

The Learning Sciences
Education 737; Psychology 808; SI 705
Winter 2006
Mondays 1 p.m. – 4 p.m. Room: 4437 East Hall

Instructors

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Overview of the Course

This course will explore topics of interest to learning sciences scholars, including cognitive and socio-cognitive theories of learning, learning in communities of work and practice, design-based research methodologies, learner-centered theories of design, learning in the professions, and learning in the disciplines. We will base our exploration on the forthcoming *Cambridge Handbook of the Learning Sciences*, and supplement our readings with key and classic articles that inform the learning sciences community. We will regularly feature speakers from the University of Michigan (and beyond) who represent the best work related to our focal topics.

Course Evaluation and Assignments

- Students will be required to submit reaction papers each week by Sunday evening at 5pm prior to that week's class meeting. (15%)
- Student teams will be assigned to be responsible for preparing questions for our speakers, or for hands-on sessions with technology when and where appropriate. (5%)
- Students are expected to be actively involved in class discussions. (10%)
- Students will have one short assignment where they propose existing courses from their own units that would be appropriate to include in a certificate program in Learning Sciences at UM. (5%)
- Students will write one paper exploring a topic they care about from the learning sciences in-depth. We will have a collaborative paper exchange, where students comment on a first draft of each others' work. (draft 10%, peer review 5%, final version 50%)

Communication

We will use CTools to post announcements, collect and provide feedback on assignments, and for discussions (including posting of reading reactions). To communicate with the class via email, please use the CTools email address, LSSeminar@ctools.umich.edu.

Note: We reserve the right to change assignments and/or readings as we go! Please watch for announcements in your email and on CTools.

Week 1 January 9: Introductions

Chapter 2. Foundations and opportunities for an interdisciplinary science of learning. John Bransford, Brigid Barron, Roy Pea, Andrew Meltzoff, Pat Kuhl, Phil Bell, Reed Stevens, Dan Schwartz, Nancy Vye, Byron Reeves, Jeremy Roschelle and Nora Sabelli.

Week 2 January 16: No Class Martin Luther King Holiday

Week 3 January 23: Learning Theories (or Theoretical Approaches in Learning Sciences)

Chapter 5. Cognitive Tutors: Technology bringing learning science to the classroom. Ken Koedinger and Albert Corbett.

Chapter 6. Learning in activity. James G. Greeno.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-42.

Lemke, J. (2000). Across the scales of time: Artifacts, activities, and meanings in ecosocial systems. *Mind, Culture, and Activity*, 7(4), 273-290.

Guests: Jay Lemke, School of Education and Janet Kolodner, Georgia Institute of Technology

Week 4 January 30: Research Methodologies

Chapter 9. The evolution of design studies as methodology. Jere Confrey.

Chapter 10. Design-based research: A methodological toolkit for the learning scientist. Sasha Barab.

Chapter 12. Analyzing collaborative discourse. R. Keith Sawyer.

Chi, M. T. (1997). Quantifying qualitative analyses of verbal data: A practical guide. *The Journal of the Learning Sciences*, 6(3), 271-315.

Guest: Judy Olson, School of Information, School of Business, Dept. of Psychology

Week 5 February 6: Design Methodologies

Chapter 8. Learner-centered design: Reflections on the past and directions for the future. Chris Quintana, Namsoo Shin, Cathleen Norris, and Elliot Soloway.

Olson, J. & Moran, T. (1995) Mapping the method muddle: Guidance in using methods for user interface design. In the *Proceedings of a Workshop on Human-Computer Interface Design* (pp. 269 – 300). San Francisco: Morgan Kaufmann Publishers Inc.

Guests: Chris Quintana, School of Education and John Laird, Electrical Engin. & Computer Sci.

Week 6 February 13: Socially-Constructed Learning (and Science Education)

Chapter 20. Making authentic practices accessible to learners: Design challenges and strategies. Daniel C. Edelson and Brian J. Reiser.

Chapter 19. Project-based learning. Joseph S. Krajcik and Phyllis Blumenfeld.

Chapter 21. BioKIDS: An animated conversation on the development of curricular activity structures for inquiry science. Nancy Butler Songer.

Guest: Joe Krajcik, School of Education

Week 7 February 20: Collaborative Learning

Chapter 24. Computer-supported collaborative learning. Gerry Stahl, Timothy Koschmann, and Daniel D. Suthers.

Chapter 27. Learning in online communities. Amy Bruckman.

Dillenbourg, P. (1999). What do you mean by “collaborative learning”? In P. Dillenbourg (Ed.) *Collaborative Learning: Cognitive and Computational Approaches* (pp. 1-19). Oxford, Elsevier.

Guest: Tom Finholt, School of Information

Week 8 February 27: No class—Winter break

** Paper proposal due by February 27 (5 pm). 500 word prospectus or paper outline.

Week 9 March 6: Learning in the Professions I (Medicine)

Koschmann, T., Myers, A. C., Feltovich, P. J., & Barrows, H. S. (1993). Using technology to assist in realizing effective learning and instruction: A principled approach to the use of computers in collaborative learning. *The Journal of the Learning Sciences*, 3(3), 227-264. JSTOR URL (tinyurl): <http://tinyurl.com/p3c9f>

Kemper, K.J., et al. (2002). Randomized trial of an Internet curriculum on herbal and other dietary supplements for health care professionals. *Academic Medicine*, 77(9), 882-889.

Chumley-Jones, H.S., Dobbie, A., & Alford, C.L. (2002). Web-based learning: Sound educational method or hype? A review of the evaluation literature. *Academic Medicine*, 77(10), 886-893.

Guest: Larry Gruppen, Medical Education

Due: Learning Sciences course suggestions document.

Week 10 March 13/March 16 (Special class meeting on Thursday)

Cognition and Technology Group at Vanderbilt. (1990). Anchored instruction and its relationship to situated cognition. *Educational Researcher* (August-September), 2-10.

Bransford, J. D., Sherwood, R. D., Hasselbring, T. S., Kinzer, C. K., & Williams, S. M. (1990). Anchored instruction: Why we need it and how technology can help. In D. Nix & R. Spiro (Eds.), *Cognition, Education, and Multimedia: Exploring Ideas in High Technology* (pp. 115-141). Hillsdale, NJ: Erlbaum.

Bransford, J. D., & Schwartz, D. (1999). Rethinking transfer: A simple proposal with multiple implications. In A. Iran-Nejad & P. D. Pearson (Eds.) *Review of Research in Education*, 24, pp. 61-100. Washington, DC: American Educational Research Association.

Guest: John Bransford (on 3/16 as Learning Sciences speaker series guest)

Week 11 March 20: Learning in the Professions II (Teacher Education)

Chapter 32. Teacher learning research and the learning sciences. Barry J. Fishman and Elizabeth A. Davis.

Schlager, M. S., Fusco, J., & Schank, P. (2002). Evolution of an online education community of practice. In K. A. Renninger & W. Shumar (Eds.), *Building Virtual Communities: Learning and Change in Cyberspace* (pp. 129-158). Cambridge, England: Cambridge University Press.

Davis, E. A., & Krajcik, J. S. (2005). Designing educative curriculum materials to promote teacher learning. *Educational Researcher*, 34(3), 2-14.

Guest: Betsy Davis, School of Education

Week 12 March 27: Motivation

Chapter 28. Motivation and cognitive engagement in learning environments. Phyllis C. Blumenfeld, Toni M. Kempler, and Joseph S. Krajcik

Lepper, M. R., & Malone, T. W. (1987). Intrinsic motivation and instructional effectiveness in computer-based education. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, learning, and instruction: Cognitive and affective process analysis* (Vol. 3, pp. 255-285). Hillsdale, NJ: Erlbaum.

- or -

Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, learning, and instruction: Cognitive and affective process analysis* (Vol. 3, pp. 223-253). Hillsdale, NJ: Erlbaum.

Reading suggested by guest speaker – TBD

Guest: Phyllis Blumenfeld, School of Education

** Rough draft of paper due (5 pm).

Week 13 April 3: Mathematics Learning

Chapter 11. Guiding inquiry-based math learning. Paul Cobb and Kay McClain

Confrey, J., Castro-Filho, J., & Wilhelm, J. (2000). Implementation research as a means to link systemic reform and applied psychology in mathematics education. *Educational Psychologist*, 35(3), 179-191.

Reading suggested by guest speaker - TBD

Guest: TBD

** Peer review due (5 pm).

Week 14 April 10: Cognitive Foundations of Learning Sciences

Bruer, J. (1993). *Schools for Thought: A Science of Learning in the Classroom*. Cambridge, MA: MIT Press. (Chapters 1 and 2).

Byrne, J. P., & Fox, N. (1998). The educational relevance of cognitive neuroscience. *Educational Psychology Review*, 10, 297-342. Additional possible reading

Schwartz, D., & Heiser, J. *Spatial representations and imagery in learning*. (Chapter 17).

Schwartz, D., & Bransford, J. D. (1998) A time for telling. *Cognition and Instruction*, 16, 475-522.

Klahr, D., & Nigam, M. (2004). The equivalence of learning paths in early science instruction: Effects of direct instruction and discovery learning, *Psychological Science*, 15, 661.

Week 15 April 17: Literacy

Chapter 18. Literacy and the learning sciences. Annemarie Palincsar and Barbara G. Ladewski.

Reading suggested by guest speaker - TBD

Guest: Annemarie Palincsar, School of Education

Finals Week

Final papers due Friday, April 21 (5 pm) 15-20 pages

Some Hints for Preparing Reading Reactions

- By Sunday afternoon at 5pm prior to each week's class, you are responsible for posting your reading reactions to the appropriate CTools discussion thread.
- Your reactions should consist of the following three elements:
 1. A brief statement about what you thought the most important idea or ideas was in each of the papers or chapters or books we read for this week.
 2. Some issues that you would like us to explore further in class discussion
 3. Some questions you would ask the author if you could (and you might be able to!)
- Your reaction should be personal, and not a response to what others might have posted before you. After you have posted your reaction, feel free to use the discussion tools to comment on others' reactions.
- Reactions need not be scholarly, but they should be thoughtful.

Some Hints for Preparing for to Co-Lead Class

There are two goals in this activity: to have diverse and interesting frameworks for class meetings, and to develop your discussion leadership and facilitation skills. Here are some of the things this entails:

- Think about how *you* would like to see the information for this week presented or discussed.
- Consider and integrate the comments of your classmates from their reading reactions.
- Meet with the professor(s) as soon as possible to begin planning for your week(s).
- If appropriate, coordinate with the guest speaker (check with the professor on this one).
- Develop an activity with relevance to the week's reading (if possible).
- Prepare the class to interact with the guest speaker (if applicable).
- Lead a debriefing discussion with the class at the end of the session.