

Teaching the *How* of Cognitive Science: The Inquiry Website

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Cognitive scientists are pretty adept at coordinating multiple methods and perspectives; it is what we do. Teaching other people to do it is harder, especially when the other people are whole classes of undergraduates in one of the new cognitive science majors or specializations. The challenge is to provide students with (a) a sufficient understanding of some of the methods used in the contributing fields, (b) the strengths and weaknesses of these methods, and (c) how they can be coordinated in interdisciplinary research to achieve new understanding.

Inquiry is a web-based curriculum for introducing students to the range of research methods employed in cognitive science. This tutorial provides an opportunity to hear about Inquiry and the ideas it embodies, to interact with it in a group setting, and to help and be helped to improve undergraduate education in cognitive science.

To promote active understanding of the research methods that are introduced, the course materials are interactive. For example, instead of just providing a definition of cognitive science, students are guided to construct their own characterization after identifying and classifying a variety of phenomena as cognitive or not. They are then challenged to test the adequacy of their characterization in light of other phenomena and characterizations advanced by other students. Such devices as animation, pop-up windows, and a dynamic menu system also increase students' engagement.

The materials are organized into semi-independent modules that can be selected and recombined to meet the objectives of particular courses. To provide integration to the different methods, research on memory provides a common theme, but examples from a variety of other domains are offered as well.

The core modules for the course are divided into empirical strategies and modeling strategies. The range of empirical strategies addressed includes observational and correlational techniques, causal reasoning, including the use of directed graphs, and various experimental designs. The modeling strategies include mechanistic modeling, mathematical modeling, symbolic modeling, and neural

network modeling. The final set of modules (not yet available) focus on the integration of research techniques; cases examined include neuroimaging and memory research on the hippocampus.

In addition to the materials for student use, a variety of tools have been designed to enable instructors to utilize these modules and to supplement them with material of their own or found elsewhere on the web. The instructors' site also offers reports of web usage organized by student or by module and a "lab manual" that provides ideas and guidance for in-class projects designed to make the material more concrete.

In one of the in-class projects, students are given a complex mechanism (e.g., a Pachinko Machine) and are given the task of understanding how it works and of communicating that understanding in writing or in a diagram. In another class, students watch raw footage of an amnesic patient (K.C.) being questioned by a psychologist and are then asked to diagnose his memory deficit on the basis of the interview. In a more extensive project, each student is asked to construct an interesting experiment in a field of their choice, to envision possible results, and to say something about what each possible result would mean.

This tutorial will provide hands-on experience with both the web-based modules for students that have been developed so far and the tools and lab manual designed for instructors. Participants will be invited to incorporate some of these modules and tools into their own courses, and will receive guidance in doing so. Since the design of the materials is ongoing, participants also may provide feedback on how to make the Inquiry site (<http://inquiry.wustl.edu>) more useful to students and instructors at a broad range of educational institutions.

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