Interactive Learning Environments – Fall 2008

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Course Objectives

This course explores issues of design and use of learning technologies in classroom settings. We will explore several questions about how specific interactive environments are designed and implemented, as well as how they impact classroom dynamics and student learning. What are the underlying theories of teaching and learning that have influenced design of a particular learning environment? What factors contribute to the use of interactive environments in a classroom? What role does the teacher play? How can we assess student learning in a technology rich learning environment?

We will focus on three main themes. First, we will explore the theoretical underpinnings that have informed the design of learning environments. Second, we will discuss how factors in the classroom environment, such as teacher facilitation, curriculum and student interactions impact the ways in which learning technologies are used in a classroom. Third, we will explore how a systematic study of the design of learning environments can be achieved by examining both learning outcomes and classroom enactments.

Design project

Your final project will be the design of a learning environment for teaching in a particular domain. You will include in your design proposal, the theory that your design is based on, the domain that your design addresses, identified student needs in that domain and how your design will address these needs. You can either design curriculum to use existing technology, or propose a design for new technology. You can include mock screen shots to illustrate features of your software environment.

You will need to prepare a report to address the following:

- Objectives - What is the domain or skill that you wish to support?
- Audience - Who are your students? What are the known student needs in this domain and how are you addressing them in your design?
- Philosophy - What are the epistemologies that have guided the design of that technology? Why do you think they are appropriate for this domain?
- Rationale for using technology - How does the technology meet the objectives that you have set?
- Assessment - How will you assess whether or nor students are learning, what are the types of data that you will collect
- Describe the activity (or activities) students will undertake, the time frame, and the products they will produce (with examples where possible).
- References / Bibliography in APA format.

Your report should be no longer than 25 pages (double spaced) and is due on December 9th.

We will have project milestones along the way, so that you can get feedback on your designs.

Syllabus

Introduction

Scaffolding student learning: Issues and Approaches

Stone, C. A. (1998). The metaphor of scaffolding: Its utility for the field of learning disabilities. *Journal of Learning Disabilities, 31*(4), 344-364.

Stone, C. A. (1998). Should we salvage the scaffolding metaphor? *Journal of Learning Disabilities, 31*(4), 409-413.

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Technology support for scaffolding

Reiser, Brian J. (2004). Scaffolding complex learning: The mechanisms of structuring and problematizing student work. *Journal of the Learning Sciences*: 13(3), 273-304.

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Tabak, I. (2004*).* Synergy: A Complement to Emerging Patterns of Distributed Scaffolding, *Journal of the Learning Sciences, 13(3),* 305-335.

Puntambekar, S., & Hübscher, R. (2005) Tools for scaffolding students in a complex environment: What have we gained and what have we missed? *Educational Psychologist. Vol. 40 (1)*, 1-12.

Learning from digital text

Rouet, J-F. (2006). Comprehending multiple documents. In J-F. Rouet, *The skills of document use: From text comprehension to web-based learning*, (pp. 62-91).

Naumann, J., Richter, T., Flender, J., Christmann, U., & Groeben, N. (2007). Signaling in expository hypertexts compensates for deficits in reading skill. *Journal of Educational Psychology, 99*, 791-807.

Shapiro, A., & Niederhauser, D. (2004). Learning from hypertext: Research issues and findings. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (2nd ed.) (pp. 605-620). Mahwah, NJ: Erlbaum

McNamara, D.S., & Shapiro, A.M. (2005). Multimedia and hypermedia solutions for promoting metacognitive engagement, coherence, and learning. *Journal of Educational Computing Research, 33*, 1-29.

Intelligent tutoring systems

Nwana H.S. (1990). Intelligent Tutoring Systems: an overview . *Artificial Intelligence Review, 4*, 251-277.

Brusilovsky, P. (2004). Adaptive navigation support: From adaptive hypermedia to the adaptive Web and beyond. *Psychology 2 (1*).

Biswas, G., Leelawong, K., Schwartz, D., Vye, N. & The Teachable Agents Group at Vanderbilt (2005). Learning By Teaching: A New Agent Paradigm for Educational Software, *Applied Artificial Intelligence*, vol. 19, (pp. 363-392).

Koedinger, K. R., & Corbett, A. (2006). Cognitive Tutors. In R. K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (pp. *61 -77)*. New York: Cambridge University Press.

Lab: ELM-ARThttp://apsymac33.uni-trier.de:8080/Lisp-Course

Learning with Hand-held devices
Project Milestone: Initial project ideas

Sharples, M., Taylor, J., Vavoula, G. (2005) Towards a theory of mobile learning. To be published in *Proceedings of mLearn 2005 Conference*, Cape Town.

Roschelle, J., Patton, C., Tatar, D. (2007). Designing networked handheld devices to enhance school learning. In M. Zelkowitz, Ed. *Advances in Computers, 70,* 1-60.

Vahey, P., Tatar, D., & Roschelle, J. (2007). Using handheld technology to move between private and public interactions in the classroom. In M. van 't Hooft & K. Swan (Eds.). *Ubiquitous computing in education: Invisible technology, visible impact* (pp. 187-210). Mahwah, NJ: Lawrence Erlbaum Associates.

October 14: Constructionism

Papert, S. (1996) Situating Constructionism In I. Harel and S. Papert, Constructionism, Ablex, Norwood, NJ.

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Resnick, M., Berg, R., and Eisenberg, M. (2000). Beyond Black Boxes: Bringing Transparency and Aesthetics Back to Scientific Investigation. *Journal of the Learning Sciences*, vol. 9, no. 1, pp. 7-30.

Learning from multiple representations

Ainsworth, S.E (2006) DeFT: A conceptual framework for learning with multiple representations, *Learning and Instruction, 16(3)*, 183-198.

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Kozma, R. (2003). Material and Social Affordances of Multiple Representations for Science Understanding. *Learning and Instruction*, 13(2), 205-226.

Computer supported collaborative learning

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Stahl, G., Koschmann, T, & Suthers, D. (2006). Computer supported collaborative learning: A historical perspective. *The Cambridge Handbook of the Learning Sciences* (pp. 409-426). New York: Cambridge University Press.

Sawyer, R. K. (2006). Analyzing Collaborative Discourse. In R. K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (pp. *1* 87-204). New York: Cambridge University Press.

Suthers, D. D. (2006). Technology affordances for intersubjective meaning making: A research

agenda for CSCL. International Journal of Computer-Supported Collaborative Learning (ijCSCL), 1 (3), 315-337.

Design of learning environments, role of the teacher and curricula

Puntambekar, S., Stylianou, A., & Goldstein, J., (2007). Comparing Classroom Enactments of an Inquiry Curriculum: Lessons Learned From Two Teachers *Journal of the Learning Sciences*. 16(1), 81-130.

Davis, E. A. & Krajcik, J. S. (2005) Designing Educative Curriculum Materials to Promote Teacher Learning, *Educational Researcher, 34(3*), 3-14.

Ball, D. L., & Cohen, D. K. (1996). Reform by the book: What is—or might be—the role of curriculum materials in teacher learning and instructional reform? *Educational Researcher, 25,* 6–8, 14.

Cohen, D. K., & Ball, D. L. (2001). Making change: Instruction and its improvement. *Phi Delta Kappan, 83*(1), 73–77.

Design-based research

Brown, A. L. (1992). Design Experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. Journal of the learning sciences, 2 (2), 141-178.

Barab, S. (2006). A Methodological Toolkit for the Learning Student. In R. K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (pp. 153-169). New York: Cambridge University Press.

The Design-Based Research Collective. (2003). Design-based research: An Emerging Paradigm for Educational Inquiry. *Educational Researcher, 32*, 1, pp. 5–8.

Assessment of student learning: Log files, concept maps

Osmundson, E., Chung, G. K. W. K., Herl, H. E., & Klein, D. C. D. *Knowledge Mapping in the Classroom: A Tool for Examining the Development of Students' Conceptual Understandings.*

Ruiz-Primo, M. A., Schultz, S., Li, M., Shavelson, R. J. *On the Cognitive Validity of Interpretations of Scores From Alternative Concept Mapping Techniques*

Puntambekar, S., Stylianou, A., & Hübscher, R. (2003) Improving navigation and learning in hypertext environments with navigable concept maps. *Human Computer Interaction,* 18 (4), pp. 395-426. (Will be emailed to class).