Partnering with Social Service Organizations to Develop Socially-Relevant Projects in Computer Science and Engineering

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Abstract

The University at Buffalo's Computer Science and Engineering (CSE) Department is partnering with the Center for Handicapped Children (CHC) and Elderwood Nursing Facility to solve socially relevant problems, in its capstone design courses. Such projects have long been used in the social sciences, and health professions to provide real-world experience. In computer science and engineering, such problems are typically viewed as too vague and outside the mainstream to be considered. However, the design of systems for the handicapped starting from an incompletely specified problem serves as an invaluable learning experience for students.

The use of socially relevant projects contrasts with traditionally well-defined problems with fairly direct solutions. Choosing a problem that is socially relevant and not within the experience of most students forces students to develop a high-level understanding and design before coding, as early implementation is not feasible. Clients such as health care providers and handicapped individuals rarely understand the capabilities of technology, cannot assess the complexity of desired features, and do not use the same vocabulary as CSE students. Through this experience, students learn to view project requirements and constraints from the domain of the client. Student teams elicit project specifications and constraints from clients, and are responsible for effective communication of design capabilities and complexities so they can make educated product decisions. For students these projects ceased to be purely academic exercises and became problems that required their full creative and cooperative energy.

When exploring sources for projects, the handicapped community had a wealth of unsolved and technologically complex problems. Partnering with these groups became a win-win experience. Not only does CSE provide much needed technical solutions, but engaging UB students and faculty in this effort focuses incredible creative energy. Students begin to see themselves as having the power to make a difference, responding with intensity and philanthropy. Clients have participated in the classroom experience as recipients and teachers. The program has rescued students at academic risk, broadened the understanding of college students to the needs and experiences of special needs individuals, enhanced the school's reputation, and delivered much-needed devices

Initially, CSE students were asked to build an augmentative communications device for a stroke patient in his 40s (Elderwood). While the stroke did not result

in cognitive impairment, limited motor skills and total speech impairment resulted. CSE students worked in teams to develop laptop devices. The best components were incorporated into one device and given to the client who uses it to communicate. Subsequently, we reassigned the project with new requirements to meet the needs of children with cerebral palsy.

The second project comes from a school (CHC) supporting special-needs youngsters. Students created a device to enhance choice-making and the teaching of cause-and-effect in physical, speech, and occupational therapy sessions with severely disabled youngsters. Through the development of a programmable station utilizing light, video, music, and sound, therapists create a choice-making, positive feedback or calming environment for youngsters who react positively to enhanced sensory experiences.

This paper explores the benefits and difficulties of such partnerships.