

TEACHING DIVERSITY THROUGH INCLUSIVE DESIGN CASE STUDIES

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Abstract - Educators, economists, and employers agree that the next generation of engineers must be trained to develop products and systems that serve diverse users. Inclusive design requires identifying the broadest possible range of users, and designing performance criteria and adaptable interfaces that enable access by people with varying physical capabilities and from diverse cultures. The end results are products, systems and services more easily used by everyone. The goal of the Engineering Education for Inclusive Design Project is to facilitate the integration of inclusive design into undergraduate engineering education. In this presentation we will report on a pilot effort that involves the development of case-based instructional materials to introduce the concept of inclusive design to first and second year engineering students. We will report on the development and use of a case study about the design of accessible Automated Teller Machines, and discuss the implications of our work for an inclusive design case study protocol.

Index Terms - inclusive design, engineering education, engineering case studies, innovative instructional approaches.

PROJECT OVERVIEW

The goal of this project is to develop teaching tools that sensitize engineering students to the needs of people with different abilities. There are many examples of designs that exclude people from the proper use of engineered products: airbags that harm small occupants, warning labels on power equipment that require knowledge of English, or computer user interfaces that require a steady hand to guide a mouse.

In order to achieve this goal, the Education Development Center, CPB/WGBH Center for Accessible Media (NCAM), and the Rose-Hulman Institute of Technology are collaborating to develop an approach to write illustrative case studies for inclusive design. As part of this project, we conducted case research to identify and explore products and corporate histories for possible inclusion in future case studies. We are currently developing

a model case study and plan to establish a process for creating case materials. As part of this process, we plan to examine how case studies ought to be designed so that they support teaching and learning about inclusive design.

The model case study that focuses on the development of accessible Automated Teller Machines (ATMs). The case study targets first and second year engineering students and illustrates the design and decision-making processes that resulted in ATMs that are accessible to the disabled users, primarily those who are visually impaired. The case study examines how societal, political, technical, and business issues influenced the design and commercialization of accessible ATMs. The case study will allow students to learn about the pressure of rapidly emerging markets, constantly evolving technologies, the process of rapid prototyping, the role of cost containment, the advantages of considering usability from the outset compared to having to retrofit existing products, and inclusive design strategies. In addition to the case study, we are developing learning activities that are structured to provide students with opportunities to practice decision making, to identify and solve problems, to analyze events and adopt a point of view, to assess consequences, and to assume multiple perspectives (e.g., technical, marketing, user). The case study will be piloted at the Rose-Hulman Institute of Technology, reaching approximately 120 engineering students.

Based on these activities, we will be developing a protocol for designing case studies and will be identifying design criteria for case studies to insure that they are effective for supporting teaching and learning about inclusive design.

The case study, along with the process used to create the case study, will be reported in the appropriate archived publications and maintained within the American Society of Engineering Educators' Case Study Library located at the Rose-Hulman Institute of Technology.

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