Music and Mechanics: Instructional Technology on Display

Alice M. Agogino
Associate Dean, College of Engineering
Professor, Mechanical Engineering
Director, Synthesis Coalition
Synthesis Coalition Goals

- Reform curricula
- Develop digital infrastructure
- Improve retention
- Link to K-14
New Media Teaching and Learning

- Development of an Infrastructure to Support the Use of New Media for Teaching and Learning
  - Courseware (instructional software) Development
  - Courseware Database for Archival, Searching and Downloading
Synthesis proposal built on early Internet opportunities.

The use of the Internet is growing with no end in sight!
NEEDS: National Engineering Education Delivery System

Three components connected through Internet:

**Delivery**
- Classrooms
- Instructional Labs
- Small Study Groups
- Residences
- Libraries
- Anywhere

**Development**
- Courseware Studios
- Instructional Labs
- Faculty Offices & Residences
- Libraries
- Anywhere

www.needs.org
The NEEDS Database of Multimedia Courseware and Quality Review

- Integrated Database of Multimedia Engineering Courseware
  - Bibliographic records with downloadable courseware
  - Multimedia elements - downloadable movies, images, and text

- Multilevel Courseware Evaluation System
  - Peer Review of Courseware
  - Premier Award for Excellence in Engineering Education Courseware
NEEDS Database: www.needs.org
NINa (NEEDS Image Navigator)  
Search over “Disk Drive”) Elements  
Displaying 8 of 64 Results
Download Element

Name: drill_morph

Description: Video “morph” of an electronic drill showing the transitions in the dissection.

Type: Gif

Courseware: Drill Dissection
NINa Bibliographic Details & Element Download

QuickTime™ and a Compact Video decompressor are needed to see this picture.

Download Element

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Description: Video “morph” of an electronic drill showing the transitions in the dissection.

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Courseware: Drill Dissection
New Media Teaching and Learning

- Development of an Infrastructure to Support the Use of New Media for Teaching and Learning
  - Courseware (instructional software) Development
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- Development of:
  - Accommodating Different Learning Styles
  - Instructional Goals and Assessment Strategies
  - Pedagogical Models
  - Metaphors for Interaction
Changes in Student Diversity and Instructional Technology

1910

QuickTime™ and a Cinepak decompressor are needed to see this picture.

1970

1995
Multimedia Case Studies of Engineering Design

- Highlights of successfully engineered products
- Examples of "best practices" in industry
  - customer-driven design
  - quality and continuous improvement
  - multifunctional teams
  - design for assembly & manufacture
- Social and historical context
- Integration of engineering, math, physics and chemistry
Synthesis Courseware Promotes Integrative Learning

Integrated hands-on activities

Videos from industry

Concrete Experiences

Abstract Theory & Conceptualization

Active Experimentation

Reflection

Mattel Color Spin Case Study

QuickTime™ and a Video decompressor are needed to see this picture.
Synthesis Courseware Integrates Research, Education and Industry

**Technical Research**
- Disk Drive
- High Speed Networks
- Multimedia & Video Servers

**Industry**
- Western Digital
- Quantum
- IBM Almaden Research

**Education Research**
- Scaffolding
- Links to math & physics

**Synthesis Classes**
- E28, ME39C
- ME290P

Multimedia Virtual Disk Drive Design Studio
Game, Dissection Example
Workplace Metaphor
Multimedia Virtual Disk Drive Design Studio
Game, Dissection Example

> message 1

From: Ms. Elliot
To: chief engineer
Subject: new product design

QuickTime™ and a Sisapex decompressor are needed to see this picture.
Students Design their Own Disk Drive in the Game

DESIGN GOALS

CAPACITY 1.2 GB
ACCESS TIME 10 ms
POWER CONSUMPTION 10 W
COST $120.00
DEVELOPMENT TIME 140 days

click on the high-lighted right button below to review the current design
Virtual and Physical Dissection and Theory Exploration

QuickTime™ and an Animation decompressor are needed to see this picture.
Virtual and Physical Dissection and Theory Exploration

- Voice Coil Motor
- Spindle Motor
- Disk Platter
- Head Stack Assembly
- Printed Circuit Board
From: Ms. Elliott, President of ACME Engineering
To: chief project engineer
Subject: product launch results
> message 1

From: Ms. Elliott, President of ACME Engineering
To: chief project engineer
Subject: product launch results
Links to K-12: MESA & Interactive University
Links to K-12: MESA & Interactive University
NINa (NEEDS Image Navigator)
Search over “Disk Drive”) Elements

Displaying 8 of 64 Results

- open_drive image/gif
  - [details] [download]

- head_assembly QT video
  - [details] [download]

- disk_section image/gif
  - [details] [download]

- testing image/gif
  - [details] [download]

- schematic image/gif
  - [details] [download]

- market_tends image/gif
  - [details] [download]

- platters image/gif
  - [details] [download]

- McCoy QT video
  - [details] [download]
NINa (NEEDS Image Navigator)
Search over “Disk Drive”) Elements

Displaying 8 of 64 Results

QuickTime™ and a Compact Video decompressor are needed to see this picture.
Long Term Vision:
Global Electronic Library of Quality Multimedia Courseware

NEEDS Database

www.needs.org
Contact Information:

Alice M. Agogino
(510) 642-6450
(510) 643-1818 (Synthesis HQ)
aagogino@euler.me.berkeley.edu

Brandon Muramatsu
(510) 643-1817
mura@needs.org

Synthesis Coalition National Headquarters
3112 Etcheverry Hall
University of California, Berkeley
Berkeley, CA 94720-1750