Teaching Computer Scientist to be Interaction Designers

At Southern Illinois University Edwardsville (SIUE), the Human-Computer Interaction (HCI) course is a required course which computer science students usually take in their junior year prior to the Senior Project Capstone course. The Senior Project Capstone course involves a team project spanning two semesters. Projects are solicited from the University and local community. Students are expected to carry out the entire project from initial requirements gathering to implementation and deployment.

The HCI course lays the foundation for performing the design work in the capstone course by presenting material on human aspects of interaction design, technological aspects of interface design, and design methodologies (See Table 1). Exercises in the HCI course include practicing design and data gathering techniques, critiquing existing software, and constructing interface elements. The HCI course includes a laboratory component that requires students to practice interacting with, gathering data from, and designing with users who do not have a technological background. The course is taught each fall and spring during 15-week semesters. Enrollment in each section of the course is restricted to no more than 30 students. Teaching strategies used in the course include lecture, demonstration, small group discussion and exercises, and a team design project. The prerequisite course for the HCI course, Interaction Programming, provides students with an understanding of event driven programming, graphical user interfaces (GUI), and one language to program GUIs.

Contextual Design	Steps in the design process including data gathering, interpretation, user modeling, brainstorming, paper prototyping, and usability testing.
Ethnographic Techniques	User observation, user interviewing, validating data, transcribing videotapes, and writing field notes
Psychology of HCI	Knowledge representation, mental models, conceptual modeling, perception, and memory constraints
HCI Design Concepts	Use of metaphors, icon design, affordance, visibility, feedback, constraints, heuristic evaluation, etc.
Organization and Visual Composition	Consistency, simplicity, readability, use of color, grouping, alignment, use of borders, symmetry, use of white space, balance, etc.
Social and Ethical Implications	Professional ethical responsibilities, design for disabilities, etc

Table 1: Topics Covered in the HCI Course

Contextual Design

The HCI course emphasizes techniques used in participatory design. Participatory design techniques require the software designer and the user to interact during the design process. Early in the process, the designers use ethnographic techniques to gather detailed data about the user and the tasks they perform. From the data, designers create models, develop interpretations, and recognize design implications. Later in the process, users and designers interact through prototypes, which allow users to participate in the process and refine the products. This approach to design is becoming more prevalent in industry. Consultation with St. Louis based companies

that use participatory design affirmed that our approach to software design is becoming a standard of practice. Members of the software design teams from Tripos Corporation and Edward Jones offered insightful input on the course redesign, and Grant Consulting provided significant help with the course development and usability lab design.

Contextual Design (CD) is a participatory design method developed by Hugh Beyer and Karen Holtzblatt (Beyer & Holtzblatt, 1997). The CD process stresses the use of customer data to drive the design process. Steps in the process attempt to engage the user as a partner in the design process right from the start. Initial data is collected through observation and interviews. The user is invited to be a co-designer through ongoing dialog throughout an iterative refinement process using paper prototypes. Steps in the CD Process are described in Table 2.

Design Steps & Concepts	Course Exercises
Contextual Inquiry: Involves collection of raw data through observations, interviews, and collection of artifacts. Enables the users to "teach" the designer what they know and how they go about doing their tasks. • Gather factual user data • Observation skills • Interviewing skills • Partnership-relationship with users • Writing field notes	Observation • Out-of-class • Observe an individual doing a public activity • Develop field notes Interviewing • In-class and out-of-class • Practice open-ended interviewing skills • In-class interview critiquing • Develop field notes Role Playing • In-class • Observe a design interview (role play) • Develop field notes (used for later modeling exercise)
Work Modeling: Organized data and provide a visual representation of data collected. • Organizes data around 5 aspects: Information flow, sequence of user activities, artifacts used in the task, cultural setting, and physical setting. • Builds shared (team) understanding of data	Work Modeling • In-class • Teams of 3-4 students develop flow, sequence, and artifact models from field notes developed from Role Playing Interview (above) • Practice a team process and "working-on-the-wall" method of team work
Visioning: Using the work models to recognize implications to the application design, teams brainstorm possible system solutions • Multiple ideas are generated. • Ideas are consolidated and refined until a single solution is created.	Brainstorming • In-Class • Teams brainstorm design ideas that the support the implications recognized in the work models. • Ideas presented to the class
Paper Prototyping	Project Milestone (See Table 3)
High-Fidelity Prototype	Project Milestone (See Table 3)

Table 2: Contextual Design Steps

Beyer, H., & Holztblatt, K. (1997). *Contextual design: A customer-centered approach to systems designs*. San Francisco, CA: Morgan Kaufman Publishers.