Integration of Technology into the Curriculum and the Impact on Resources (Dancing With the Devil?)

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What the Devil is Happening?

An elevator story with unintended consequences
My Stanford Pos-Doc (1986-87)

- Videotexto/Viewdata/Minitel/Bildschirmtext
- Cognitive Sciences
- New Information and Communications Technologies
The School of the Future of the University of São Paulo

- Scaffolding – linking human and material resources
- Virtual Library of the Brazilian Student
- Virtual Learning Communities
- Virtual Communities of Practice
Our Mentors

The California Technology Project

Mihaly Csikszentmihalyi
*Creativity-Discovery and Invention* (1996)
- Concentration
- Against multiprocessing

Howard Gardner
*Frames of Mind* (1983)
*Multiple Intelligences-the Theory in Practice* (1993)
- Linguistic
- Logical/Mathematical
- Spacial
- Bodily-Kinesthetic
- Musical
- Interpersonal
- Intrapersonal

CD on Algebra based on MI

- **Routine Production Services (25%)**
  - A shrinking part of the workforce
- **In-Person Services (30%)**
  - A growing, largely feminine part
- **Symbolic-Analytic Services (20%)**
  - Problem-solvers (MDs, Engineers), knowledge workers, university trained, new and growing
Robert Reich  *The Work of Nations*  
*Updated*

- New ways of looking at how people work now (2016)
- Automation is changing the major categories of work
- Machine-learning…algorithms…
- Cognitive work vs Non-Cognitive work
- Non-repetitious vs Repetitious work
New Thrusts

- Following other areas of society (genomic oriented medicine, custom-made automobiles):
- individual learning environments (virtual carrels)
- atomization of knowledge (to facilitate comprehension and reutilization): learning objects and open educational resources
Growth of Distance Learning

- Normally conceived of as having a course structure
- Type 1: Course-based (20 min.; 20 weeks; 20 months)
- Type 2: Using Internet2 permits serious learning: virtual/augmented reality environments; operation of scientific equip.
- Type 3: Access to virtual/digital libraries, museums, archives
What are the Non-Monetary Obstacles?

• Schools of Education in universities
  – they look more to the past than to the future ("heralds of retrogression")
  – no courses for learning how to deal with/use thinking about the future (building scenarios, exercising the imagination)

• Teachers´ Unions
What Type of Personality is Attracted to Education?

- The rule-of-thumb:
  - 20% of teachers and professors are enthusiastic early-adopters
  - 20% are “doubting thomases,” resistant to change
  - 60% go with the wind; are influenced by local champions

- We need more research on this personality-attraction issue
On Memorization

- There is too much information coming at us
- A pluralistic society is not conducive to “canons”
- It can no longer be required
- The only thing worth memorizing today is the national poetry of one’s country of origin—a question of maintaining one’s identity
On Memorization

• “An education is what remains after one has forgotten all one learned in school” - Albert Einstein

• School gives you information and development. Later on you forget the information, but the development remains

• “5-Minute University” YouTube, Vimeo

• “Medieval Helpdesk”
We Need New Approaches to Learning

• In the past, when education was more elitist, the young learned
  – how to learn
  – how to evaluate evidence
  – how to spot a fallacy
from reading, reading, reading
(indirectly)
Now, with the avalanche, they must have special classes on thinking (direct)
Preparation for What?

• 50% of university graduates eventually abandon the professional field they prepared for, and take on 5 to 6 different fields before retiring

• Retraining these people represents an enormous market for information providers
What’s the Lowest Common Denominator of Learning?

- How to identify problems
- How to ask the “right” questions concerning a problem
- How to find the information you need to solve the problem
- How to evaluate the evidence you’ve found
- How to draw just conclusions
- How to communicate your results clearly, orally and in writing
Competencies versus comprehension

- Both are important, in differing dosages
- They are transferable to other fields
- But.....competencies are “horizontal”, and not profound
- Comprehension is “vertical,” going deeply
- [See Carl Bereiter and Marlene Scardamalia, UToronto, on this subject]
And Learners Need Contact with their Cultural Environment

• The forty-hour work week will eventually be reduced because of increased automation

• What will workers and their families do with the new-found time on their hands?

• They need to have “appreciation in music” and other arts taught in school
Thanks for your patience

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[The Powerpoint “shell” used in this presentation was adapted from that created for Richard Katz’s 1998 talk at the Educause Conference, and for which I express thanks!]