Transforming Learning for the 21st Century: An Economic Imperative

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The Evolution of Education

- shifts in the knowledge and skills society values
- development of new methods of teaching and learning
- changes in the characteristics of learners

emerging information technologies are reshaping each of these
Prepare Students for the Future, Not the Past

- Business-led “education reform” initiatives emphasize creating employees, but not entrepreneurs and leaders.
- Students are developing learning styles and ICT fluency outside of classrooms that are ignored in academic settings.
- Dropouts and sub-optimal career choices document huge loss of talent from erosion of engagement and self-efficacy.
- Information and communications technologies (ICT) have greatly increased effectiveness in other sectors, but this is not widespread in education.
The Crisis We Face

• “The next decade will determine the future of the U.S. economy for generations to come.”

• “Competitive advantage for a region, state, or nation is now built on the skills of its general workforce as opposed to its geography, trade laws, research labs, and patents.”

• “For the first time in centuries, there is doubt that future generations will be as economically prosperous as their parents.”

• “The worker of the 21st century must have science and mathematics skills, creativity, information and communication technologies (ICT) skills, and the ability to solve complex problems”
Educational Implications of A Flattened World

Emerging interactive media now empower not only countries and companies – but also individuals – to collaborate, to accomplish, and to learn in new and powerful ways.
The Rapid Advance of ICT

- **Device** (cell phone, HDTV, personal digital assistant)
- **Application** (word processors, intelligent tutoring systems, educational simulations)
- **Medium** (shared virtual environments, interactive television, worldwide web)
- **Infrastructure** (Internet, telephony, cable and broadcast television, cyberspace)
Automation vs. Amplification


- Expert Decision Making
- Complex Communications
Other nations are investing in education focusing on growth.

The U.S. views education as expense, focusing on control.
the government has launched a program designed to propel Korea ahead of [other nations].
ECONOMIC AND SOCIAL ENVIRONMENT

It is recognised and accepted that education is a critical driver of economic success and social progress in modern society. There is a growing recognition, particularly in the European Union, that the provision of quality education and training is central to the creation of a high-skill, knowledge- and innovation-based economy that will underpin ongoing and sustainable prosperity. Education and training are also crucial to achieving the objective of an inclusive society where all citizens have the opportunity and the incentive to participate fully in the social and economic life of the country.

Central to our future economic and social success is the development of quality and inclusiveness in education. This must be seen as part of a strategy to support lifelong learning with the aim of improving knowledge and skills and promoting personal fulfilment. The attainment of these objectives and goals will require that we ensure access, progression and completion and the achievement of high standards for all learners, irrespective of their background.

SUPPORTING GOVERNMENT POLICY

Education is a key priority for the Government. This Strategy Statement has been drawn up taking into account the education objectives of Government policy as outlined in the Agreed Programme for Government concluded in June 2002.

In addition, the goals and objectives outlined in this document are designed to contribute to a range of policies developed by the Government to address issues of national strategic importance. These include the National Development Plan 2000-2006, “Sustaining Progress” - the social partnership agreement 2003-2005, the National Anti-Poverty Strategy, the National Children’s Strategy, the National Health Strategy, the Information Society Strategy and the National Spatial Strategy. A further policy context is provided by the “concrete future objectives of education and training systems” which is a statement by all EU Education Ministers of their priorities for education and training systems to 2010 and complements the Lisbon agenda aimed at “making the European Union the most dynamic and competitive knowledge-based economy in the world by 2010.”
Policies Needed for Success

• Follow other countries’ lead in national planning based on economic evolution, educational capacity building, and investments in ICT

• Create regional partnerships among high value-added businesses, policymakers, and educators to link education, economic development, workforce development, and social services

• Invest in education research and development, including ICT innovation and scaling up studies
Educational Implications of Economic and Technological Shifts


http://www.learningpt.org/tech/transforming.htm
Evolving toward Distributed Learning

✓ Sophisticated Methods of Learning and Teaching
  ✓ Guided learning by doing
  ✓ Apprenticeships, mentoring
  ✓ Learning communities

✓ Orchestrated across classrooms, homes, workplaces, community settings

✓ On demand, just-in-time
✓ Collaborative

distributed across space, time, media
“Next Generation” Interfaces for Distributed Learning

- **World to the Desktop:**
  Accessing distant experts and archives for knowledge creation, sharing, and mastery

- **Multi-User Virtual Environments:**
  Immersion in virtual contexts with digital artifacts and avatar-based identities

- **Ubiquitous Computing:**
  Wearable wireless devices coupled to smart objects for “augmented reality”
What is a MUVE?

✓ A representational container that enables multiple simultaneous participants to access virtual spaces configured for learning.

✓ A place where learners represent themselves through graphical avatars (persona) to communicate with others’ avatars and computer-based agents, as well as to interact with digital artifacts and virtual contexts.

✓ A learning experience that provides diverse activities in support of classroom curriculum.
Findings from Gaming Research

Massively multi-player online games (MMOG) and complementary fan-fiction offer rich learning and identity formation, but peripherally linked to life

Everquest game has 77th largest economy; over 120,000 fan-fictions online about Harry Potter
River City—Interface

- View and Actions Space
- Virtual Space
- Display Space
- Functions Space
- Communication Space
- Toolbar Space
Findings from Our Research

- enhancing motivation (challenge, curiosity, beauty, fantasy, fun, social recognition)
- reaching learners who don’t do well in conventional classroom settings
- learning both sophisticated content and higher order skills
- building fluency in distributed modes of communication and expression -- rhetoric

http://muve.gse.harvard.edu/rivercityproject/
Powerful Pedagogical Models

✓ guided inquiry learning with active construction of knowledge
✓ apprenticeship/mentoring relationships
✓ collaborative learning: social exploration of multiple perspectives

How People Learn (National Academy Press, 1999)
http://www.nap.edu/books/0309070368/html
Situated Learning

• constellations of architectural, social, organizational, and material vectors that aid in learning culturally based practices
  – apprenticeship (the process of moving from novice to expert within a given set of practices)
  – legitimate peripheral participation (tacit learning similar to that involved in internships or residencies)
Learning Community

A culture of learning, in which everyone is involved in a collective effort of understanding

✓ Shares and develops a repertoire of resources: experiences, tools, stories, ways of addressing recurring problems
✓ Allows a close connection between learning and doing
✓ Addresses the informal and tacit aspects of knowledge creation and sharing

Within courses (lc-light) and in world (community of practice)
Distributed-Learning Communities

✓ Range of participants’ skills and interests goes beyond geographic boundaries
✓ Asynchronous media enable convenient participation and deeper reflection
✓ Emotional and social dimensions intensified by synchronous virtual interchanges
✓ Broader range of participants engage in dialogue

Mediated, Situated Immersion
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Ubiquitous Computing

• One-to-one student to tool ratio

• Wireless Mobile Devices (WMD) offer approximately 60% of the computing power of laptops of a few years ago (a WMD is approximately 10% of the cost of a modern laptop)

• Wireless mobile computing – instant on, anytime, everywhere, and in the hand of the user

“Smart objects” and “intelligent contexts” enable “augmented realities”
Augmented Reality

- Each team has a GPS (Global Positioning System) device
- The GPS knows your real location
- The team walks around and investigates
- The immersive simulation combines physical world and virtual world contexts.
Mystery@MIT

- Players briefed about rash of local health problems linked to the environment
- Provided with background information and video briefings
- Need to determine source of pollution by drilling sampling wells, interviewing virtual people, accessing virtual databases, analyzing water samples, and rapidly reaching a conclusion
‘Map’ Screen

-- Where you are 
   (orange triangle)
– Game “People” 
   (pink squares)
– River Stations 
   (blue icons)
– Indoor Places to check 
   (yellow icons)
Virtual Characters

- Walk over to a pink square. These are Virtual Characters.
- A picture of the Virtual Character will pop up on the screen.
- Click ‘Interview’ or ‘Cancel’ The interview will be saved.
Three Roles

• Each player on a team has one of three roles:
  – Environmental Scientist
  – Engineer
  – Reporter

• Each role has UNIQUE skills so work as a team!

• Virtual Characters may also tell different things to each role, so pay attention!
Drilling Wells

• Choose
  – Sites to Sample
  – Sampling Methods
    • Influence budget, accuracy, and timeliness of samples
Conducting “Desktop” Research

- Triggering of media events at specified locations
  - library → web documents
  - machine shop → video interviews with personnel
A Different Model of Pedagogy

- Experiences central, rather than information as pre-digested experience (for assimilation or synthesis)
- Knowledge is situated in a context and distributed across a community (rather than located within an individual: with vs. from)
- Reputation, experiences, and accomplishments as measures of quality (rather than tests, papers)
Implications for Professional Development

- **Co-Design:**
  Developing learning experiences students can personalize

- **Co-Instruction:**
  Utilizing knowledge sharing among students as a major source of content and pedagogy

- **Guided Social Constructivism and Situated Learning:**
  Infusing case-based participatory simulations into presentational/assimilative instruction

- **Assessment Beyond Tests and Papers:**
  Using peer-developed and peer-rated forms of assessment
Beyond McLuhan

- Media shape their messages
- Media shape their participants
- Infrastructures shape civilization