Teaching, Learning and Technology: Theoretical Underpinnings and Practical Applications

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Overview: This talk covers a few common methods of teaching and ways educational technologies have been used to support them. For a more exhaustive list of teaching strategies, see Models of Teaching by Joyce and Weil (1992).
Socially-oriented models: Cooperative Learning, Group Investigation, and Role Play
Cooperative Learning and Group Investigation

- Johnson and Johnson, UMN
- Slavin, JHU
- Sharan, Tel Aviv Univ.
- Dewey, Thelen (democratic problem solving)
- Hullfish and Smith (linkages between intellectual and social development)
Why Cooperative Learning?

- Generate synergy, motivation, Gestalt
- Learn from each other
- Increase positive feelings, self esteem
How Cooperative Learning works

- Present a puzzling situation
- Explore individual reactions
- Organize “plan of attack”
- Students perform independent study
- Regroup and analyze progress
Ed Tech Applications for Cooperative Learning

- Web, Groupware, Hypertext, Collaborative software
- e.g.: MIT Global Culture course
Role Play

- Shaftel
- Chesler and Fox
Why use Role Play?

- Explore feelings
- Gain insight into attitudes, values
- Develop problem solving skills
- Explore subject matter in new ways
How a Role Play works

- Warm up/introduction
- Assign roles
- Prepare players
- Enact role play
- Debrief and discuss
Ed Tech Applications for Role Play

- MUDs (Bruckman)
- Groupware
- Communication software
- e.g.: Negotiation seminar
Teaching thinking skills: Inductive Thinking and Inquiry Learning
Inductive Thinking

Taba
Why Inductive Thinking?

- Thinking can be taught
- Thinking is an active transaction between the individual and data
- Processes of thought evolve by a lawful sequence
Steps in teaching Inductive Thinking

- Concept Formation
  - Enumeration/listing; Grouping/Categorizing

- Interpretation of Data
  - Identifying /exploring relationships; making inferences

- Application of Principles
  - Predicting consequences, explaining unfamiliar phenomena, supporting hypotheses; verifying predictions
Ed Tech Applications for Inductive Thinking

- Databases, multimedia development tools, groupware, productivity tools
- e.g.: “Is per-capita income associated with life expectancy?”
Inquiry Learning

- Suchman
- Schlenker
- Bruner
Why use Inquiry Learning?

- People are naturally curious
- Learners can become conscious of their thinking strategies
- Develop intellectual discipline through practice
How Inquiry Learning works:

- Confrontation of the problem
- Gather and verify data
- Isolate variables, form and test hypotheses
- Organize and formulate explanation
- Analyze inquiry process
Ed Tech Applications for Inquiry Learning

- Simulation/Modelling software
- Databases and other data sources
- Productivity software
- e.g. 2D Truss software, SimCity, Quanta
Behavioral Models: Mastery Learning and Direct Instruction
Mastery Learning

- Carroll
- Bloom
Why use Mastery Learning?

- Individually prescribed study
- Independent of student aptitude
How Mastery Learning works

- Objectives set
- Content divided into learning units
- Diagnostic tests for each unit
- Test data used to provide supplementary instruction
Ed Tech Applications for Mastery Learning

- Traditional drill and practice
- Customized instructional software
- Language Lab-style resources
Direct Instruction

- Skinner
- Madaus, Airasian, and Kallaghan
- Rosenshine
Why use Direct Instruction?

- Particularly good for math and reading
- “modeling with reinforced guided performance”
- Maximization of student learning time
- Not so useful for teaching problem solving, abstract thinking, creativity
How Direct Instruction works

- Orientation/introduction to lesson
- Presentation of material
- Structured practice
- Guided practice
- Independent practice
Ed Tech Applications for Direct Instruction

- Drill and practice
- e.g.: MathBlaster