Innovative Uses of Engineering Courseware Available through NEEDS—The National Engineering Education Delivery System

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Abstract — *This presentation will address two questions: what kinds of teaching innovations are available on NEEDS, and how do faculty adapt or adopt courseware developed by others for their own use in the classroom? The first question will be addressed by a short demonstration of how NEEDS works and will precede the discussion of how the innovations have been used in the classroom. The response to the second question will be based on the results of a case study of faculty use of the Premier Courseware of 1997.*

Teaching Innovation and NEEDS

NEEDS—The National Engineering Education Delivery System—is a web-based digital library (www.needs.org) to support the use of innovative educational technology (e.g., computers, the WWW, and CD–based courseware) for learning. NEEDS was developed by Synthesis: A National Engineering Education Coalition (www.synthesis.org) in the early 1990's as a mechanism to support development, use and more importantly re-use of these instructional technologies. The nationally distributed nature of the Coalition and its interest in cross/multi-disciplinary education provides a broad view of how instructional technologies available through NEEDS can be used, changed and adopted by other faculty; what is needed to describe them; and who is their target audience.

NEEDS currently catalogs courseware and other instructional technology developed nationally and internationally to provide a digital library where both instructors and learners can search, access, and download educational materials. NEEDS is currently undergoing its fourth major evolution since it debuted as a Web-based digital library in 1994. It is expanding its current services to include peer review, feature reviews, user comments and analyses, and electronic community development. Many of these new features are aimed at strengthening review methods for all courseware within the digital library, to help NEEDS' user community better evaluate whether to adopt or adapt a particular piece of courseware to meet their needs.

Since 1994, NEEDS has worked with numerous experts, nationwide, to develop and implement a quality review procedure for engineering education courseware. This process has resulted in a multi-tiered review system for courseware. The initial focus has been on the highest level of this scholarly review, the *Premier Award for Excellence in Engineering Education Courseware*. The *Premier Award,* developed by NEEDS, John Wiley & Sons, Inc., and the Synthesis Coalition was created to recognize and promote high-quality, non-commercial courseware designed to enhance engineering education. Over the first two years of the competition there has been a dramatic improvement in the quality of submissions—a sign that the use of educational technology is advancing and maturing. Through the *Premier Award*, NEEDS has been able to provide a highly-visible, national distribution and dissemination outlet for engineering educators developing quality courseware.

Evaluation Case Study of the *Premier Award*

In the Fall of 1998, NEEDS initiated a study of the use of *Premier Award* courseware in order to better understand how faculty and students use educational courseware. One of the purposes of this research will be to develop a case study that informs our understanding of how engineering courseware in general is used, what support it's authors require from digital libraries, and how best to disseminate it. The study was initiated with a national survey of engineering faculty who have or are currently using *Premier Award* courseware in their classroom. Faculty who used the courseware in their classes were contacted and interviewed.

NEEDS plans to use the results from this evaluation to better inform courseware developers and digital library administrators about the impact of dissemination methods to date, and to describe how courseware is used by non-developers. More specifically, this study hopes to answer such questions as:

- Is this courseware adopted "as-is" by users, or do they adapt it to meet their particular course and teaching needs?
- What are the critical pathways used by faculty in using this courseware?
- What are the most effective ways of disseminating this courseware?
- What are the views of quality courseware and how do they change over time, if at all?
- What has been the impact of Premier courseware on student learning?

In addition to surveying and interviewing users of the *Premier Award* Courseware, dissemination and usage data were also tracked.