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WORKSHOP

Interactive Computer-Based Activities for Undergraduate Cog Sci Instruction: Training in their Use & Exploring Future Directions in their Development and Dissemination

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Keywords: Instruction; pedagogy; online experiments; cognitive psychology; artificial intelligence; robotics; neurobiology; anthropology; linguistics; EEG; visual search; color terms; dopamine; inquiry-based instruction; Chinese Room argument.

Overview

This all-day workshop will provide training in the use of interactive computer-based curriculum modules which offer undergraduates an effective “hands-on” introduction to a wide range of research methodologies in the cognitive sciences. The expertise of researchers from many different disciplines is built into online modules that give students research activities that can be accomplished in 1-2 hours as a “take-home” assignment or that can be used during an in-class computer lab session. Some of the modules are designed for use by students with little or no previous background in the field and some can either be used with intro-level students or made more ambitious for upper-division majors in cognitive science or related disciplines. The modules to be introduced with include but is not limited to the following:

Robotics: Top-Down and Bottom-Up

- (A) Building Top-Down Robots – Real & Virtual
- (B) Building Bottom-Up Robots – Real & Virtual

Neuroscience

- (A) Virtual EEG Lab: Design and Run EEG Experiment – get real EEG data
- (B) Virtual Neuroscience Lab: Become a researcher in a Rat-Cocaine-Dopamine Study

The Nature of Computation

- (A) Online Turing Machine: Students learn to program an easy-to-use Turing machine
- (B) Online Artificial Neural Net

Foundational Issues in Cognitive Science

- (A) Virtual Anthropology Lab: Students gather data on color terms and study the broader controversy involving the universalism of Berlin & Kay, relativism of Sapir-Whorf, etc.
- (B) Searle’s Chinese Room: Students enter an analog to Searle’s Chinese room, engage with virtual robots controlled by Chinese room, and join the debate over this lightning rod of an argument.

Visual Search & Model-Based Reasoning

- (A) Design and Run Online Visual Search Experiment
- (B) Explore “model-based reasoning” and its contribution to student learning.

Participant Contributions

(A) Participants who have submitted their own research modules, will give brief presentation.

(B) Participants who have submitted other instructional materials -- syllabi, expanded modules, software, etc. -- will give a brief presentation.

While a majority of the Workshop will be spent on training participants in the use of interactive online curriculum modules, the workshop will end with an open-ended discussion of the future of instructional technology and the publication and dissemination of digital content.

The Future of Instructional Technology

(A) Digital Archives & Dissemination – including the new Archive for the Consortium on Mind/Brain Instruction hosted by Indiana University

(B) Digital Publishing – developing new standards for the use and re-use of electronic content.

(C) Discuss collaborations to further the development of interactive online curriculum and undergraduate research projects.

Goals

The workshop is designed for anyone who teaches courses in the cognitive sciences or related disciplines and who wants to give students engaging, hands-on research experiences in the use of research methodologies that are not otherwise available to them in the classroom. The goal is to equip participants with everything they need to enhance their courses with exciting new research-oriented content, including training in the use of the online activities and software as well as creative ideas about how make maximum pedagogical use of the interactive materials.

This workshop will bring together consumers and producers to explore the best pedagogical uses of existing content and to form collaborations between users and producers to test and refine existing content and to design and produce new content. The goals are to increase use of first-rate online content in classrooms, to encourage the

continuing development of new content, and to form permanent working groups, possibly associated with the Consortium on Mind/Brain Instruction, that will provide an ongoing organizational structure to ensure the longevity of these efforts.

Presenters

The workshop has an able group of presenters, many of whom are providing training in modules that they have created, all of whom have extensive experience in the undergraduate cognitive science instruction. The Presenters in alphabetical order are:

David Leech Anderson (Philosophy) Illinois State University

Peter Bradley (Philosophy / Computer Science) McDaniel College

Gary Bradshaw (Psychology) Mississippi State University

Ruth Eberle (Informatics) Indiana University

Ken Livingston (Psychology) Vassar College

Neil Stillings (Psychology) Hampshire College

Module developers who are unable to attend the workshop, but whose modules will be featured include:

Bill Bechtel (Philosophy) University of California, San Diego

Thomas Busey (Psychology) Indiana University

Robert Stufflebeam (Philosophy) University of New Orleans)

Acknowledgments

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