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Cognition, Collaboration, and Technology
Instructor: Dr. Cindy Hmelo-Silver

Thursday 4:50- 7:30
GSE 314
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How computers can serve as cognitive, metacognitive and social tools?
What effects do multimedia, simulations, and modeling tools have on learning?
In what ways can technology be used to support student collaboration and reflection?
How can we understand the effects *with* and effects *of* computer-based learning environments

This seminar will tackle these questions as we consider cognitive, constructivist, and sociocultural approaches to learning and teaching with technology. A myriad of educational technology has been developed over the last decade, much of it based on psychological research on how people think and learn. We will explore a number of technologies ranging from those that provide information such as hypermedia to technologies that support collaborative learning to those that provide expressive media for learners. We will discuss factors that are important to the success and failures of these approaches as well as exploring the research issues inherent in these learning environments. We will examine the nature of knowledge construction, collaboration, and distributed cognition by discussing the relevant literature, demonstrations of different examples of these technologies. In addition, we will consider some of the Web 2.0 technologies and look to the future to see how these might be important in education.

Course requirements:

1) Class attendance is mandatory. This will be a discussion-based seminar and being here is half the fun. Class participation will account for 10% of the class grade. Any absences above 2 will lead to a grade reduction. When class is online, be sure to check in regularly to engage in scheduled activities.
2) Lead a discussion: All students will lead discussions on 1-2 readings (5% of grade). The discussion should open with the 3 key points from each readings—this should take no more than 5 minutes with another 10 minutes allotted to a software demo (see 3). Discussion questions should be posted by the 11:00 the night before class in the discussion board.
3) Demonstrate software: All students will demonstrate an exemplary piece of software and explain the learning sciences principles underlying the software design as part of leading the discussion (5%).
4) Reflect and participate in online blogs and discussion (15%)—All students will post reflections and discussion questions on their blog by 8:00 pm the night before class. You should respond to at least 2 other students' blogs each week. You can access the blogs through Sakai. Timeliness is important and will be factored into the grade.
5) Learn a tool: All students will learn to use a new tool such as NetLogo, HubNet, FLE3, Boxer, Squeak, Second Life, etc. (15%). Demonstration of minimal proficiency is negotiable but should involve creating an artifact. You may develop a portfolio that demonstrates your proficiency (this can include intermediate products enroute to your

final project such as code examples, CDs, etc. with an explanation of how these show proficiency and reflections on how you went about learning).

6) Project proposal (5%). This will allow you to get early feedback. **Due March 24**. This should be 2-3 pages with appropriate figures that lays out clearly what your project team will be doing. It should be clear which option you are choosing for your project (see below).
7) Theoretical framework or design principles for your project (5%). This should be 2-3 pages that explains the conceptual underpinning of your project..
8) Needs analysis or data analysis plan (15%). This should present the results of your analysis of interviews and any supporting literature for a needs analysis.
9) Final project. (30% of grade). You are encouraged to work on these projects in teams.

There are two options for your project:

a. Design a learning environment . Make sure that you do human-centered design: begin with a group of people with a need, and show how you can use technology to meet that need. Begin by doing interviews with 3-6 members of your target user group. Each team member must do at least 2 interviews. This should be a needs analysis, not just what people think of your design (e.g., why is the area that you are tackling something that might benefit from technology support).

    i. For each design decision, explain why you made the decision you made.

    ii. Write a 'scenario' of your learning environment in use--tell a fictional story of one or two people coming to use the site, and what they do on the site.

    iii. Cite the readings in your analysis. Where appropriate, note possible alternate design approaches and explain why you chose the approach you did. Compare and contrast your proposed site to existing sites, especially those we've viewed in class.

    iv. In a paint program, powerpoint or other prototyping tool or by hand, prepare designs for all the main screens of your system. Include these in your paper. It is not necessary to write any code or do any actual implementation work.

    v. In your paper, make sure to cite the course readings and include a detailed bibliography that may also go beyond course readings.

    vi. This is not an exercise in science fiction-- please make your design technically realizable. Do not include features that require major technological advances to achieve.

Include a page in your paper noting who on your team did what.

Grading criteria:

- Insight into design, usability, and usefulness issues
- Writing
- Background research
- Attention to detail
- Use of readings

- APA style

b. Evaluate a learning environment. This might involve a usability study in trying to use a learning environment to achieve a task or possibly the use of a tool to design a learning environment. It might also involve trying to understand how learners work with a learning environment or piece of educational software. It might also involve studying an online community. This would most likely involve use of existing data. If you collect new data, you may need to check with IRB and get their approval (there are some exceptions for course-related projects).

   i. Consider ways in which the learning environment is successful of not with respect to learning or other goals. For example, if you are evaluating videomosaic.org, you might study how easy it is to locate videos for a particular professional development goal. If you are looking at video of students using a software, you might examine inquiry practices, motivation, collaboration, etc.

   ii. If you plan to do such research, please discuss this with me early in the semester as I have several datasets that could be used and usability projects that I can suggest. In any event, your project must be approved by the instructor before you begin work.

   iii. In your paper, make sure to cite the course readings and include a detailed bibliography.

   iv. Include in your paper a "methods" section in which you describe how you did your research and analysis.

   v. At the end of your paper, include a short description of which team member did what.

   Grading criteria

   - Quality of writing.
   - Attention to detail.
   - APA style
   - Quality of field work.
   - Thoughtful citation of course readings. Show me that you have done the readings and they have aided in your understanding of what you observed.
   - Insight into research issues about the design of online communities.

Tentative Class Schedule

	Date	Topic	Readings	Assignments and activities
1	January 19	**Introduction**	Bush (1945) Pea (2011) CSCL Keynote video	Blog: Introductions
	January 26 Online	**Technology for Learning: The big picture**	National Educational Technology Plan Collins & Halverson (2009) Woolf (2010)	Blog: Reflections, questions Forum: Questions and themes about technology
2	February 2	**Design, Multimedia as a tool for learning**	Kirschner et al., (2004) Dennen & Hoadley (in press) Explore short usability tutorial: http://www.utexas.edu/learn/usability/index.html Liu & Hmelo-Silver (2009) Explore: http://reptools.rutgers.edu/	Blog: Reflections, questions In class: Be prepared to select discussion leaders
3	February 9 Online	**Computers as Metacognitive Tools, Technology and Culture**	Winne et al., (in press) Zhang et al., (in press)	Blog: Reflections, questions Initial project ideas, team formation
4	February 16	**Computers as Tools for Inquiry**	Wilensky & Reismann (2006) de Jong (2006) Linn et al (2006) Explore: http://www.ccl.sesp.northwestern.edu/netlogo	Blog: Reflections, questions
5	February 23	**Computers as Scaffolds**	Reiser (2004) Fisher et al. (in press) Davis (2003)	Blog: Reflections, questions

			Explore: http://wise.berkeley.edu/pages/intro/wiseIntro01.html	
6	March 1 Online	**Learning and social media, Computer supported-collaborative learning**	Greenhow (2009) Stahl, Suthers, and Koschmann (2006) Jeong & Hmelo-Silver (2011)	Blog: Reflections, questions Project proposals due
7	March 8	**Tools for Knowledge Building**	Chan (in press) Van Aalst & Chan (2007) http://www.knowledgeforum.com/K-12/products.htm	Blog: Reflections, questions **Tool portfolio due**
8	March 22	**Analyzing data from technology-rich learning environments**	Guest speaker: Gregory Dyke, Carnegie Mellon Reading TBA	Blog: Reflections, questions **Theoretical framework due**
9	March 29 Online	**Mobile computing**	Looi et al (in press) Squire (2010)	Blog: Reflections, questions
10	April 5	**Multimodal literacies and new media**	Jewitt (2008) Barron et al. (2010)	Blog: Reflections, questions **Needs analysis due**
11	April 12 Online	**Online communities, virtual worlds, games 1**	Steinkuehler (2006) Gee (2008) Shute (2011) Explore: Second life, whyville, river city	Blog: Reflections, questions
12	April 19 Online	**Online communities, virtual worlds, games II**	Fields & Kafai (2009) Clark-Midura & Dede (2010)	Blog: Reflections, questions

13	April 26	**Video as a tool for learning**	Derry et al. (2006) Hmelo-Silver et al. (2010) Explore: videomosaic.org http://stellar.wcer.wisc.edu/Dev/kw/SignIn/pbl/step01 (id: demo2; password: testing2)	Blog: Reflections, questions
14	May 5	**Project presentations**		**Project due**

Readings (subject to modification)

Many of the in-press citations (not individually listed here) are from Hmelo-Silver, C. E., Chinn, C., Chan, C. K. K., & O'Donnell (in press). *International Handbook of Collaborative Learning.* Taylor & Francis.

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