-152.

11 Acemoglu, D., Aghion, P. and Zilibotti, F. (2006) Distance to Frontier, Selection and Economic Growth. *Journal of the European Economic Association.* 4, pp.37-74; see also Aghion, P., Boustan, L., Hoxby, C. and Vandenbussche, J. (2009) "The Causal Impact of Education on Economic Growth: Evidence from U.S." Washington, DC: Brookings Institute.

12 Analysis based upon data in UNESCO Institute for Statistics (2005) "Global Education Digest 2005." Paris: UNESCO.

13 Hanushek, E. et al. (2008) Education and Economic Growth. *Education Next.* 8(2), p.64.

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Even if finding teachers, building schools, and teaching students more effectively than ever before were somehow suddenly possible, it would still not be enough. Society's demands for labor and citizens for the next ten years must be met either by people who have already entered educational systems or who have left them behind and entered the workforce.

It is inevitable, therefore, that traditional, formal education systems will deliver a relatively smaller proportion of our global requirements for learning than they do today. Whilst continuing to pursue improvement, we must look elsewhere for the answers to the hardest educational questions of our time.

A New Solution to a New Problem

We need to change the question. Rather than "How can we get people into school?" we need to ask "How can we enable people to learn most effectively throughout their lives?"

Education systems will have a role to play, but only if they are radically reformed in ways that enable them to interact with and shape the *Learning Society* that surrounds them. A *Learning Society* that:

1. Engenders a culture of learning throughout life.
2. Aims to develop motivated, engaged learners who are prepared to conquer the challenges of tomorrow as well as those of today.
3. Takes learning to the learner, seeing learning as an activity, not a place.
4. Believes that learning is for all, that no one should be excluded.
5. Recognizes that people learn differently, and strives to meet those needs.
6. Cultivates and embraces new educational providers, from the public, private, and NGO sectors.
7. Develops new relationships and new networks between learners, providers (new and old), funders, and innovators.
8. Provides the infrastructure they need to succeed—still physical but increasingly virtual.
9. Supports systems of continuous innovation and feedback to develop knowledge of what works in which circumstances.

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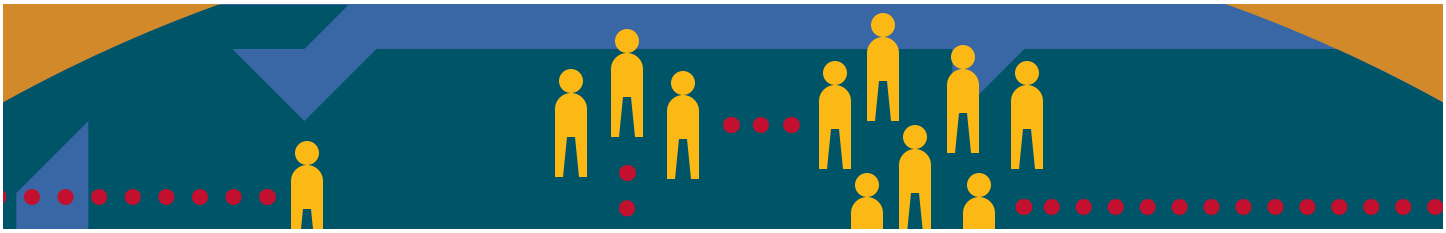

Part II:
Climate Change in Education[14]

Climate change is coming to education. Some have likened the pressures of globalization, technology and demography to a "perfect storm". But after a storm, life tends to return to a state of normalcy. This will not be the case. As a result of globalization, accelerating technological change and massive demographic shifts, education is experiencing long-term and irreversible "climate change" that is radically changing the level and nature of the demand for learning.

Building the *Learning Society* is a response to these long-term drivers of change. It is a way of organizing learning that deals with these new realities and better meets our global and local needs for learning.

Globalization and Learning

The world is more interdependent than ever before. As a proportion of global GDP, trade between economies has risen from 40.1 percent in 1990, to over 60 percent today.[15]

The IT revolution, along with improved transportation—containerization, more fuel-efficient ships and planes—has integrated world markets and brought new, lower-cost producers into the world market, reducing prices but also the profit margins of producers.

Increasing Returns to Learning: No Prizes for Second Place

Globalization also means that the labor needed to manufacture a product can now be bought from almost anywhere. Now, jobs are transferred from one side of the world to the other with remarkable speed.[16]

With this "death of distance",[17] it is increasingly difficult to make a living by being second best. Consumers and researchers are able to look across the world for the best product. Whereas in the past, education systems could produce people who were "good enough", or research that met local needs, globalization demands deeper knowledge and broader skills.

Globalization has created more mobile international labor markets for both those with learning credentials and those without. People with learning credentials (portable qualifications that are valued and recognized around the world) have higher status and more opportunities as a result. People without such learning credentials do not. They tend to enter more informal labor markets, with lower status and lower pay.

A Need for Cultural Understanding

The advance of globalization demands that we learn more about the world and our place in it. On the one hand, global companies, international teams, and increased mobility mean that cultural understanding will be more important than ever before.

However, this correspondingly means that learning about your own society's core values and cultural practices becomes increasingly valuable. Learners will need to learn about "the nature of one's work and the needs and desires of the society in which one lives",[18] Learners need to understand and develop their own identity, but to situate themselves in an ever-expanding global commonwealth.

14 This title and concept is adapted with great respect from PA Consulting (2009) "Escaping the Red Queen Effect: Succeeding in the New Economics of Higher Education." London: PA Consulting.

15 World Bank Development Indicators, 2009.

16 Berger, S. (2005) "How We Compete: What Companies Around the World Are Doing to Make it in Today's Global Economy." New York: Broadway Business. As an example, U.S. investment in what economists call "intangibles" has more than doubled over the last 50 years — tribute to the growing importance of brain rather than brawn in delivering comparative advantage (Corrado, C., Sichel, D. and Hulten, C. (2006) "Intangible Capital and Economic Growth." FEDS Working Paper No. 2006-24. Washington, DC: Federal Reserve Board.

17 Cairncross, F. (2001) "The Death of Distance: How the Communications Revolution Will Change Our Lives." Cambridge, MA: Harvard Business School Press.

18 Gardner, H. (2006) "Five Minds for the Future." Cambridge, MA: Harvard Business School Press.

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Learning Goes Global

Data from UNESCO indicate that students are increasingly mobile, with 2.7 million international students in 2006 (up from 2.5 million in 2004).[19] Many of them are studying for degrees in English-speaking countries such as the United States, the United Kingdom, and Australia, but there is now increasing global competition from regional hubs such as Malaysia, Singapore, and South Africa. Universities are increasingly delivering distance learning and many established physical universities have set up branch campuses overseas.

This has altered the level and nature of demand for learning. Higher education is a growth industry in emerging economies, and given the size of the populations in (for example) India and China, even low-participation rates create huge numbers of graduates and large new markets for learning providers.

This competition, in turn, increases the pressure on developed economies with aging populations to continue to produce large numbers of graduates (and post-graduates). At the same time, rising graduate unemployment in nations such as China points to the need for more differentiated forms of niche learning outside the traditional academic degree.

Technological Change Demands More and Different Skills

Technological change is exponential, not linear.[20] Powering this change are "general-purpose technologies" such as the printing press, the railway, and biotechnology. These innovations reach beyond the bounds of one industry to transform many sectors and to profoundly alter the economic and social fabric of the society in which they are introduced.[21]

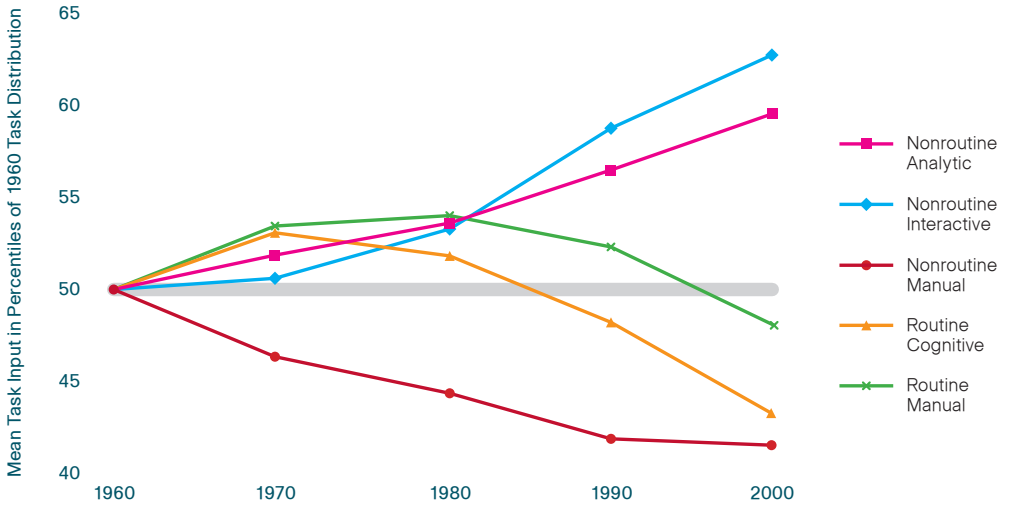
The frequency of these innovations is increasing: there were only two such technologies in the 18th century, four in the 19th, and seven in the 20th. Already there has been one (nanotechnology) in this decade, and it is not implausible that the 21st century will see a further doubling.[22]

Changing Demand for Skills

Technology has cut the demand for unskilled jobs like clerks, telephone operators, and computer programmers, jobs that are governed by deductive rules and easily recognizable patterns, and are therefore amenable to automation. By contrast, it has raised the demand for high-skilled jobs—software engineers and management consultants,[23] or jobs which cannot be easily replaced by technology, such as care workers.

Figure 1 uses four decades of data to show how the contribution of certain skills to economic input has changed. Notably, nonroutine skills are in significantly higher demand than routine skills.

Figure 1: Economy-Wide Measures of Routine and Nonroutine Task Input, 1960–2000



Source: Updated chart from R. Murnane in a private communication (2010). Based on Autor, D., Levy, F. and Murnane, R. (2001) "The Skill Content of Recent Technological Change: An Empirical Exploration." NBER Working Paper 8337. Boston, MA: National Bureau of Economic Research.

19 Analysis based on data from UNESCO Institute for Statistics (2006) "Global Education Digest 2006." Paris: UNESCO.

20 Looking at world GDP over the very long run shows just how explosive technological and economic progress has been. It took 15,000 years for the $90 per-person per-annum hunter-gatherer economy to crawl to the $180 per-person economy of early industrial Europe in 1750; then growth began to pull away and ascend upwards in a sharp, almost perpendicular line. Global GDP person exploded 37-fold in the blink of 250 years to today's level of $6,600 (De Long, J. Bradford (1998) "Estimating World GDP, One Million B.C.-Present." Working Paper. Berkeley: University of California, Berkeley.)

21 Standard economic measures grossly undervalue the impact of these technologies. They not only make production cheaper and more efficient, but, more fundamentally, make possible wholly new forms of production, some of which are better at fulfilling needs we have, and some of which fulfil needs that are as yet unimaginable (Lipsey, R., Carlaw, K. and Bekar, C. (2006) "Economic Transformations: General Purpose Technologies and Long Term Economic Growth." Oxford: Oxford University Press.)

22 Lipsey, R., Carlaw, K. and Bekar, C. (2006) "Economic Transformations: General Purpose Technologies and Long Term Economic Growth." Oxford: Oxford University Press; see also Kurzweil, R. (2005) "The Singularity is Near: When Humans Transcend Biology." New York: Viking Press.

23 Levy, F. and Murnane, R. (2004) "The New Division of Labor: How Computers Are Creating the Next Job Market." Princeton: Princeton University Press; also Goos, M. and Manning, A. (2007) Lousy and Lovely Jobs: The Rising Polarization of Work in Britain. *The Review of Economics and Statistics.* 89(1), p.118-133.

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A Virtuous or Vicious Circle: The Skilled Get Richer

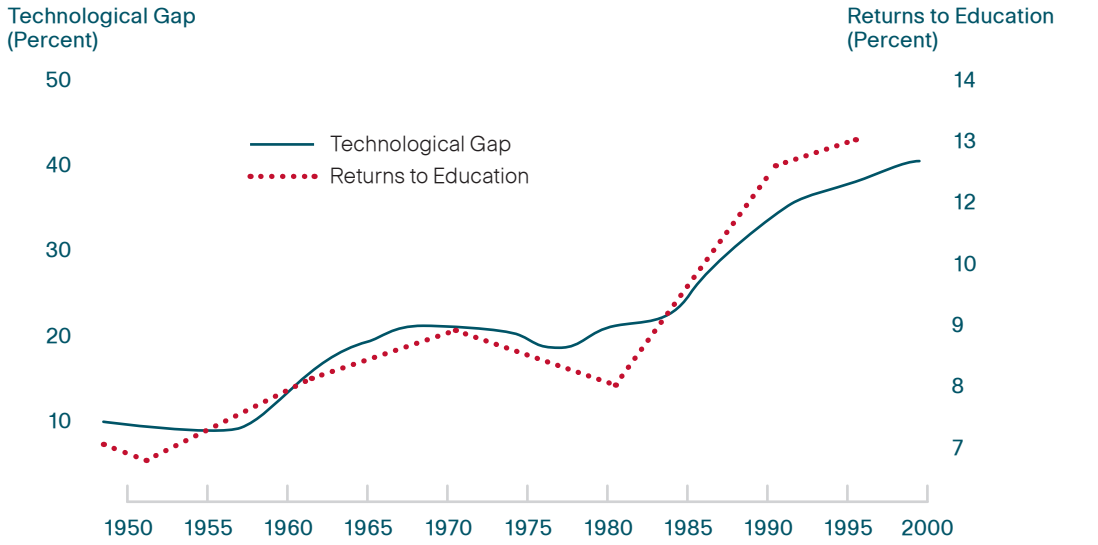
This intensification of technological innovation increases the value of learning, and increases the return on investment in it.

Figure 2 shows that in 1950, the "technological gap" (the gap between productivity of new and average practice in equipment and software) was small, necessitating very little up-skilling when a new technology arrived. However, by 2000, the gap had increased to 40 percent, and in some sectors like communication, it was as high as 73.4 percent.[24] As a result, the economic returns of learning also increased, rewarding those with higher skills and progressively disadvantaging those without.

24 Cummins, J. and Violante, G. (2002) Investment-Specific Technical Change in the U.S. (1947-2000): Measurement and Macroeconomic Consequences. *Review of Economic Dynamics.* 5(2), pp.243-284.

25 Gladwell, M. (2008) "Outliers: The Story of Success." Little, Brown and Company. See also Ericsson, K. A., Prietuala, M. J. and Cokely, E. T. The Making of an Expert. *Harvard Business Review.* July-August 2007.

Figure 2: The Widening Technological Gap and Increasing Returns to Education



From: Cummins, J. and Violante, G. (2002) Investment-Specific Technical Change in the United States (1947-2000): Measurement and Macroeconomic Consequences. "Review of Economic Dynamics." 5(2): pp.243-284.

Technology has thus driven a new demand for learning in two ways: for those doing well to keep their skills up to date, and for those who are low-skilled to retrain or catch up.

The Need for a New Curriculum

Specialist Skills for All?

Globalization has increased the value and importance of advanced specialist skills and know-how. However, specialized skills and deep expertise take a long time to develop. In "Outliers", Malcolm Gladwell popularized and extended Anders Ericsson's finding that experts in many domains are united by having spent around 10,000 hours developing their outstanding skills.[25]

Technology can help overcome this by providing easier and faster access to sources of world-class expertise: the best thinkers, researchers, teachers, and experts in their field. With improved video and true collaboration technologies, distance learning and remote collaboration become much richer experiences.

But "learning" in these specialist subjects is about more than facts; it's about learning a discipline, too. Learning how to apply the scientific method is a life skill applicable to numerous situations that allows the learner to relate to specialists across the entire domain of science. Evidence-based social science is the same, and so is law. By teaching the underlying method, these "disciplines" reach across subjects to enable people to apply knowledge in real life and prepare them to confront problems that we cannot yet imagine.

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Traditionally, these sorts of skills have been taught as the capstone of an educational experience to a tiny proportion of the population, often in higher education institutions. We now need to envisage a world where they are more widely taught, and developed throughout life.

Learners at a younger age not only need to know some science, some history, some mathematics, but need to learn how to be a scientist, an historian, and a mathematician, and practice those disciplines. They also need to be aware of the importance of interdisciplinary collaboration, through which new disciplines and fields of knowledge emerge.

Navigating Knowledge is At Least As Important As Knowing Facts

New technology has increased the availability of information; more people have access to more information than ever before.

The continuous rise of the Internet means that value lies not in knowing a fact, but in knowing where to find knowledge, being able to critically distinguish between different sorts of evidence, knowing who can help you, and then being able to convey what you've found out.

In a powerful feedback loop, this explosion of knowledge has led to a large increase in the amount of knowledge that societies can generate. Commentators now talk in terms of the rapidly diminishing "half-life of knowledge":[26] in many fields this half-life is now measured in months rather than years.

A New Set of Skills

The citizens of the 21st century need to supplement their foundational skills and knowledge with a new set of skills that are in much higher demand than before. There is much debate about these "21st century skills", but although the exact categories may differ, these eight groupings are consistently identified:

1. Gathering, synthesizing, and analyzing information.
2. Working autonomously to a high standard with minimal supervision.
3. Leading other autonomous workers through influence.
4. Being creative and turning that creativity into action.
5. Thinking critically and asking the right questions.
6. Striving to understand others' perspectives and to understand the entirety of an issue.
7. Communicating effectively, often using technology.
8. Working ethically, firmly based in both your own society and the planet as a whole.

Alongside these cognitive skills, there is growing evidence of the importance of noncognitive skills or dispositions. Again there are many definitions of these skills, but one recent report from the Young Foundation suggests they should include:[27]

- Social intelligence.
- Emotional resilience.
- Enterprising behavior.
- Inner discipline.

These skills are important. Moving an individual from the 25th to the 75th percentile of the noncognitive skill distribution increases wages by about 10 percent for males and 40 percent for females,[28] while males who held leadership positions in high school earn up to 33 percent higher wages as adults.[29]

Noncognitive skills also have a very strong impact on educational achievement. For example, an increase in the noncognitive score from the 25th to the 75th percentile of its distribution is associated with a 30 percent increase in the probability of graduating from a four-year college.[30]

These skills do not replace the need for bodies of knowledge, for scholarship, and for mastery of disciplines and inter-disciplinarity, but they are now very much needed in combination with them.

26 Gonzalez, C. (2004) "The Role of Blended Learning in the World of Technology." Retrieved 10 December, 2004 from http://www.unt.edu/benchmarks/archives/2004/september04/eis.htm

27 Robert, Y. (2009) "GRIT: The Skills for Success and How They Are Grown." London: Young Foundation.

28 Heckman, J., Stixrud, J. and Urzua, S. (2006) The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics.* (24), pp.411-482.

29 Kuhn, P. and Weinberger, C. (2005) Leadership Skills and Wages. *Journal of Labor Economics.* 23(3), pp.395-436.

30 Heckman, J., Stixrud, J. and Urzua, S. (2006) The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics.* (24), pp.411-482.

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Demographic Change is Driving a Renewed Need for Lifelong Learning

Many countries have aging populations. Their median age is rising (and in many cases is already over the age of 50, as Figure 3 shows), and they have more people of retirement age than school age.

Societies that are aging face an increasing dependency ratio: a greater number of older people will be relying on a smaller number of younger people to drive the economy and deliver social services, thus slowing future economic growth. Indeed, without significant change, the fiscal costs of aging, including various entitlements from healthcare to pensions, will be ten times the cost of the recent bailout of the financial system.[31]

Figure 3: Countries Whose Median Age is Projected to be 50 or Over in 2050*

Taiwan	56.3	Hong Kong, SAR	54.0	Armenia	52.3
Japan	56.2	Ukraine	54.0	Croatia	52.1
Bulgaria	55.9	Romania	53.9	Cuba	52.0
South Korea	55.5	Slovakia	53.9	Germany	51.8
Slovenia	55.3	Latvia	53.8	Belarus	51.7
Czech Republic	55.0	Italy	53.5	Hungary	51.2
Poland	54.4	Greece	53.3	Portugal	51.1
Singapore	54.3	Lithuania	52.8	Austria	50.9
Spain	54.2	Bosnia & Herzegovina	52.7	Georgia	50.2

* Excludes countries with populations of less than 1 million.

From: Howe, N. and Jackson, R. (2008) "The Graying of the Great Powers: Demography and Geopolitics in the 21st Century." Washington, DC: CSIS. Original source: "World Population Prospects." (UN, 2007); and "Population Projections for Taiwan Area, 2006–2051." Taipei: Council for Economic Planning and Development, Taiwan. Available at: http://www.cepd.gov.tw/encontent

However, not all areas of the world are aging. "Youth bulges" exist in parts of Africa and the Middle East, and areas ravaged by HIV-AIDS now demonstrate hourglass-shaped populations, with large numbers of young and old, and a very small number of productive workers (including teachers) in the middle.

Retaining and Retraining

Even today, it is estimated that in the United States, employees have held over ten jobs by the time they are 42, and that the vast majority of jobs are held for less than five years.[32] These numbers appear to be increasing.

Therefore, higher participation rates in the workforce are not possible without a concomitant investment in a lifelong learning infrastructure that enables people to re-enter the labor market after a prolonged absence, or retrain for industries that did not even exist when they left school. Recognizing this, it is especially important that employers play a more substantial and active role in creating employment practices and opportunities that support a culture of learning.

31 Blanchard, O. (2009) Sustaining a Global Recovery. *Finance & Development.* Vol.46, No.3.

32 Results from United States Bureau of Labor Statistics (2008) "National Longitudinal Survey of Youth 1979." Washington, DC: BLS.

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Increasing Workforce Participation

In some countries, immigration is part of the answer, even if it is politically controversial.[33] However, increasing participation in the workforce is also a necessity, which means a greater number of older people and women will need to work. Currently, only about 40 percent of 55 to 64 year olds work in Europe.[34] In Asia, only between 50 and 60 percent of women work, with the figure at 40 percent in India. The estimated cost of gender inequality in the workplace worldwide is between $42 billion and $45 billion each year.[35]

Increasing the numbers of older people and women in the workforce is not easy, and there is no single solution. It requires cultural and attitudinal change by employers and potential employees alike, as well as legislative and regulatory changes to pensions, employment law, and welfare benefits. In addition, it certainly requires greater access to schooling at an early age, and a transformation in lifelong learning opportunities.

Learning for All

In summary, an enlarged and more diverse workforce in the future requires lifelong learners with strong basic skills, a love of learning, an ability to apply that to new areas, and a broad base from which to build towards whatever new challenges are thrown at them.

An Endless Demand for New Forms of Learning

As a consequence of this "climate change" in education, five types of demand have emerged:

1. Demand from countries that have established formal education systems but are lagging behind and want to catch up.
2. Demand from those countries that are struggling to provide even the basics of education and who need radical new solutions that avoid the costs of adopting the models used in the developing world.
3. Demand from those with educational systems that seem to be performing well on traditional metrics but who are experiencing diminishing returns on investment, and are struggling to help people develop the skills most important in the coming century.
4. A global need for improved lifelong learning opportunities.
5. Latent demand for learning that is waiting to be unlocked. It is apparent in the rising numbers of people learning for leisure, taking lifelong learning seriously, and learning informally at home, in their communities, and online.

Meeting any one (or all five) of these demands means thinking beyond our traditional infrastructure of schools and universities.

A Pressing Need for Action

Climate change in education means that the demand for learning is increasing rapidly, and the nature of the demand is changing as new skills, knowledge, disciplines, and learning outcomes become more important. It also means that meeting these new pressures has become mission-critical to our collective success—for whole societies, and indeed, globally.

Positive change is not inevitable. Indeed, these forces could be disastrous for many individuals, communities, and societies, and even for the future sustainability of the planet. The critical factor is how we collectively respond to the changing world. We will only succeed if we develop and take advantage of innovations in learning for individual and collective benefit.

33 To maintain the size of the workforce in Italy, Japan, Germany and South Korea, the total number of immigrants would have to rise to a staggering 30-40 percent of the population by 2050. In France and the UK, immigrant population would have to rise from around 10 percent to 20-25 percent in 2050 (Magnus, G. (2008) "The Age of Aging: How Demographics are Changing the Global Economy and Our World." Hoboken, NJ: John Wiley & Sons.)

34 Magnus, G. (2008) "The Age of Aging: How Demographics are Changing the Global Economy and Our World." Hoboken, NJ: John Wiley & Sons.

35 UN Economic and Social Commission for Asia and the Pacific (2007) "Economic and Social Survey of Asia and the Pacific." Bangkok: UNESCAP.

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Part III:
Running Out of Steam: Diminishing Returns on Educational Investment and Reform

Significant Achievement Against Considerable Odds

The model of education prevalent across most of the world (and aspired to almost everywhere else) has done a remarkable job.

- From 1900 to 2000, estimated primary enrolment ratios increased from below 40 percent in many regions[36] to 85 percent globally.[37]
- In developing countries, literacy tripled from 25 percent to 75 percent, and average years of schooling more than doubled between 1960 and 1990, increasing from 2.1 to 4.4 years.[38]
- The number of students enrolled in secondary school increased tenfold in the past 50 years, roughly from 50 million to 500 million.[39]

Rather than decry the fact that education systems have not changed for over a century, we should observe their considerable success: in what other industry (other than perhaps bicycles and cars) has the standard model continued to be dominant for the past tumultuous century?

Those who place education at the center of future economic and social development must, by necessity, grant the current systems credit for the successes of the past century.

Diminishing Returns on Increasing Investment

However, the current education systems (even the high-performing ones) will never be able to meet the rising and challenging global demand for learning. Education systems are already failing to meet rising levels of demand:

- Approximately 759 million adults lack literacy skills today.[40]
- About 72 million children of primary school age are not currently enrolled in school, and official statistics may understate the problem by as much as 30%. "Business as usual" would leave 56 million children out of school by 2015. Nearly 71 million adolescents were out of school in 2007, almost one in five of the total age group.[41]
- Of school-age children who enter primary school in developing countries, more than one in four drops out before being able to read and write.[42]

Ten million new teachers will be needed to get an additional 260 million students into education systems in China, India, Indonesia, and Nigeria. Even if achieving that goal were desirable, it would be prohibitively expensive.[43]

To those in established systems, these challenges seem distant. But there is no room for complacency. Existing education systems systematically fail large groups of society and reproduce many of the inequalities and disadvantages that have hindered our social and economic progress.[44]

36 Except northwestern Europe, North America, and Anglophone regions of the Pacific (where the ratio was 72 percent); see Cohen, J. and Bloom, D. (2005) Cultivating Minds. *Finance and Development.* 42(2).

37 Cohen, J. and Bloom, D. (2005) Cultivating Minds. *Finance and Development.* 42(2). Note that the 1900 figure is an estimated Gross Enrolment Ratio, whereas the 2000 figure is a more accurate Net Enrolment Ratio — so the achievement is all the more remarkable.

38 Bloom, D. and Cohen, J. (2002) "Education for All: An Unfinished Revolution." Dædalus (Summer). Cambridge, MA: MIT Press.

39 Bloom, D. and Cohen, J. (2002) "Education for All: An Unfinished Revolution." Dædalus (Summer). Cambridge, MA: MIT Press.

40 UNESCO (2010) "Education For All Global Monitoring Report: Reaching the Marginalized." UNESCO.

41 UNESCO (2010) "Education For All Global Monitoring Report: Reaching the Marginalized." UNESCO.

42 Cohen, J. and Bloom, D. (2005) Cultivating Minds. *Finance and Development.* 42(2).

43 Analysis based upon data in UNESCO Institute for Statistics (2005) "Global Education Digest 2005." Paris: UNESCO.

44 Bowles, S., Gintis, H. and Osborne, M. (Eds) (2005) "Unequal Chances: Family Background and Economic Success." Princeton, NJ: Princeton University Press.

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When the achievement of the most deprived children is examined in isolation, the true depth of these failings is exposed. In the United States, only 20 percent of children from low-income families achieve good grades when they leave school compared to a national average of 50 percent. There remains a large, persistent gap in achievement between white students and black and Latino students. So large, in fact, that closing it would have boosted output by between $310 billion and $525 billion in 2008, or 2 to 4 percent of GDP.[45] In Mexico, 85 percent of the students from indigenous communities scored level 0 in the OECD PISA tests in 2006, and none achieved higher than level 4 (out of 6).[46]

In many countries, student achievement is also greatly affected by social class. In Germany, Hungary, and Belgium, children from poor families systematically achieve fewer qualifications and at lower levels than children from richer families. Iceland, Hong Kong, and Russia, however, have more equitable systems, proving that such linkages are not inevitable.

Finally, continued investment along traditional lines is leading to diminishing returns: after rapid gains in the 1960s and 1970s, international test scores have been largely flat for a decade.

Tinkering Toward Utopia: Incremental Improvement is Insufficient[47]

Education systems were never designed and built to meet the new and endless global demand for learning. With incessant incremental reform, we are in danger of only breeding faster horses (in the words of Henry Ford), not thinking again so that we can invent the car.

It is no surprise that education systems have long proved hard to reform from within. As Clayton Christensen points out, schools have developed a highly interdependent architecture, which makes it very expensive to customize learning opportunities. Interdependencies, ranging from the physical layout of schools to the role of centralized assessment and curriculum decisions, imprison schools within an inflexible instructional mode.[48]

These interdependencies have emerged as a result of functional design and historical accretion. Processes have been modified, added, linked, and replaced over time that have often gone unnoticed by policymakers, teachers, students, and parents. The result is a rigidity that conspires against more radical reform.[49]

And, of course, education systems have developed conservative and resilient structures for a reason. Education is politically charged, and seen as too important to toy with. Its effects are hidden for decades, thwarting evidence-based analysis and generating unexpected outcomes.

The change that is now required is so radical that internal reform within the education sector will be insufficient. Changes to formal education must be paired with an entirely new approach to informal learning and to models that blend the two.

45 Auguste, B., Hancock, B. and Laboissière, M. (2009) The economic cost of the U.S. education gap. *The McKinsey Quarterly.* June 2009.

46 Guichard, S. (2005) "The education challenge in Mexico: delivering good quality education to all." Economics Department Working Papers, No. 447. Paris: OECD.

47 This title was adapted with great respect from the book "Tinkering Towards Utopia: A century of public school reform" by David Tyack and Larry Cuban (Harvard University Press, 1997).

48 Christensen, C., Horn, M. and Johnson, C. (2008) "Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns." New York: McGraw-Hill.

49 Christensen, C., Horn, M. and Johnson, C. (2008) "Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns." New York: McGraw-Hill.

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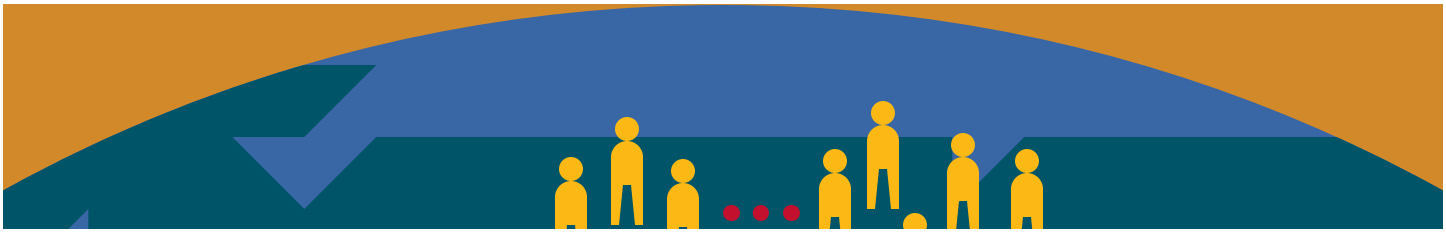

Part IV:
Building on New Knowledge About Learning

Over the last 50 years, significant advances in our understandings of learning from learning theory, learning science, and neuroscience mean that we should reconsider how we think about that most important component: the "learning moment".

New Understandings of How People Learn

> *Now, what I want is, Facts. Teach these boys and girls nothing but Facts. Facts alone are wanted in life. Plant nothing else, and root out everything else. You can only form the minds of reasoning animals upon Facts.*
>
> *– Headmaster Thomas Gradgrind in* Hard Times *by Charles Dickens*[50]

Even in the nineteenth century, Gradgrind was a caricature. Over recent decades, we have found just how far he was from enabling effective learning.

Developments in learning research now make clear that:

Learning is an active, social process

Learners learn new knowledge, principles, and concepts for themselves through dialogue and interaction with others, and through experimentation and risk-taking in safe environments.[51] Indeed, learners can only develop meaningful knowledge through their interactions with each other, with teachers (if any), and with their learning environment.

Motivation is critical to effective learning

Cognitive constructs of learning are incomplete if they disregard motivational and emotional aspects.[52] Levels of motivation and positive or negative emotional states can be critical determinants of effective learning.

Learners bring different knowledge to a new learning challenge

Learners are not empty vessels waiting to be filled with new ideas and facts, but have prior knowledge no matter how inaccurate or narrow. Effective learning builds on this, engages with it and explains why prior knowledge may be wrong, and progressively moves towards new understanding, step-by-step. This is why formative assessment is crucial: to establish what students know, to help them assess their understanding, and for them to monitor their progress.

Learners start from different places and follow different routes to the same learning outcome

There is no one right way to learn, no one-size-fits-all. Learners can try many different routes before they achieve their learning outcomes.

To be effective, knowledge should be discovered as an authentic, integrated whole

The world in which the learner needs to operate does not appear in the form of clearly differentiated subjects, but as a complex myriad of facts, problems, dimensions, and perceptions.[53] As a consequence, knowledge should not be divided into different subjects or compartments, but discovered as an integrated whole.[54]

50 Dickens, C. (1854) "Hard Times."

51 Seely Brown, J., Collins, A. and Duguid, P. (1989) Situated Cognition and the Culture of Learning. *Educational Researcher.* 18(1), pp.32-42; see also Ackerman, E. (1996) Perspective Taking and Object Construction: Two Keys to Learning. In: Kafai, Y. and Resnick, M. (Eds) (1996) "Constructionism in Practice: Designing, Thinking, and Learning in a Digital World." New Jersey: Lawrence Earbaum Associates. pp.25-35.

52 Boekaerts, M. (forthcoming) The crucial role of motivation and emotion in classroom learning. In: OECD/CERI (forthcoming) "Learning in the 21st Century." Paris: OECD/CERI.

53 Ackerman, E. (1996) Perspective Taking and Object Construction: Two Keys to Learning. In: Kafai, Y. and Resnick, M. (Eds) (1996) "Constructionism in Practice: Designing, Thinking, and Learning in a Digital World." New Jersey: Lawrence Earbaum Associates. pp.25-35.

54 McMahon, M. (1997) "Social Constructivism and the World Wide Web — A Paradigm for Learning." Working Paper. Perth: Edith Cowan University; Di Vesta, F.J. (1987) The Cognitive Movement and Education. In: Glover, J.A. and Ronning, R.R. (Eds) (1987) "Historical Foundations of Educational Psychology." New York: Plenum Press. pp.203-23.

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Optimum Periods for Different Types of Learning

Neuroscience is gleaning new insights into how learning happens that can inform educational practice. Although important, such findings should be treated with care: there's a long way between the neuron and the learning outcome. Assigning causality is akin to predicting macroeconomic outcomes from observing only microeconomic behavior.[55]

While neuroscience has disproved the existence of "critical periods" (which suggest that there are windows of opportunity during which interventions are likely to be most effective but which then slam shut irreversibly), it has signposted sensitive or optimum periods—periods that are apt for learning, but which are extensive in duration and can be exceeded without damage.[56] Given the current concentration of investment in schooling years, it is unsurprising that some 50 percent of the variance in inequality in lifetime earnings is estimated to be determined by age 18.[57]

Get Them While They're Young

Because later interventions are constrained to operate within the contours established by earlier experience, research has emphasized the gains from high-quality preschool interventions, especially for children born into poor or otherwise disadvantaged families.

It is important that people self-identify as learners when they are young, that they master the basic skills—such as literacy, numeracy, speaking skills, and ICT— and that they have the confidence to learn entirely new ones. Basic skills are the foundation of future teaching and learning and are strongly related to economic success later in life. Mastery of them gives confidence to the learner to then take on more advanced topics.[58] Indeed, the more we learn about these, the more important they appear. Recent research indicates that literacy and numeracy levels affect earnings in later life independently of cognitive ability.[59]

Preschool programs such as the Perry Preschool Program and the Carolina Abecedarian Project recorded estimated rates of return (the return per dollar of cost) of around 10 percent (substantially higher than the post-World War II return on U.S, stock market equity of 5.8 percent).[60] The more recent U.S.-wide Head Start program[61] is found to yield about 80 percent of the benefits of these initiatives but at about 60 percent of the cost.[62] Notably, however, life is a marathon not a sprint: these gains will disappear without reinforcement by quality learning opportunities at the primary and secondary level.

Older Does Mean Wiser

Age witnesses an increase in white matter volume in the brain, allowing for more efficient communication between different areas of the brain. Thus, any loss in flexibility and speed—reasoning, speed of thought, and spatial visualization are all shown to decline in healthy educated adults when they are in their 20s and 30s—is offset in part by gains in functionality.[63] The young brain may be able to absorb any incoming information sponge-like, but is much less able to distinguish between what is time-honored truth and proverbial sales-talk.[64]

55 Given its exciting implications, it is not surprising that neuroscience has captured the wider imagination, though the effect has sometimes been confusion rather than enlightenment, propagating false dogmas and unrealistic expectations. See Bruer, J. (1999) "The Myth of The First Three Years." New York: Free Press.

56 Huttenlocher, P. (2002) "Neural Plasticity: the effects of environment on the development of the cerebral cortex." Cambridge, MA: Harvard University Press; see also Battro, A., Fischer, K. and Lena, P. (2008) "The Educated Brain: Essays in Neuroeducation." Cambridge: Cambridge University Press.

57 Cunha, F. and Heckman, J. (2007) "The Evolution of Inequality, Heterogeneity and Uncertainty in Labor Earnings in the U.S. Economy." NBER Working Papers, No 13526. Washington, DC: NBER.

58 Educationalist and McKinsey Partner Sir Michael Barber has written extensively on this subject.

59 Centre for the Economics of Education (2007) "Research Brief CEE02-07: The Value of Basic Skills in the British Labour Market." London: CEE.

60 Heckman, J., Malofeeva, L., Pinto, R. and Savelyev, R. (2008) "The Effect of the Perry Preschool Program on Cognitive and Noncognitive Skills: Beyond Treatment Effects." Unpublished manuscript. Chicago: Department of Economics, University of Chicago; see also http://www.voxeu.org/index.php?q=node/1564

61 Head Start is a U.S.-wide pre-school program budgeted at nearly $7 billion that promotes school readiness for around 900,000 children who are below the federal poverty level, on public assistance or in foster care. It consists of a nine month full- or part-day program, providing not only pre-school education but also medical, dental and mental health care (including nutrition), and child development assistance and education for parents.

62 Deming, D. (2009) Early Childhood Intervention and Life-Cycle Skill Development Evidence from Head Start. *American Economic Journal: Applied Economics.* 2009, 1:3, pp.111-134.

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Technology on the Brain

The increasing time children spend online and using computers raises the possibility that this new environment may be wiring our brains in different ways.

A positive picture is not hard to paint. Multiple streams of information engaging the senses prime the brain for more rapid multitasking, scanning, and cognitive processing.[65] Even video games that have been the object of scorn in the popular media possess qualities beneficial to education, such as the presentation of scenarios, problem-solving, collaboration, and agency, as well as being intrinsically fun.[66]

Notably, motivation seems to increase with moderate risk-taking; however, this inclination tends to fall off when a task is perceived as educational. Fearful that failure will harm self-esteem and social standing, students generally prefer low levels of academic uncertainty and problems that are less demanding. This suggests that organizing learning activities as games with elements of pure chance can increase learners' motivation and encourage them to venture out where real achievement is possible without worrying about the consequences of failure.[67]

However, there is a subtle, perhaps less benign dimension to the new multimedia environment of Facebook and YouTube. A world of perpetual motion, a cut-and-paste culture where principles lose their internal integrity as they are voluminously linked to everything else and an undifferentiated, invisible buzz of information—these characteristics may crowd out opportunities for sustained imagination and reflection.[68]

These concerns, of course, are not a critique of technology per se; rather they reflect a particular way technology's empty vessel has been filled.

The Importance of Informal Learning

Learning is not confined to places dedicated to it like schools and universities. A vast range of inputs and influences affect the process of learning. Some of these influences work at the granular level of individual families, others at the general level of the economy, and still others in the community and neighborhood, both real and virtual.

Students spend only 14 percent of their time at school.[69] Indeed, learning is an inherent part of everyday life: each new experience, at home, at work, or during leisure time, may throw up a challenge, a problem to be solved, or a possibility of an improved future state.[70]

In Frank Coffield's words, informal learning is like an "iceberg"—its mass is vast and impressive but hidden from sight.[71] The tip that can be observed, however, suggests that participation in and demand for informal learning is high.

In the workplace, it is estimated that 70 percent of what people know about their jobs, they learn informally from the people they work with,[72] and that every hour of formal training is matched by four hours of informal learning.[73] The appetite for informal learning can be further seen in the ongoing popularity of museums, books, public television and radio, and simple human interaction. Today, the appetite for informal learning underpins the phenomenal growth of everything from Wikipedia[74] and Rosetta Stone[75] to Dr Kawashima's Brain Training[76] and Planet Science.[77]

This appetite not only exposes but also has the potential to ease some of the bottlenecks created by the mainstream. Informal learners can make activities as organized as they wish, invest as much or as little time and money as they want, and integrate them into their lives when it best suits them. It allows for authentic, hands-on experiences that contribute to more exciting and interesting processes of discovery.

63 Abilities based on accumulated knowledge, such as vocabulary and general information, carry on increasing until 60 (Salthouse, T. (2009) When does age-related cognitive decline begin? *Neurobiology of Aging.* 30(4), pp.507-14.

64 Altonji, J. and Williams, N. (2005) Do Wages Rise with Job Seniority? A Reassessment. *Industrial and Labor Relations Review.* 58 (April), pp.370-97; also Topel, R. (1991) Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority. *Journal of Political Economy.* 99 (February), pp.145-76.

65 Tapscott, D. (2008) "Grown Up Digital: How the Net Generation is Changing Your World." New York: McGraw-Hill Professional.

66 Gee, J.P. (2007) "What Video Games Have to Teach Us About Learning and Literacy." 2nd ed. Basingstoke: Palgrave Macmillan.

67 Howard-Jones, P. (2008) Play a Smart Game. *Times Education Supplement.* 15 August 2008. Available at: http://www.tes.co.uk/article.aspx?storycode=6000946

68 A similar critique was made in Greenfield, S. (2003) "Tomorrow's People: How 21st Century Technology is Changing the Way we Think and Feel." London: Allen Lane.

69 Bransford, J., Brown, A. and Cocking, R. (Eds) (1999) "How People Learn." Washington, DC: National Academy Press.

70 Marsick, V. and Watkins, K. (2001) Informal and Incidental Learning. *New directions for adult and continuing education.* 2001(89), pp.25-34.

71 Coffield, F. (2000) "The Necessity of Informal Learning." Bristol: The Policy Press.

72 Dobbs, K. (2000) Simple Moments of Learning. *Training.* 35, No.1 (January 2000), pp.52-58.

73 Stamps, D. (1998) Learning Ecologies. *Training.* 35, No.1 (January 1998), pp.32-38.

74 Wikipedia is now the 8th most popular site in the world, has around 280 million unique users and 300 million page-views a month, provides 10.7 million articles in 250 languages, and has around 100,000 active editors (yet only 22 employees).

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A Complement, not a Substitute

Informal learning is inappropriate for certain types of studies. Problems such as basic literacy and numeracy, resulting from years, even decades-long neglect, cannot hope to be solved with ad hoc programs lasting 20 hours, rather than say 100 or 150 hours.[78]

However, increasingly technology may itself be carrying out these functions. For instance, video games with their conveyor belt of rules and objectives can provide the kind of ordered, articulated progression associated with more traditional learning environments.[79]

The Power of Peers

It appears that who you know impacts what you know. Peer effects may improve educational outcomes through the increased willingness of peers to instruct one another, the psychological need to hold an identity and be compared favorably, and through the process of observational learning. Together, these dynamics mean that peer effects can exercise a very powerful influence.[80] A study in Texas found that a change of 1 point in peers' reading scores raises a student's own score between 0.15 and 0.4 points.[81]

But what Edmund Burke famously celebrated as "little platoons of family and friends" also has a dark side that may reinforce and reproduce disadvantage. Quite opposite to a virtuous circle of learning and reinforcement, in deprived settings the quest for recognition sometimes finds an outlet in a culture of opposition, a sense of "not for us", and pursuit of risky activities—academic cheating, drug taking, gang involvement, teenage sex, and truancy.[82]

Peer influences do not operate equally and symmetrically across characteristics and behaviors. Most obviously, they vary by age. Studies find an inverted-U relation, with effects increasing between childhood and early adolescence (with family the main influence before this time), reaching a peak sometime around age 14, and waning during high school and university years.

Using Research to Maximize Learning

These insights from learning theory, learning sciences, and neuroscience should inform all learning systems, but currently they do not. Most cannot be easily inserted into existing systems since they do not fit neatly into current institutional boundaries, policy prescriptions, or job descriptions. However, where these constraints are relaxed, innovation is occurring, and learning is taking on a radically new shape—with startling results.

75 Rosetta Stone, the language course providers, has also benefited from a perceived recent growth in the demand for life-long learning. Organic growth saw revenue increase from $25.4 million in 2004 to $209.4 million in 2008; a 69 percent CAGR. This is within a huge, and growing, worldwide language learning industry — in 2007 global consumer spend on language learning was estimated to be more than $83 billion.

76 In just over three years since launch in May 2005, the Brain Age/Brain Trainer series has sold over 26 million copies worldwide generating estimated revenue of over £200 million.

77 See http://www.planet-science.com/home.html

78 Woolcock, N. (2009) Adult literacy drive "almost worthless", says Anna Vignoles. The Times. 3 April 2009. Available at: http://www.timesonline.co.uk/tol/life_and_style/education/article6024931.ece

79 Sefton-Green, J. (2004) "Literature Review in Informal Learning with Technology Outside School." Futurelab Series, Report 7. Bristol: Futurelab.

80 Goethals, G., Winston, G. and Zimmerman, D. (1999) Students educating students: the emerging role of peer effects. In: Devlin, M. and Meyerson, J. (Eds) (2001) "Forum futures: Exploring the future of higher education." New York: Forum Publishing. pp.25-45.

81 Hoxby, C. (2000) "Peer Effects in the Classroom: Learning From Gender and Race Variation." NBER Working Paper No.7867. Washington, DC: NBER.

82 Carrell, S., Malmstrom, F. and West, J. (2008) Peer Effects in Academic Cheating. *Journal of Human Resources.* 43(1), pp.173-207; Gruber, J. (Ed.) (2001) "Risky Behavior Among Youths." Chicago: Chicago University Press.

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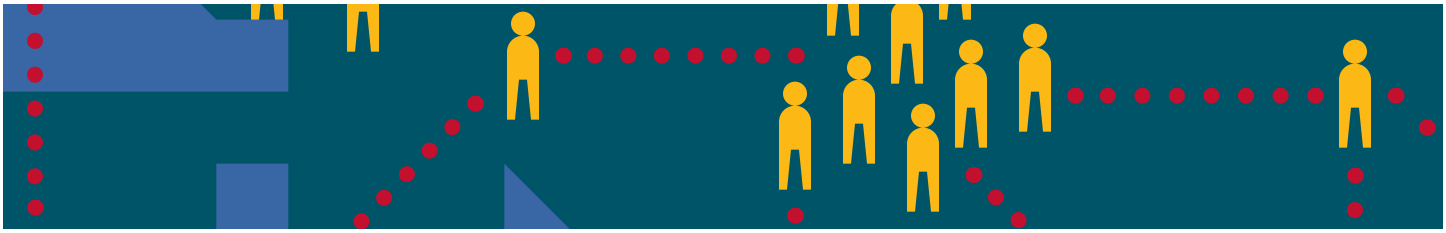

Part V:
Early Signals of the *Learning Society*

Largely unconstrained by the baggage of formal education systems, we see emergent examples of the *Learning Society* in society's use of technology, at the margins of established education systems, and in extreme environments in the developing world.

New Technologies are Lighting the Way to the *Learning Society*

New technologies are creating learning opportunities not just within schools but throughout the whole of society—at work, at home, in the community. Today's learners operate in a very different world compared to those of 50 years ago. They live in a fragmented and complex networked environment. Learning that was previously monopolized by large, formal education institutions is now distributed and delivered by a wide range of public, private, and nonprofit providers.[83]

Mass Collaboration and Social Networking

There has been a well-documented rise in online collaboration and social networking, especially (but not exclusively) among young people.[84]

For students, media and technology have become central to their lives outside school. Social networking sites and mobile phones dominate their media experience, alongside more traditional content media like television and video game consoles.

Teenagers are not interested in the technology of social networking as such. Instead they are drawn by the presence of their friends and peers, and the freedom offered by unmoderated, adult-free public spaces.

"Edutainment" and "Serious Games"

Simultaneous with the rise of the video gaming industry has been the rise of games that utilize advanced visualization and simulation technologies to achieve direct or indirect educational outcomes.

The value of this type of content was stated by Xerox PARC legend John Seely Brown and Douglas Thomas in their article for *Wired,* "You Play World of Warcraft? You're Hired!":

> *Becoming an effective World of Warcraft guild master amounts to a total-immersion course in leadership. A guild is a collection of players who come together to share knowledge, resources, and manpower. To run a large one, a guild master must be adept at many skills: attracting, evaluating, and recruiting new members; creating apprenticeship programs; orchestrating group strategy; and adjudicating disputes.*

They further assert that this informal learning is perhaps more powerful than formal training: "Once the experience is explicitly educational, it becomes about developing compartmentalized skills and loses its power to permeate the player's behavior patterns and worldview."[85]

83 It is not only traditional players from different sectors who are making educational offerings — entirely new entrants are making an appearance. Self-help videos are aggregated by *Wonder How To, Whyville* and *Expert Village,* and the *School of Everything* is connecting learners who want to learn with people who may never have thought of themselves as educators.

84 For some discussion of this process, see Benkler, Y. (2006) "The Wealth of Networks: How Social Production Transforms Markets and Freedom." New Haven: Yale University Press; or Shirky, C. (2008) "Here Comes Everybody: The Power of Organizing Without Organizations." London: Allen Lane.

85 Seely Brown, J. and Thomas, D. (2006) You Play World of Warcraft? You're Hired! *Wired.* 14(4).

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A World of "Free" Content

Recent years have seen a substantial rise in "free" software and free content—both unpriced and free to be modified and passed on. Most obvious has been the development of the open source software movement, particularly Linux.

Alongside this has been the emergence of "user-generated content" (UGC), manifest in the education space not just among learners, but also in creating content for teachers. Websites such as Yaca Paca! and Promethean Planet provide materials for teachers and learners that in the past would have been produced by traditional commercial publishers.

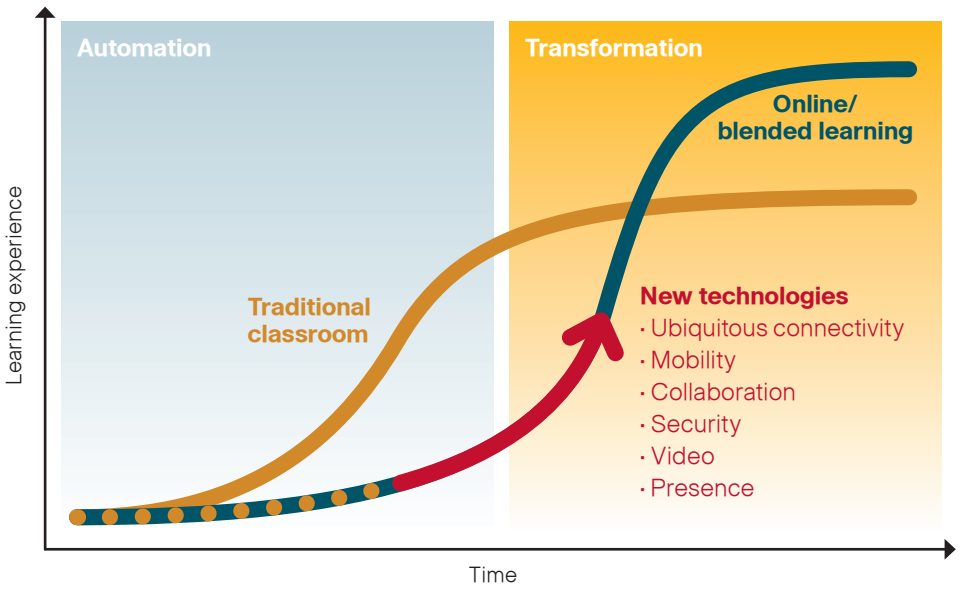
The "Open Access" movement has gained momentum over recent years with sites such as RepEc and Google Scholar representing real challenges to the revenue streams of academic publishers. And services such as Flickr, Photosynth, and Wikipedia collate and organize large quantities of "free" information given by individuals, to create knowledge and/or assets that are equivalent in value to those maintained by traditional, closed-source providers.

Learning Technology Moves from Automation to Transformation

To date, technology has made two main contributions to the education system. First (and most successfully), it has revolutionized back-office administration and the delivery of information. Second, it has made some impact on how teaching and learning happens, although this has been slower and so far less successful than the initial evangelists in the 1990s predicted.

Now, though, with global, high-speed Internet access and far greater availability of computers, some of what was always promised by educational technology may finally be coming to fruition. Figure 4 illustrates this transition, and its potential.

Figure 4: Technology is (Finally) Ripe for Education



High-definition videoconferencing like Cisco TelePresence™ delivers an in-room experience without the travel. Leading-edge pedagogical solutions such as Cisco WebEx® Training Center allow for constant interaction and assessment. Collaboration technologies like WebEx Connect provide ongoing, collaborative workspaces, and "presence" and community features permit some of the incidental conversation that is possible in a classroom setting.

The improved capacity and reliability of global networks mean that more of these features can be delivered more reliably to all areas of the world. Problems remain with cost, bandwidth, and integration between services, but the major technical and pedagogical hurdles have been overcome: it is only a matter of time and investment.

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Previously, technology has helped education systems automate. Now it looks as though it can (at long last) help them re-engineer and transform. Case studies from around the world show how learning technologies are helping pioneering educators respond to relentless pressures in society for new forms of learning that established education systems fail to provide:[86]

New ways of organizing learning: Technology is changing where and when learning takes place and also how it is supported and funded. New groups can form around learner interest or educational philosophy, rather than proximity, location, or age. In Indonesia, local companies and leading universities have partnered with Cisco Networking Academy to deliver the Industry Attachment Programme, providing strategic ICT advice to the companies and providing authentic learning experiences to the students.

New pedagogy: By removing learning from traditional classroom and school contexts, new models that use technology increasingly focus on participation and negotiation rather than direction and instruction. Students often act as mentors providing support to other students and to teachers, giving them new insight into the education system and greater independence as learners. Scotland has pioneered a games-based curriculum through its Consolarium initiative, with positive effects on student achievement, engagement, motivation, and attendance.

New relationships: Connectivity is supporting new learner-mentor relationships beyond classroom or school walls. Education is no longer the sole responsibility of teachers and parents, but of learners and a wider, distributed network of support. It has encouraged the formation of new communities of practice, fostered greater awareness and tolerance of diversity and of multiple perspectives, and engendered a growing sense of citizenship on a global scale. In India, Grameen is using voice-over-IP (VoIP) technology to pioneer the Grameen Peer Learning Network. This enables users (in a facilitated setting) to learn from each other as they implement the Progress out of Poverty Index.

A more sophisticated, integrated learning mix: Technology allows access to the learning that takes place outside traditional classroom settings, whether at home, within local communities, or within the global community. The learning can be formal or informal, reflecting either standard curricula or learning that is initiated by the interests and enthusiasms of the learners themselves. In the United Kingdom, NotSchool has been remarkably successful at using blended models of learning to re-engage excluded students, achieving a 98 percent success rate.

Richer assessments and evaluations: New forms of assessment, including development of e-portfolios, simulations, and formative assessment with immediate feedback, can make a contribution to understanding each learner's development, understanding, and future direction. Learners are being given more control over what is assessed, and when and how the results are used.

Recently, Cisco, Intel, and Microsoft have partnered with the University of Melbourne and the OECD to launch ATC21S, a global effort to develop new tests and standards for 21st century skills. Denmark is piloting the use of computers in examinations, measuring the use of knowledge rather than simply the ability to recall the knowledge itself.

Data at all levels: Breakthroughs in technology have allowed student progress to be carefully measured and analyzed to inform better decisions by teachers, lecturers, parents, school and university leaders and students themselves. Learning can be personalized and funding targeted on those innovations that have maximum impact. In New York City, the Achievement Reporting and Innovation System (ARIS) tracks detailed student progress. On an international level, the OECD PISA tests and their output have started driving more informed education decisionmaking at all levels of government.

86 This section draws heavily on Breslin, S., Dykes, G., Goodman, L., Llewellyn-Jones, C., Pearson, W. and Sutch, D. (2009) "Mapping the current and future landscapes of technology in education." Unpublished study for Cisco by Futurelab.

Educational Technology Does Not Have To Be High Technology

Innovation in education does not necessarily require high-tech and complex solutions. Often innovation is about an attitude of mind or culture. Many of the most successful and forward-thinking projects make use of existing and easily accessible technologies that are a familiar part of learners' everyday lives—social networks, games, and discussion forums.

Use of familiar technology can have particular benefits for learners who perhaps have not excelled in more traditional classroom settings. Simple to use and simple to understand technologies can also help teachers to have the confidence to integrate them into their existing practices in creative ways.

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The *Learning Society* Emerging from Extreme Environments

In response to increasing demand, traditional schooling systems in developed countries have expanded. They have been supplemented by uneven levels of community and adult education, as well as by informal learning support. Within these supplementary sectors, exemplary practice and pedagogies have developed. However, these sectors are often under-resourced and fragile. In general, they have weak links with the mainstream schooling system.

This is unsurprising. We know from the innovation literature that disruptive innovations are usually marginalized or crushed by the dominant system. For more established demonstrations of the *Learning Society*, we must look elsewhere—in extreme environments and at the margins of existing systems. As we do this, we can already see emergent aspects of the *Learning Society* in practice in both developed and developing countries.

Learning from the Extremes[87]

Examples of educational innovation from some of the world's most challenging economic and social environments imply that there are some benefits to a lack of educational baggage. Indeed, by being "deprived" of the trappings of 20th century educational success, extreme education innovators have developed lessons for mainstream systems elsewhere.

Based on a system that depends for its very survival on a perpetual innovation engine, they are devising new visions of learning and putting them into practice, often with spectacular effect.

From these inspirational endeavors, several lessons emerge:

Innovate constantly and embrace new providers

Unconstrained by traditional boundaries and facing extreme pressures where the choice is often between unusual education or no education at all, schools in challenging environments innovate constantly, drawing ideas in from all sides and rapidly selecting and deploying those that seem most effective.

In the slums of Hyderabad, the Ga District of Ghana, Mukuru in Nairobi, there is more private provision than public. By 2004, it was estimated that China had over 78,500 private schools and educational institutions (excluding vocational training institutions) enrolling 17.7 million students.[88] And the education provided seems to be good:

> *In Hyderabad, for instance, mean scores in mathematics were about 22 percentage points and 23 percentage points higher in private unrecognized and recognized schools, respectively, than in government schools. The advantage was even more pronounced for English. In all cases, this achievement advantage was obtained at between half and a quarter of the teacher salary costs.*[89]

The social entrepreneurial sector is also a vital complement to public school systems, providing it with new ideas and challenge, and supplementing its weaknesses.

Separate learning from schooling

Without school buildings, educators have to innovate. But education works best when it connects with and builds on other initiatives, like community issues or healthcare. The Mukuru center run by the Sisters of Mercy in one of Nairobi's most notorious slums educates in a community atmosphere and links learning to opportunity creation, like jobs and skills needed by the wider community. In Pune, India, the Doorstep School takes learning to where students are, even if that's on one of the city's 5,000 construction sites.

Pull learning rather than push teaching

Where nonconsumption of education is a critical issue and there are so many other competing pressures in students' lives, education has to be something that pulls people in. This can mean starting with a focus that inspires learners, and connects with the rest of their lives. But the best educators then provide skills and content through and around that. In Brazil, the Instituto Ayrton Senna funds programs that engage students with an interest in sport, dance, and art. Elsewhere in Brazil, the Centre for Popular Culture and Development has devised more than 2,000 learning games of which about 200 are being used regularly in the schools of Minas Gerais.

87 This section draws from Leadbeater, C. and Wong, A. (2010) "Learning from the Extremes." San Jose: Cisco.

88 Dahlman, C., Zeng, Z. and Wang, S. (2007) "Enhancing China's Competitiveness Through Lifelong Learning." Washington DC: World Bank.

89 Tooley, J. and Dixon, P. (2005) "Private Education is Good for the Poor: A study of private schools serving the poor in low-income countries." Washington DC: Cato Institute.

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Authentic learning, relevant to context

Drawing and keeping the attention of learners means capturing them with relevant problems that make sense in their environment. In Yachana Technology High School, students in the Amazon learn skills pertinent to living in the forest, with a focus on sustainability. In India, Barefoot College focuses on deploying knowledge to provide communities with access to clean water and reliable power.

Learners and parents as contributors

Great teachers can help build motivation and commitment to learning. But in response to a paucity of professional teachers, developing pupils into mentors and teachers becomes an essential part of a sustainable system of education. In India, Baljyothi and Pratham have both embraced nontraditional teachers. Baljyothi is a collection of schools run by their communities, and Pratham trains, trusts, and deploys an army of para-teachers drawn from across the community. In South Africa, Bulgado Edutrade has students teaching each other, building on their knowledge and cascading learning.

Investing in Innovation[90]

90 This sections draws from Leadbeater, C. and Wong, A. (2010) "Learning from the Extremes." San Jose: Cisco.

In *Learning from the Extremes,* Leadbeater and Wong identify a new way of thinking about investing in educational innovation. They divide the educational world along two axes: Formal/Informal education, and Sustaining/Disruptive innovation.

Figure 5: Innovation Grid: Improve, Supplement, Reinvent, and Transform

	Formal Learning	Informal Learning
Sustaining Innovation	IMPROVE	SUPPLEMENT
Disruptive Innovation	REINVENT	TRANSFORM

To effectively manage innovation, education systems need to spread their investments intelligently between these four areas. Currently, systems tend to overinvest in 'Improve' and underinvest in all others.

To meet the challenges of the *Learning Society,* educational leaders need to invest in a portfolio of innovations, and especially in those with the potential to "Transform" the future of learning.

Making the Extreme Mainstream

The innovations that can be found in extreme environments, the online innovations that we take for granted in wider society, and recent developments in learning technologies give us insight into what the *Learning Society* might look like. They help us imagine what a new way of organizing and thinking about learning might look like, and above all they tell us that the *Learning Society* is possible.

By remaining largely isolated pockets of innovation, they also indicate that education's current system of innovation is unequal to the task of creating a *Learning Society* that works for everyone. Education systems that prevent alternatives to the dominant model of education from flourishing and that absorb large amounts of investment in research and development in maintaining the existing model will never be able to seed and support the innovation that will meet the needs of future learners.

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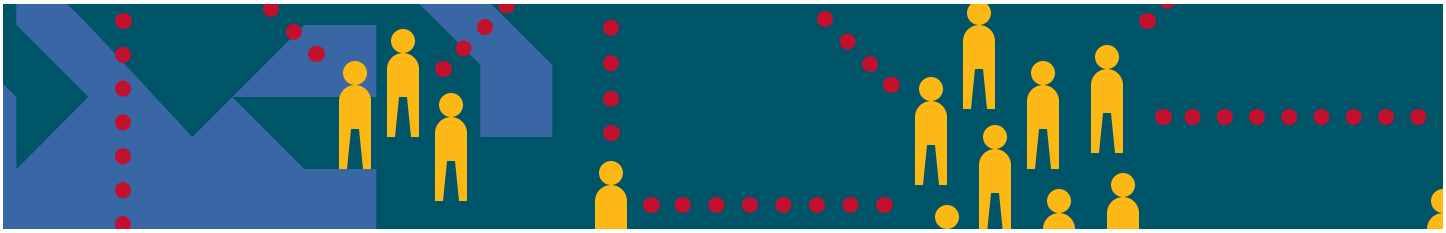

Part VI:
Building the *Learning Society*

We Have Tried "More" and "Better": It is Time for "Different"

Industrial economies based on the principles of mass production demanded large numbers of people with basic education, and small numbers of specialists with deep skills. Today, distributed production, mass customization, and flexible specialization demand a new type of education and a new type of learning.

Meeting these challenges means rethinking the role of every part of our society— business, government, the household, and civic society—as well as reshaping our formal education systems.

To meet the new global demand for learning, the ways we currently organize learning will have to change dramatically. Some countries are currently in the phase of **more**— of simply providing more schools, more classes, and more teachers.

With the recent waves of standards and accountability reform, many countries have been through the phase of **better**—of running schools and colleges more efficiently, of identifying the most crucial parts and polishing them and replacing them.

Now, it is time for **different.**

Learning should be organized on a completely different set of principles from those that we have inherited. We call this the *Learning Society.*

The Nine Principles of the *Learning Society*

The principles that characterize the *Learning Society* are informed by the demands of the 21st century, by the emergent innovations at the very leading edge, and by what we now know about how learning happens. The result is the following set of principles designed to meet society's new demands for learning and to realize the learning potential of every part of society and every part of the globe.

The *Learning Society:*

1. Engenders a culture of learning throughout life.
2. Aims to develop motivated, engaged learners who are prepared to conquer the unforeseen challenges of tomorrow as well as those of today.
3. Takes learning to the learner, seeing learning as an activity, not a place.
4. Believes that learning is for all, that no one should be excluded.
5. Recognizes that people learn differently, and strives to meet those needs.
6. Cultivates and embraces new learning providers, from the public, private, and NGO sectors.
7. Develops new relationships and new networks between learners, providers (new and old), funders, and innovators.
8. Provides the universal infrastructure they need to succeed—still physical but increasingly virtual.
9. Supports systems of continuous innovation and feedback to develop knowledge of what works in which circumstances.

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New Roles for Existing Players

Governments: The Regulator of the *Learning Society*

Governments have perhaps the most important role in enabling the emergence of the *Learning Society*. For this reason, they must step back and reappraise their role.

The critical shift for government is one of mindset: from running education to enabling learning, including the learning of pupils, educators, and whole learning systems. This means recognizing that learning goes on beyond school walls and continues well after the end of compulsory schooling.

In stepping back from being a near monopoly provider of education, government needs to focus on six roles that remain fundamentally in the public interest:

- Convening the new and unusual coalition necessary to govern the *Learning Society*.
- Articulating the goals and valued outcomes for the *Learning Society*, and acting as champion of them.
- Evaluating and assessing how far those goals have been met.
- Helping to knit the system together, as learning is distributed between institutions, and through communities; providing the all-important conceptual framework for what is being achieved.
- Protecting and promoting the interests of the underprivileged and those least likely to participate in the *Learning Society*.
- Embracing nontraditional providers and using regulation, deregulation, and funding to spur disruptive innovation.

Existing School Systems: Transform to Education 3.0

For existing educational systems, the *Learning Society* holds considerable promise. It offers a new way to deliver improved results to more people with fewer resources. It offers teachers the chance to focus entirely on teaching, and administrators to be effective and data-driven managers.

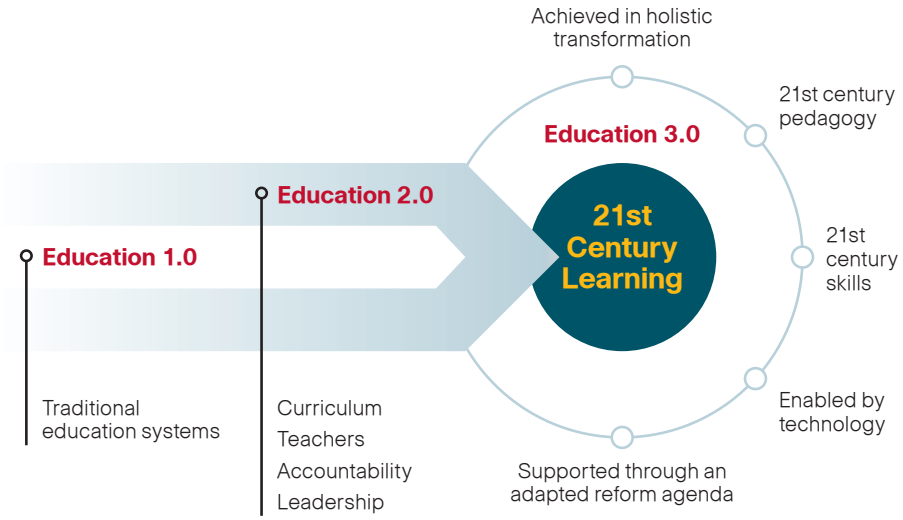
For established systems, the Cisco Education 3.0 Roadmap provides a step-by-step guide to the characteristics of a 21st century school system.[91] Figure 6 graphically represents this goal.

> *To borrow from technology parlance, Education 1.0 represents education as it was during most of the 20th century, characterized by access and quality challenges, variable practices and standards, and limited performance management. In the Education 2.0 phase, system reforms have been designed to professionalize processes and set standards. Education 3.0 is the emerging paradigm of 21st century learning. It builds on the system reform of Education 2.0 and the opportunities afforded by Web 2.0 to equip learners with new skills by introducing new pedagogy.*[92]

91 For full detail, see Cisco (2008) "Equipping Every Learner for the 21st Century." San Jose: Cisco.

92 Cisco (2008) "Equipping Every Learner for the 21st Century." San Jose: Cisco.

Figure 6: From Education 1.0 to Education 3.0



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In all systems, educational institutions need to see themselves having a lifelong relationship with every learner. They need to think beyond the age-bound constraints that they currently operate within and consider the school premises as a multipurpose entity, perhaps available to children during the day and adults at night. Buildings need to be designed with this in mind, with particular attention paid to both physical and virtual security systems.

Higher Education: Expand Reach to Play a Full Role in the *Learning Society*

Traditionally, higher education institutions (HEIs) provide the most advanced form of workforce training and contribute directly to education through research and in training the teachers of tomorrow. Many also contribute to economic development, by working with industry to drive innovation. As such, they have a potentially fundamental role to play in building the *Learning Society*.

However, to reach their full potential and meet the needs of the *Learning Society* that surrounds them, HEIs need to improve their reach and their quality, and to proactively extend beyond the campus and out into the private sector and local community. HEIs should embrace their role as a pillar of the *Learning Society,* working more closely with companies and opening their facilities to lifelong learners.

Effectively Managing Innovation

Moving to the *Learning Society* will require a continuous process of innovation. As the incumbent providers in the current system, governments, schools and universities must not only seek to drive innovation but learn to be "good adopters".

Innovation is very risky and involves people taking personal and commercial risk. A common complaint from social innovators is that when they are successful, government can very readily adopt an innovation without rewarding the originators (or worse, put them out of business).[93]

As the adopters of new ideas, both governments and schools must be responsible for establishing a system of assessing learning and evaluating success, and for linking this to how innovation is funded.

93 Mulgan, G. (2007) "Ready or Not?" London: NESTA.

94 Georghiou, L. (2007) "Demanding Innovation: Lead markets, public procurement and innovation." London: NESTA.

New Roles for New Players

Building the *Learning Society* is a whole-society endeavor. It demands full participation from all sectors, far beyond the fragmented efforts of community, adult, and further education institutions that currently exist.

Social innovators, free of the constraints of public sector bureaucracy and helped by capital investment and supportive frameworks set up by governments, the private sector, and social investors, should work through, around, and beyond the current educational system, pioneering more new models of formal and informal learning.

The **private sector** has a new role at the heart of the *Learning Society*. As employers, they should support employees who wish to take time off to engage in any learning activities, and invest in the future of their staff through job-specific training. They must fund more formal and informal learning than ever before. Businesses must bring corporate universities and training into the educational mainstream, meeting quality requirements and interfacing with national and international assessment and accreditation standards.

Social investors have an important role to play in providing seed capital to innovators in the *Learning Society*. They must take the higher risks that governments will not be prepared to take. Part of this is also commissioning research and evaluation that grows the collective knowledge base of what works and why. Frequently, they will function as an important broker—bringing together the public, private, and third sectors.

Informal learning providers and cultural institutions must knit their offerings into an overall framework, linking to curricula and providing steps towards documented achievement. In the United Kingdom, the National Museum's Online Learning Project has linked its Creative Pathways to the National Curriculum, demonstrating a first step in this direction.

What about the learner? **Learners** are at the center of the *Learning Society*. It will be driven by their demand, and shaped by their priorities. Learners need to become what innovators call a "lead market"—early adopters of innovative offerings, often placing unusual and unreasonable demands on their suppliers.[94]

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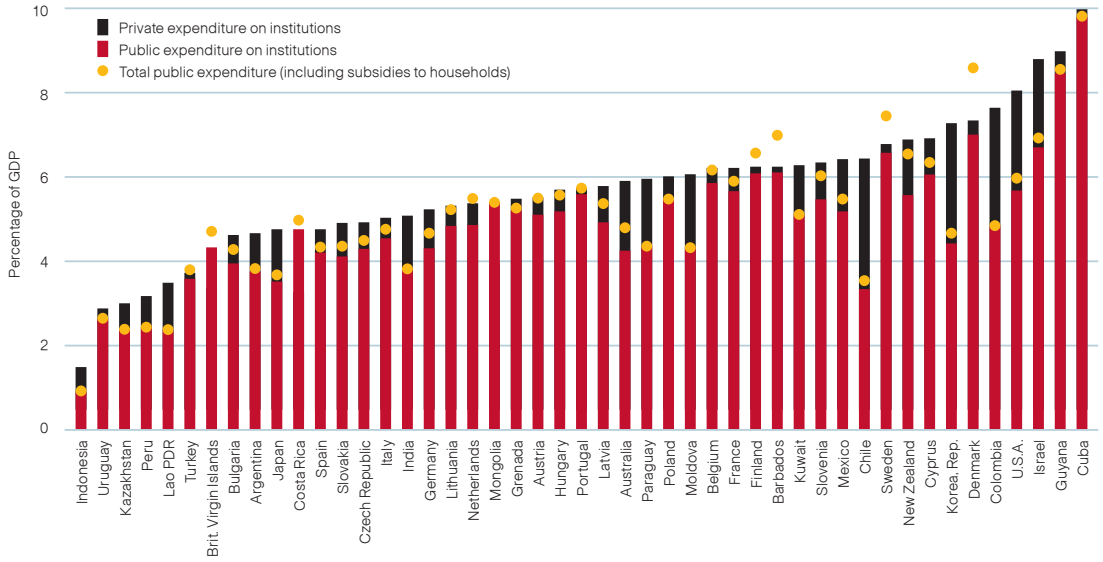
Funding the *Learning Society*

Many developed countries spend between 6 and 8 percent of their GDP on support for educational institutions (see Figure 7).[95]

Figure 7: Public and Private Expenditure on Educational Institutions, 2005



Source: UNESCO Institute for Statistics database

More efficient organizations and the introduction of new technologies will reduce the current costs of learning. However, meeting the global demand for learning will likely require increased overall expenditure. Traditionally, the state has for the most part paid for education on behalf of all three. This needs to change. These new costs must be spread across the main beneficiaries of learning: the individual, business, and wider society.

However, the correct funding solution varies by age range, type of education, and ability to pay. At the earliest, most beneficial stages of education, those benefits are also most diffuse and distant.[96] Here, the state should likely remain the greatest funder, perhaps shifting money from elsewhere in the educational system. This does not imply that the state will also run education, but only that it must provide funds in new ways to support innovators.

At later stages, benefits are lower, more obvious, more personal, and more immediate. For instance, in simplified form, where training is technical and job-specific, employers should foot the bill. Where it is technical but more related to a profession, learners should pay a greater proportion. Improved loan systems and even human capital contracts should be examined as ways to open up funding.[97] Where learning is remedial or related to sudden social or economic change, the state should step in to ensure that the whole of society benefits.

Recommendations

For too long, we have considered learning in isolation. In most countries, "Education" is a separate branch of government policy, and learning is a separate activity from our daily lives. Building the *Learning Society* means assembling a new coalition that can draw innovations from all sectors of society for the benefit of learners. It needs to mobilize new structures, new approaches, and new technology to deliver a new balance of skills to a lifelong learning population.

95 UNESCO (2007) "Factsheet 04: What do societies invest in education? Public versus private spending." Montreal: UNESCO Institute for Statistics.

96 For a discussion of the social versus private returns to different types of education, see Psacharopoulos, G. and Patrinos, H. (2002) "Returns to Investment in Education: A Further Update." World Bank Policy Research Working Paper 2881. Washington DC: World Bank.

97 See Matching Funding Strategies with National Priorities in Santiago, P., Tremblay, K., Basri, E. and Arnal, E. (2008) "Tertiary Education for the Knowledge Society Volume 1: Special Features: Governance, Funding, Quality." Paris: OECD.

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With this in mind, we make the following recommendations:

1. The *Learning Society* needs strong stewardship from a new coalition of governments, businesses, NGOs, and social investors who together bring the legitimacy, innovation, and resources that can make it a reality. The membership of this movement will vary, but it must deliver a clear articulation of its collective purpose and goals, and be open to an ever-expanding group of supporters, innovators, and funders.

2. *Learning Societies* need a mixture of learning providers—public, private, and third sector organizations and individuals that provide content, learning opportunities, and instruction to learners of all ages. To drive innovation, the *Learning Society* must actively encourage new entrants and not allow monopolies to persist.

3. Telecom providers (supported by governments) must ensure access to a shared learning infrastructure—the roads and rails of the *Learning Society*. Making learning easy to access is fundamental to encouraging uptake, and means providing seamless, high-quality, low-cost (and at times no-cost) connectivity at home, at work, on the move, and in public spaces. Governments and the international community should prioritize investment in backbone infrastructure and intelligently regulate to drive access to low-cost, high-bandwidth Internet connectivity. Service providers should work with existing educational institutions and community groups to develop new delivery models that help ensure access for all.

4. All groups must be prepared to invest more time and money in learning. Employers and unions should encourage their staff, members, and communities to take advantage of learning opportunities, and provide funding and reward for doing so. Individuals must be prepared to bear their share of the burden for learning that has private (personal and professional) benefits.

5. The mixed provision of lifelong learning demands new funding models to make it easier to invest in learning. Investing in learning should be tax-efficient for individuals and their employers. For those out of work, funds should be created to incentivize learning. Governments should use regulation and taxation to encourage financial institutions to develop new financial instruments that allow learners to access opportunities when they need them most. They can do this by lowering cost, reducing risk, and smoothing repayments.

6. International organizations and social investors should lead governments and businesses in a long-term process to develop legitimate, standard credentialing systems that offer the prospect of portable qualifications that are recognized around the world.

7. Credentials drive assessment and assessment drives learning by articulating what society values. Most current assessments measure the wrong things in the wrong way. Global assessment regimes must be reformed to support the *Learning Society*, rewarding skill development as well as content knowledge, and restructuring themselves around stage, not age.

8. Rapid progress and the avoidance of duplication require the development of a standard framework for assessing the impact of innovations in learning. This must be supported by substantial funding for rigorous independent evaluation of innovations and for the recording and dissemination of the results.

9. Without day-to-day guidance from a teacher or professor, there is a danger that learners can become lost in the *Learning Society*. Existing models may not be able to bear the weight of lifelong relationships with learners, so the *Learning Society* must create new ways of managing lifelong support relationships with the learner. Learners should have access to an independent, trusted mentor to whom they can turn for advice, support, encouragement, and information. This must, in turn, be supported by a private, permanent, secure and independent storage space for recording achievement, much like a health record.

10. The *Learning Society* must fund a diversity of innovators—from spreading known models to experimental work on high-risk and high-reward projects. Recognizing that a key customer for many successful models will likely be school systems, governments should put considerable effort into developing schools as "good adopters"—proving porous to new ideas, hospitable to innovative individuals, and giving credit where it is due.

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