Ed Tec 6444/Ed Psy 6444: Cognition and Technology
Spring 2010: Mondays, 5:30-8:10pm
Villa 155 Learning Studio

Joe Polman, Ph.D.
Office Hours: Mondays 3-5pm, or by appointment
Office: Marillac 301
Phone: 516-4804
Email: polman@umsl.edu
Mygateway course web site at: http://mygateway.umsl.edu

A Note on this Syllabus
This syllabus is subject to change based on the needs of the class as a learning community. Adjustments will be made that generally benefit the group's learning opportunities.

Course Purpose
Through exploration, discussion and analysis of cognitive theories and computer-based "cognitive tools", students will gain a critical understanding of the relationship between the design of technological tools, the use of those tools in educational settings, and the implications of that use for learning.

Objectives
• Understand major cognitive theories and their implications for and relevance to the use of technologies in education. Perspectives include:
- Cognitive modeling rooted in artificial intelligence
- Conceptual change models and causal models
- Cognitive apprenticeship
- Distributed cognition and sociocultural theories of learning

• Critically evaluate the design of technology-based "cognitive tools" and their use. Specific tools include: computer tutors, simulations, multimedia exploratory environments, and knowledge building databases.

Required Activities
There are six main activities associated with the course:
1) Attending class weekly and actively participating. These sessions will be devoted to presentation and discussion of readings and other assignments, led by the professor and students, as well as "laboratory" exploration of software. You should notify me before class if you know you will not be able to attend, and as soon as possible if something unexpected arises. Missing more than two class meetings will require makeup work.

2) Doing the required reading and discussing it in our online discussion board
You are expected to post at least one message per week to discussions of readings on the class discussion board on the class Mygateway site (accessed at http://mygateway.umsl.edu). You must make at least one post *before* midnight Sunday evening, the day before class. Please read other students' responses to the discussion before you post, and make an effort to build on their ideas (we want a discussion, not a set of isolated comments). Before class, make sure and read

any comments that are posted after yours, because we are likely to use the online discussion as a jumping off point for face-to-face discussion.

3) Making a presentation of key points in one reading during the semester. You will sign up for time slots the second week of the semester. Your presentation should be a short (10-15 minute) summary of key points in the chapter/article using an Inspiration diagram, and should end by raising one question for the class to discuss based on the reading.

4) Participating in a class "wiki" about the readings (http://cogandtech.wetpaint.com). For the same article or chapter that you sign up to summarize for the class, you will (a) write or edit or add links to a one-page textual summary before and/or after class. In addition, you need to help improve at least 2 other students' wiki posts during the course of the term, by making substantive additions or changes.

5) Completing a report on a cognitive evaluation of an educational technology. A proposal will be reviewed in Week 8 and approved by me, and the printed paper will be due at the time of the final exam. The paper should be in APA format (5th Edition) and refer to concepts from class readings (with citations where appropriate) and discussion. See details in the Assignments area of MyGateway. This project may be done individually or in a pair.

6) Completing an "open final exam". At the beginning of the session, you will be given a set of questions and the opportunity to discuss them with the group. You will then individually write up answers to the questions, but have the opportunity to discuss them further as you wish, and refer to any resources you bring with you.

Grading

Grades for the course will be based on class-related work as follows:

- Class participation, including weekly participation during class, and associated short written assignments (20%)
- Weekly participation in online discussion group (20%)
- Leading one week, including:
  Posting to the wiki related to your article, before and/or after class (5%)
  Summarizing key points in the reading in a diagram/graphic (15%)
- Helping to improve two other people's wiki posts substantively (5%)
- Research paper—(length 8 or more printed pages, using APA format) (25%)
- Final exam (10%)

Final grades will be given based on the sum of these parts. Pluses and minuses may be given, with the exception of an A+.

Class Readings

There are no books to be purchased for this class. All articles and chapters (cited below in the class schedule) are linked through the Mygateway course web site in the "Course Documents: Readings" area.

Note

If anyone has a health condition or disability, which may require accommodations in order to effectively participate in this class, please contact me privately as well as the ***Disability Access***

Services Office in 144 Millennium Student Center at 516-6554. *Information about your disability will be regarded as confidential.*

Class and Assignment Schedule

Week 1: Introduction

Class Activity on Monday, Jan 25:

- Personal introductions, background, and purposes
- Orientation to the class, syllabus, and policies
- Discussion of technology, cognitive science and learning theory
- Brief introduction to the use of Mygateway and the wiki in the course

Week 2: Cognitive Science and Education

*Assignments to be completed **before** class this week*

- Read Chapters 1 & 2 of Bruer, J. T. (1993). *Schools for thought: A science of learning in the classroom*. Cambridge, MA: MIT Press.
- Participate in Mygateway online discussion
- Check out the wiki, and make an edit somewhere

Class Activity on Monday, February 1:

- Discussion of readings

Week 3: Learning Technologies

*Assignments to be completed **before** class this week*

- Read Ch. 9, "Technology to Support Learning", of Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press. available online at http://www.nap.edu/html/howpeople1/ch9.html
- Participate in Mygateway online discussion

Class Activity on Monday, Feb 8:

- Adventures of Jasper Woodbury activity
- Discussion of reading

Week 4: Problem-solving and Math

*Assignments to be completed **before** class this week*

- Watch introductory video "Our Research Base" at http://www.carnegielearning.com/ (and any other of the "Featured Videos" you'd like)
- Read Rittle-Johnson, B., and Koedinger, K. R. (2005). Designing knowledge scaffolds to support mathematical problem solving. *Cognition and Instruction, 23*(3), 313-349.
- Participate in Mygateway online discussion

Class Activity on Monday, Feb 15:

- Exploration of a Geometry or Algebra computer tutor from Carnegie Learning
- Discussion of readings

Week 5: Assessment in Cognitive Context of Science Instruction

*Assignments to be completed **before** class this week*

- Read Hunt, E., & Minstrell, J. (1994). A cognitive approach to the teaching of physics. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 51-74). Cambridge, MA: MIT Press.
- Participate in Mygateway online discussion

Class Activity on Monday, Feb 22:

- Exploration of "Description of Motion" module at http://www.diagnoser.com/diagnoser/
- Discussion of readings

Week 6: Technology as Scaffolding Science Inquiry

*Assignments to be completed **before** class this week*

- Read Linn, M. C., Clark, D., and Slotta, J. D. (2003). WISE design for knowledge integration. *Science Education, 87*, 517-538.
- Read Desharnais, R. A., and Limson, M. (2007). Designing and implementing virtual courseware to promote inquiry-based learning. *MERLOT Journal of Online Learning and Teaching, 3* (1), 30-39.
- Participate in Mygateway online discussion

Class Activity on Monday, Mar 1:

- Exploration of "How Far Does Light Go? Debate" (which focuses on physics and astronomy) or "Rainforest Interactions" (which focuses on biology, including foodwebs and ecosystems) in WISE (http://wise.berkeley.edu)
- Discussion of reading

Week 7: Scaffolding Historical Thinking

*Assignments to be completed **before** class this week*

- Watch the introductory movie on "Why Historical Thinking Matters" at http://historicalthinkingmatters.org/why/
- Read Holt, T. (1990). *Thinking historically: Narrative, imagination, and understanding*. New York: College Entrance Examination Board.
- Participate in Mygateway online discussion

Class Activity on Monday, Mar 8:

- Exploration of Historical Thinking Matters website (http://historicalthinkingmatters.org/)
- Discussion of readings

Week 8: Learning through Writing – Knowledge Forum

- Read Scardamalia, M., & Bereiter, C. (1994). The CSILE project: Trying to bring the classroom into World 3. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 201-228). Cambridge, MA: MIT Press.
- Participate in Mygateway online discussion
- Email me a short paragraph describing one or two ideas for your final project—include what cognitive tool you would like to evaluate and why. See the assignment description posted on MyGateway for details. The technological tool you evaluate *must* aim at teaching, not just assessing already accomplished learning. Starting ideas are at http://cogandtech.wetpaint.com/page/Cognitive+Tools (you are not limited to this list).

Class Activity on Monday, Mar 15:

- Exploration of Knowledge Forum -- http://www.knowledgeforum.com/Kforum/products.htm
- Discussion of readings
- Preparation for next week's Tapped In activity

Week 9: Technology-Supported Teacher Professional Development
*Assignments to be completed **before** class this week*
- Read Schlager, M. S., Fusco, J., & Schank, P. (2002). Evolution of an online education community of practice. In K. A. Renninger, & Shumar, W. (Ed.), *Building virtual communities: Learning and change in cyberspace*. New York: Cambridge University Press.
- There is no Mygateway online discussion. Work will be done in Tapped In (see below). Before class there will be an asynchronous discussion

No face-to-face class on Monday, Mar 22—I am at a professional conference. Online activity:
- Asynchronous discussion of reading in TAPPED IN (http://www.tappedin.org) "UMSL EdTech" room Monday 3/22, synchronous chat from 5:30-6:30 on Monday, 3/22.

Spring Break March 29-April 2

Week 10: Supporting the Thinking and Development of Young Children
*Assignments to be completed **before** class this week*
- Read Ching, C. C. & Wang, X. C. (2006) Revealing and mediating young children's memory and social cognition with digital photo journals. In S. Barab, K. Hay, & D. Hickey (Eds.), *Making a Difference: Proceedings of the Seventh International Conference on the Learning Sciences (ICLS)*, pp. 85-91. Mahwah, NJ: Erlbaum.
- Take at least 10 digital pictures you'd like to (and have permission to) share, which represent your own or others' learning. Either post them on Flickr, or bring them to class on a drive.
- Participate in Mygateway online discussion

Class Activity on Monday, Apr 5:
- Photo journaling activity
- Discussion of reading

Week 11: Constructionism (Back to the future of *Mindstorms*)
Assignments to be completed **before** class this week
- Read Resnick, M., Maloney, J., Monroy-Hernández, A., Rusk, N., Eastmond, E., Brennan, K., Millner, A., Rosenbaum, E., Silver, J., Silverman, B., Kafai, Y. (2009). Scratch: Programming for All. *Communications of the ACM, 52* (11), 60-67.
- Read Maloney, J., Peppler, K., Kafai, Y., Resnick, M., and Rusk, N. (2008). Programming by Choice: Urban Youth Learning Programming with Scratch.
- Participate in Mygateway online discussion

Class Activity on Monday, Apr 12:
- Exploration of Scratch (on the campus network, also available free at http://scratch.mit.edu/)
- Discussion of reading

Week 12: Participation, identity, and learning in online gaming
- Read Kafai, Y. B. (2010). World of Whyville. *Games and Culture, 5* (1), 3-22.
- Read Fields, D. A., & Kafai, Y. B. (2010). Knowing and throwing mudballs, hearts, pies, and flowers: A connective ethnography of gaming practices. *Games and Culture, 5* (1), 88-115.

- Participate in Mygateway online discussion

Class Activity on Monday, Apr 19:

- Exploration of Whyville (http://www.whyville.net)
- Discussion of reading

Week 13: "Brain Science"

*Assignments to be completed **before** class this week*

- Read Bruer, J. T. (1997). Education and the brain: A bridge too far? *Educational Researcher, 26* (8), 4-16.
- Read Racine, E., Bar-Ilan, O., & Illes, J. (2005). fMRI in the public eye. *Neuroscience, 6*, 159-164.
- Participate in Mygateway online discussion

Class Activity on Monday, Apr 26:

- Discussion of reading
- Review and discussion of course concepts and "big ideas", using Inspiration
- Course evaluations

Week 14: Big Ideas

- Participate in Mygateway online discussion about big ideas from the semester

There will be no face-to-face class meeting on Monday, May 3 (I will be at a professional conference). Online activity:

- I will respond to Mygateway online discussion, and all students are expected to make at least one more discussion post on or after Monday May 3 (so this week everyone is expected to make at least two substantive posts total, one before the beginning of class time, and one after).

Final Report due Monday, May 10, 5:30pm.
Final exam: Monday, May 10, 5:30-7:30pm.