Transformation, Technology, and Education

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Part 1: A Model for Technology and Transformation

Technological Levels of Use

Transformation

Redefinition	Tech allows for the creation of new tasks, previously inconceivable	Integrated with workgroup and content management software
Modification	Tech allows for significant task redesign	Integrated with email, spreadsheets, graphing packages
Augmentation	Tech acts as direct tool substitute, with functional improvement	Basic functions (e.g., cut and paste, spellchecking) used
Substitution	Tech acts as direct tool substitute, with no functional change	Word processor used like a typewriter

Enhancement

Levels of Use: A Classroom Example

Transformation

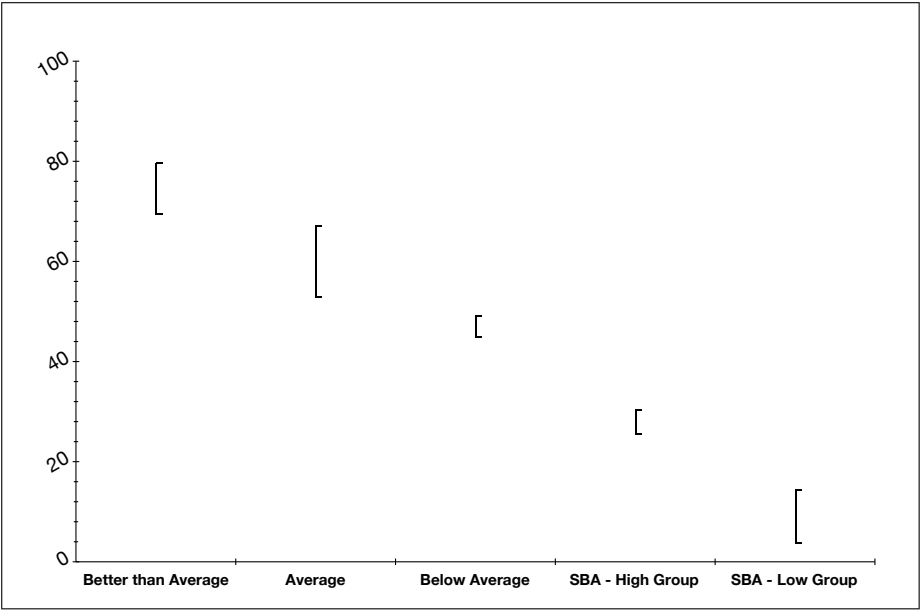|		
Redefinition	Tech allows for the creation of new tasks, previously inconceivable	Tools for visualization of narrative and structural aspects of text
Modification	Tech allows for significant task redesign	Textual, visual, audio tools for construction of shared knowledge
Augmentation	Tech acts as direct tool substitute, with functional improvement	Dictionaries, study guides, history sites linked to online text
Substitution	Tech acts as direct tool substitute, with no functional change	Shakespeare texts read in online versions

Enhancement

Part 2: Why Transformation is Needed - Competitiveness, Equity, and the OECD PISA Report

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Social Reasons: the Meaning of PISA (1)

Performance of 15-Year-Old Students in Reading, Mathematics, and Science			
Better than Average	Average	Below Average	Substantially Below Average
Australia Canada Finland Hong Kong - China Japan Korea Liechtenstein Netherlands New Zealand	Austria Belgium Czech Republic Denmark France Germany Hungary Iceland Ireland Latvia Luxembourg Macao - China Norway Poland Slovak Republic Spain Sweden Switzerland United States	Greece Italy Portugal Russian Federation	*High Group* Serbia Thailand Turkey Uruguay *Low Group* Brazil Indonesia Mexico Tunisia

Social Reasons: the Meaning of PISA (2)

Part 3: Transformation and Education

How Can We Accomplish a 2-Sigma Shift?

- Bloom (1984): one-to-one tutoring by experienced tutors produces a 2-Sigma gain in learning

Effect of Selected Alterable Variables on Student Achievement (Bloom 1984, Walberg 1984)			
Tutorial instruction	2.00	Initial cognitive prerequisites	0.60
Reinforcement	1.20	Home environment intervention	0.50
Feedback-corrective (Mastery Learning)	1.00	Peer and cross-age remedial tutoring	0.40
Cues and explanations	1.00	Homework (assigned)	0.30
Student classroom participation	1.00	Higher order questions	0.30
Student time on task	1.00	New science & math curricula	0.30
Improved reading/study skill	1.00	Teacher expectancy	0.30
Cooperative learning	0.80	Peer group influence	0.20
Homework (graded)	0.80	Advance organizers	0.20
Classroom morale	0.60		

Computer use effects: 0.4 - 2.0 Sigma

Technological Avenues to Transformation
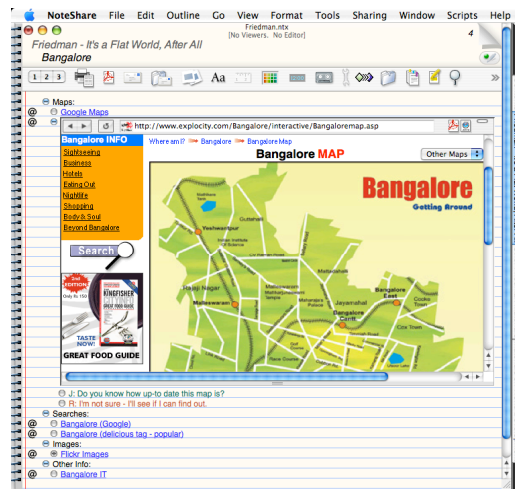
- Visualization and Simulation

- Social Computing

- Digital Storytelling
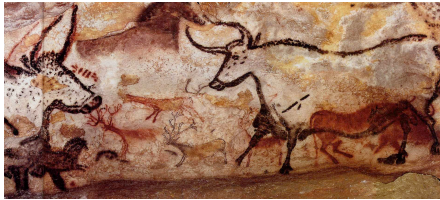
- Educational Gaming

Visualization and Simulation
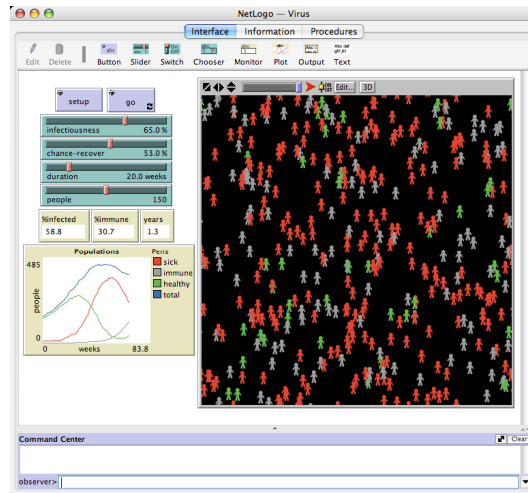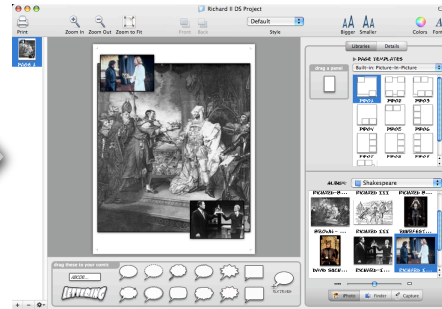

NetLogo - Virus Model

Social Computing

NoteShare - Shared Notebook

Digital Storytelling

Lascaux

Comic Life
Richard II
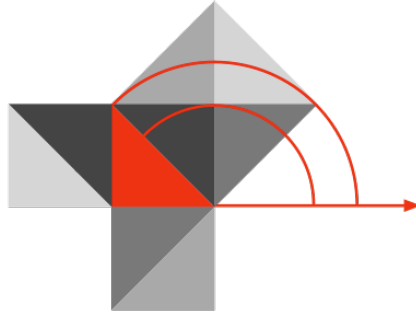Digital Storytelling Project

Educational Gaming

Astragales

Revolution
The Education Arcade
MIT/University of Wisconsin

Hippasus