Anytime, Anywhere Learning for Working Adults

Life Long Learning at Work and at Home
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Size and Scope of Defense

Education and Training

- $15-50 Billion Per Year for Operations
- 1,200,000 Uniformed Service Members
- 800,000 DoD Civilians
- 90,000 Dependents
- $150-180 Million Per Year in Research and Development ("Program 6")
These are differences in emphasis -- there are few ‘pure’ instances of either. Their underlying approaches, techniques, and technologies are the same.
Technology and the Individualization Imperative
The Challenge of Classroom Instruction: Pace

- Ratio of time needed to build words from letters in kindergarten -- 13:1 (Suppes, 1964)
- Ratios of time needed to learn in grade 5 -- 3:1 and 5:1 (Gettinger & White, 1980)
- Ratios of time needed by hearing impaired and Native American students to reach mathematics objectives -- 4:1 (Suppes, Fletcher, & Zanotti, 1975, 1976)
- Overall ratio of time needed to learn, K-8 -- 5:1 (Carroll, 1970)
- Ratio of time needed by college undergraduates to learn LISP -- 7:1 (Corbett, 1998)
## The Challenge of Classroom Instruction: Interactivity

<table>
<thead>
<tr>
<th></th>
<th>Traditional Classroom /Hr</th>
<th>Tutored Session/Hr</th>
<th>CBI/Hr</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student</strong></td>
<td>.1</td>
<td>20 -30</td>
<td>??</td>
</tr>
<tr>
<td><strong>Instructor</strong></td>
<td>3</td>
<td>120 -150</td>
<td>180 -600</td>
</tr>
</tbody>
</table>
Tutoring and Classroom Instruction

Adapted From: Bloom, B.S. The Two Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring. Educational Researcher. 13, 4-16 (1984)
“Individualization is an educational imperative and an economic impossibility.” (Michael Scriven, 1975)
Why Is Tutoring So Effective?

- Individualization of
  - Sequence,
  - Content,
  - Style,
  - Difficulty,
  - and Pace.

- Intensified interactivity

Technology Makes the ‘Educational Imperative’ Affordable
Enter the Computer: A Third Revolution in Learning?

- Writing
  Content of learning made available anytime, anywhere

- Books
  Affordable content of learning made available anytime, anywhere

- Technology
  Affordable content and interactions of learning made available anytime, anywhere

Anywhere, Anytime Learning as the Common Thread?
Is Technology-Based Instruction Effective?*

*Measured in Standard Deviations
Use of technology-Based Instruction (adaptive and distributable) can reduce costs of instruction by about 1/3, and

Either increase learning by about 1/3 (Education)

Or reduce time to learn by about 1/3 (Training)

N.B.: The real payoff is increased readiness, effectiveness, and productivity
Where Might We Be Headed?
A thought:
The future is already here, but unrecognized and unevenly distributed.
Some Trends and a Prediction

Intelligent Tutoring Systems
Moore’s Law
Global Information Grid
Natural Language Interaction
Electronic Performance Aids
Distributed Learning Capabilities
Object Oriented Applications
Hand-Held Computers
Simulations and Games
Mobile Phones on Steroids
Etc.

Personal Learning Associates
About Those Personal Learning Associates

Sharable Content Objects from across the World Wide Web

Assembled in real-time, on-demand

To provide learning and assistance anytime, anywhere

The “A” in ADL
Eventually …

- Anywhere, Anytime Learning Integrated with Performance/Decision Aiding (Integrating the supply and demand side of learning)

- Fewer Lessons, More Learning (Learning as conversation)

- Fewer Tests -- More Assessment (Continuous, Unobtrusive)

- Personal Learning Associates (In classrooms and out – anytime, anywhere)

Instruction (and Performance/Decision Aiding) as Conversation
Some Remaining Issues
-- or --
Opportunities to Excel
Issues for Training/Education Policy/Decision Making

- Standards development
  - For certification
  - For interoperability
- Budgetary practices
- Role of formal education/training
- Coordination of personnel and education/training functions
- Privacy
- Intellectual property
Some Needed Research …

• Assessment and learner modeling from routine interactions

• Assembly of objects
  – for instruction
  – for performance aiding/problem solving/decision aiding

• Authentication of content

• Authentication for certification

• Effective procedures for task/job/’work’ analysis

• Kirkpatrick’s Level 4 assessment

• Cost models (instructional economics)

• Technology for vocational (and/or avocational) guidance
Some More Needed Research …

• Design issues
  – Learning through guided conversation (real-time and on-demand)
  – Instructional engineering
  – Taxonomy of instructional objectives
  – Trade-offs between instructional approaches (Micro-ISD and the training paradox)
  – Balancing guidance with expertise
  – Trade-offs between instructional and non-instructional approaches (Macro-ISD)
  – Collaborative learning
  – Blended learning and instructor roles
  – Simulation- and game-based learning

• Etc. ……
In Conclusion …

There is no sun without shadow, and it is essential to know the night … The struggle itself toward the heights is enough to fill a man’s heart. One must imagine Sisyphus happy.
-- Albert Camus

It’s all rock and roll to me.
-- M. Jagger & K. Richards