FY04 Innovations in Teaching with Technology Awards: Social Psychology Experiments in Immersive Virtual Social Environments

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Department(s): Sociology
What do you intend to do?
The primary purpose of this project is to introduce a laboratory experience to students in a General Education sociology course, "Social Psychology." As in many sciences, experimental methods are a key tool that social psychologists use to conduct research. Yet, unlike undergraduate curricula in other sciences, social psychology curricula do not routinely afford students opportunities to replicate classic experiments or to design and conduct their own experiments. This gap in social psychology curricula is due, in part, to the fact that social psychology research involves humans as both stimuli (i.e., sources of independent variables manipulated in experiments) and objects of observation (i.e., sources of dependent variables in the form of responses to manipulations of independent variables that are measured in experiments). In a course lab context, this gives rise to pragmatic issues (e.g., logistical difficulties and financial costs of providing each student with human resources for experimentation) and ethical concerns (e.g., executing research involving human subjects). I propose that virtual (social) environments may be a cost-effective solution to the pragmatic and ethical issues that have inhibited the introduction of labs in social psychology (and other social and behavioral sciences).

How will it improve student learning?
A. How the Project Addresses Program Criteria

(1) Innovativeness

This project is innovative in the combination of its pedagogical and technological dimensions. First, with respect to pedagogy, lab sections are not a new pedagogical tool in the sciences. Yet, labs are rare in the social and behavioral sciences. I am unaware of experimental labs being offered in any social psychology courses at the University of Iowa or at peer institutions. Consequently, the incorporation of a lab experience in social psychology is itself a pedagogical innovation.

Second, the use of immersive virtual environments in undergraduate education is a technological innovation. Many courses rely on "more or less" virtual environments to enhance teaching and learning. For example, e-mail, chat-rooms, bulletin boards can all be considered virtual environments, to some extent. That is, students' communications with one another and with teachers occurs in a space other than face-to-face. Furthermore, faculty at the University of Iowa (and elsewhere) have used virtual environments to hone students' skills and increase communication. Perhaps the most notable example of this at the University of Iowa was former Asst. Prof. Diane Davis' use of MOOs (Multi-User Domain Object Oriented). In her Rhetoric course, students created virtual rooms, populated them with objects (including characters), and assigned attributes to the objects. Students interacted with one another and the objects through text-based communications via networked computers.
Immersive virtual environments represent a more extensive use of virtual technology. These environments screen out non-virtual sensory experiences and incorporate synthesized sensory experiences. They range from (a) desktop environments (such as "The Sims" software), in which individuals use a computer and monitor to move through a graphical (as opposed to text-based) virtual environment and interact with objects and virtual agents, to (b) (theoretically) complete immersive environments in which all sensory experiences (i.e., visual, audio, touch, smell, and taste) are synthesized. I propose to use immersive virtual social environments to allow students to re-create and run classic social psychology experiments. In these environments, students will script the behavior of avatars, virtual agents, which can assume the appearances and behaviors of humans (as well as other objects). The scripted avatars will assume the role that is commonly played by "confederates" (i.e., human assistants to an experimenter who portray other participants in the experiment and who follow apre-determined behavioral script to introduce stimuli to the naive participants). The students will enter the virtual environments as experimental subjects through a head-mounted display (HMD) that screens out visual and audio stimuli from the physical environment and presents synthesized visual and audio stimuli representing the virtual environment. The student experimenters will measure subject responses (e.g., verbal utterances, movement, and other behavioral reactions) to the scripted virtual stimuli. The use of position and orientation tracking integrated with the HMD will operationalize some of these responses and facilitate the scripting of avatars to respond to actions initiated by participants in the experiments. Through this technology, I can overcome many of the pragmatic and ethical issues that have undermined the introduction of laboratory experiments in social psychology curricula.

The use of virtual reality technologies in the social and behavioral sciences is new. There is only one virtual reality laboratory housed in a social and behavioral sciences department in the U.S. (the Research Center for Virtual Environments and Behavior in the Dept. of Psychology at the University of California - Santa Barbara). One of the research scientists associated with this center offers a course, "Creating Multi-Person Virtual Environments." This course, however, is primarily a graduate course focusing on the "nuts and bolts" of designing virtual environments (e.g., principles of 3-D modeling, networking for gaming). Less attention is paid to teaching students social psychological theories and principles within the context of virtual reality. To my knowledge, the project I am proposing would be the first of its kind in the sense that it would use immersive virtual environments as a laboratory for undergraduate student experiments to teach social psychological theories and principles.

(2) Education Improvement

Lab experiences improve student understanding of scientific principles.1 Labs provide students with experiential access to abstract principles, which increases their substantive understanding. Labs enhance students' technical skills (e.g., use of instruments, measurement techniques). Labs expose students to the importance of systematic, well-defined, replicable procedures. This increases their appreciation for rigor in scientific investigations. The lack of labs in social sciences may be a reason why social sciences are not always perceived as sciences by students. All students will complete the IRB-required human subjects certification, enhancing their understanding of the unique demands and ethical considerations that play into scientific research involving human subjects. To summarize, the absence of labs leaves serious gaps in social science education that I will begin to address with this project.
Additionally, through this project, I will introduce students to an object-oriented scripting language (Python), which is similar to common programming languages. Students will also learn about the limitations of virtual social environments: What affects the social realism of such environments? Virtual technologies are being increasingly deployed in many areas of everyday life. The labs will better prepare students to confront these technologies as consumers and/or designers. Thus, this course may be useful to students in disciplines other than sociology (e.g., engineering, computer science, art).

(3) Courses and Students Affected

To maximize project impact, I will introduce the virtual social environments for labs within Social Psych (034:020) in fall 2004. This course, offered twice a year, is a gen-ed course, enrolling 100-150 students from many departments in early years of undergrad studies. As a pseudo-experiment to study the project’s effects, I will introduce the labs to 1/2 of the discussion sections in the fall (~50-75 students). The discussion sections are the vehicle through which students are exposed to experiments corresponding to abstract theories and principles that are conveyed in lectures. In the fall, however, 1/2 of the discussions will be converted to labs and, instead of discussing experiments, students in these sections will script and conduct them in the virtual social environments. The substantive content of the two types of sections will remain the same (and to the extent possible, other factors like instructor and class size will be held constant). This will allow me to systematically compare learning across the different types of sections (i.e., discussion vs. virtual lab). I will use general course evaluations, student grades, and customized evaluations in this assessment. In summer 2004 prior to the fall course, I will lead a grad workshop on social psych experiments in virtual social environments. About 5-7 students will take the workshop, providing grad training in this cutting-edge method of social science research and ensuring availability of grad students with the skills to act as TAs for the undergrad course.

(4) Replication in Other Departments/Units

The course in which I plan to implement this project is cross-disciplinary in the sense that it fulfills a General Education Requirement (GER). As a GER course, it enrolls students from a wide range of majors. Furthermore, social psychology is itself cross-disciplinary; it is taught in other departments and Colleges (e.g., within the College of Liberal Arts and Sciences in Psychology, Communication Studies, Political Science, and in the Colleges of Education and Business). My strategy of using virtual social environments for lab experiences may be transferable to other social science disciplines like political science, psychology, economics, and communication studies, in which experimental research is common, but which currently lack labs. Of course, this would require some expertise with respect to building and scripting virtual environments on the part of instructors. Finally, research related to immersive virtual environments is an area being pursued by faculty and students involved with human factors research (mostly in engineering and computer science). This line of work, however, does not routinely focus on the social psychological dimensions of virtual environments. Consequently, there may be opportunities for developing team-taught and/or cross-listed courses based on this technology that incorporate recognition of the social dimensions of virtual environments.

(5) Other Significance of Project

The significance of this project lies in its integration of a common pedagogical tool in science (labs) with an emerging technology (virtual reality), and the incorporation of that integration in a social sciences curriculum to
enhance students' understanding of abstract social psychological principles, technical skills, and appreciation for scientific rigor in the social and behavioral sciences. The project represents a cost-effective strategy for overcoming pragmatic and ethical barriers that have inhibited the introduction of labs in many social and behavioral sciences.


### What resources will you need?

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<tr>
<th>Item</th>
<th>Department, Center &amp; PI Resources</th>
<th>Request Funds</th>
<th>Project Total</th>
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<tr>
<td>a) Vizard Software</td>
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<td>b) Graduate TA</td>
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<td>d) Virtual Research v-8 HMD</td>
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### Rough estimate of costs

As noted in the project budget, the PI, Department of Sociology, and Center for the Study of Group Processes are providing cost sharing via software, a multi-media computer, project space, and dedication of a graduate TA to the project. In addition, I submitted a similar proposal (same project) to the College of Liberal Arts and Sciences' Student Computing Fees Program. Associate Dean Joseph Kearney (who is overseeing the CLAS program) advised me that the CLAS is interested in supporting the project at some level and would like to explore cost sharing on it with the Innovations in Instructional Computing program. He did not, however, advise me as to the level of cost sharing that the CLAS could/would contribute, but did indicate that he had discussed this with Molly Langstaff.