Criteria for Selecting Instructional Software in Engineering Education

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NEEDS — National Engineering Education Delivery System
Outline

- Introduction to NEEDS
- Overview of criteria for the Premier Award for Excellence in Engineering Education Courseware
- Overview of ILT research on successful adaptation
- Proposed process/criteria
- Conclusion
- National digital library emerging from the Synthesis Coalition (1990 - 1999)
- Integrated database of multimedia courseware
- Multilevel courseware evaluation system (peer review, Premier Award for Excellence in Engineering Education Courseware)
- Community of Engineering Educators
www.needs.org

Aircraft Dynamics

Title: Aircraft Dynamics
Authors: Robert F Stengel
Publisher: Princeton University (01/1998)
Courseware Series: 
Version: 1999.02.20
Summary: This web-based software teaches the user concepts about aircraft dynamics.
The Premier Award

- National competition rewards authors of high-quality, non-commercial courseware that promotes effective learning practices

1999 - Engineering Graphics, Cracking Dams
1998 - Della Steam Plant, MDSolids, Structural Engineering Visual Encyclopedia - UNH

1997 - Virtual Disk Drive Design Studio, Drill Dissection & Dissection, Mars
Premier Award Selection Criteria

- Engineering Content
  - Is the content error free?

- Software Design
  - Is it well designed and usable?

- Instructional Design
  - Will students learn from the courseware?

http://www.needs.org/premier/1999/criteria.html
ILT Research on Effective Adaptation*

Adaptation successful when faculty
- Chose LT to support learning goals
  - Improve performance
  - Increase student engagement
  - Improve student attitudes towards SMET
  - Curriculum deficiency

* 9 Case Studies of effective adaptation by SMET educators in diverse institutional types and disciplines conducted in 1999-2000
Effective Adaptation, continued

• Selected LT to support good instructional practices
  – Collaborative learning
  – Faculty/student interaction
• Viewed technology as tool rather than driving force for course
  – Visualization, simulation, real-time data acquisition, speed
  – Communication
P/A Criteria - Instructional Design

• Interactivity: promotes active learning - interaction enhances learning
• Cognition/conceptual change: learning appears to be significant and long lasting, and strong, useful cognitive models can be built
• Content: well chosen and structured
• Multimedia use: effective and promotes learning objectives and goals
• Instructional Use/Adaptability: useful in a variety of settings
P/A Criteria - Software Design

• Engagement: software holds the interest of a diversity of learners.
• Learner Interface and Navigation: software is easy to use
• Technical Reliability: software is free from technical problems
P/A Criteria - Engineering Content

• Accuracy: content is error free
• Organization: structure is consistent with typical engineering instruction
• Consistent with Learning Objectives: content matches stated learning objectives and goals
Conclusions

• How do I know this courseware/LT is good?
  – Instruction design criteria most difficult to apply - must begin process by articulating clear learning goals
  – Software design criteria critical to students’ motivation to use the LT
  – Know your students and their equipment
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