



CEP 909

CEP 909 Cognition and Technology

Please note: Provided as a sample only

The following is provided to you as a sample syllabus for the course. Please note that instructors and dates are subject to change. Course contents, readings and assignments are likely to be updated and may vary. Please check with the current course catalogue <http://reg.msu.edu/> for details and contact the instructor of record should you have any questions.

Syllabus CEP 909: Cognition and Technology

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Plan for the Course and Provisional Schedule of Topics

This course will examine the complex relationship between cognition and technology. Knowledge of how the mind works is important in developing learning environments and figuring out how best to use existing ones. However, new media may also affect the nature of cognition. We will examine both directions of influence.

Receiving special attention this semester will be the rapid, radical changes that have occurred in recent years on the technology side, changes that could not have been remotely anticipated even 10 years ago. As a result of those developments on the technology side, we are arguably in a moment of revolutionary change in the nature of thinking and learning. The implications of these changes for the reconceptualization of theories of learning and teaching will be discussed in depth, as will examples of how the unique affordances of a variety of new media might affect learning. We will also engage in informal experiments on learning with new media. Again, because technology is changing so fast, there will be an emphasis on the cutting edge and our best projections to the substantially different future we know is just ahead.

Topics

Several topics in cognition and technology will receive special emphasis (though it might be that some topics get more attention, even ones not mentioned, depending on how the class evolves—we will try to stay light on our feet, responsive to sensed needs as they develop):

- The affordances of digital, random access media for new forms of *nonlinear* learning and instruction that can make possible kinds of learning difficult to foster with traditional linear and compartmentalized approaches (and kinds of learning that are especially needed for an increasingly complex and rapid changing world of life and work)
- The enormous and still largely untapped potential of *learning using search engines on the Web* (going beyond the mere “finding” of information to the fostering of deeper, more interconnected learning)
- Learning with computer games
- New literacies related to new technologies
- The “Social Web” and its potential implications for learning
- Implications for educational technology of our knowledge about the nature and development of expertise (professional expertise, but also the kinds of “mastery” that characterize learning at all levels)
- New conceptualizations of teaching and of learning to teach in a new media age
- Possibilities for a new generation of more powerful approaches to distance education
- Digital video cases and their role in learning
- Learning with new technologies in preparing the 21st century workforce
- Using new technologies to promote learning about the grand challenges society faces (e.g., climate change; the fresh water crisis; health care; etc.) in cognitively manageable ways that acknowledge rather diminish their complexity

Required texts

Much of the reading for the course will be drawn from online sources. Many of those pieces will be determined by us together by applying the processes of deep and open searching of the Web that we will be exploring (and this determination of direction for some of our readings – by a collaborative adaptation to what has just been read and discussed, made efficient by the new affordances of media – will itself, in turn, be a continuing subject of discussion).

We will also look at the non-academic media, where there has been an explosion of writing for general informed audiences on the topic of cognition and technology from outside of the professional field. Interestingly, and characteristic of this time of substantial and rapid change in this field, the debate on the effects of new technologies has sometimes been led from outside. We will examine that literature for its possible cognitive implications; there are almost surely effects that have been hypothesized there that have not yet been given serious scientific attention and should.

In addition, some individual articles will be assigned, including the ones listed below, but with others that may be added depending on the direction our discussions go and that we decide, as a team, to take. Readings will be available at our Angel site if they aren't online.

There is just one required book, the same one that the face to face section is using. You should order it directly from amazon.com or other online sources. It is already a classic, and it is intended to provide a lot of the background for the course on the cognitive side (as well as important knowledge about *methodologies* for studying learning). However, it will also provide a point of departure for exploring new directions in learning in new media contexts as they might compare to traditional approaches to expertise (including the kind of 'expertise' appropriate to mastery at any level of education), that can *accelerate* the learning process.

K. A. Ericsson, N. Charness, P. Feltovich and R. Hoffman (Eds.) (2006), *The Cambridge Handbook of Expertise and Expert Performance*. Cambridge University Press.

Finally, a set of introductory readings by cognitive psychologists John R. Anderson and Steven Pinker will be made available at our Angel site and should be read in order to fill out the rest of the background one should have in cognition; these readings will *not* be covered in class (there isn't enough time for all of it), and it will be your responsibility to do them at your own pace during the semester. (Of course, you should consult with me if you have any questions about them, as you should do at any time during the course if you have questions about anything.)

The nature of this class: An ethos of teamwork, a focus on the new, and a goal of improving classroom teaching and learning through understanding new possibilities emerging in the cognition-technology connection

In a sense, some parts of this class will be like others you have taken. We will have readings in cognition and technology, and we will discuss those readings in forums. Even there, though, where things are closest to a typical class, we will endeavor to take advantage of the special affordances of digital media to build bridges across disparate discussions throughout the semester, both for purposes of better synthesis of material and to allow creative insights to emerge from what might at first seem to be distant juxtapositions – insights that are important to cultivate because so much of this field is *emerging*.

The other aspect of the course will be quite different from typical courses. We will spend a lot of our time building our knowledge as a team (with me as a team member), with a kind of internal, 'mini-crowdsourcing' to insure representation of diverse perspectives (as befits a field in rapid development) and a focus on learning in ways that are non-traditional, capitalizing on the affordances of digital media and attempting to turn potential problems with learning in digital environments into better kinds of learning.

We will use software tools to help us see the newly available virtues of *nonlinearity* for promoting learning, helping us: to achieve simultaneous breadth and depth by working with substantive *fragments* of information, knowledge, and experience that are then recombined in different contexts, at different times, and for different purposes, promoting better transfer/application of knowledge in future contexts; to better connect material that should be connected on multiple dimensions but usually can't be because of limitations of traditional media for learning and

teaching; and to build new kinds of cognitively-based learning tools for classroom use (as part of an ongoing project that we will formulate together and work on as a team throughout the semester).

Most in line with traditional classes, there will be a couple of occasions where I will ask you to watch video of me making a lecture about background material you should hear about. You will have opportunities to ask me questions afterward. This will not, however, be the primary kind of activity in this class – not by a long shot.

By the way, there is also a face to face section of this class. That section will be largely independent of this one, with different kinds of activities. However, it is likely on an occasion or two that we will have mini-events that will allow your group and theirs to share some of your differing, complementary experiences.

As mentioned above, there will be a semester-long team project, with multiple parts. One part will be our observations about how we are learning when we are using our new methods. Another part will be our ongoing observations about issues in the evaluation of websites, since much of our work will be on the Web. The heart of the work, though, will be using what we've learned to develop new approaches to classroom teaching and learning. Individuals will have investigative and writing responsibilities within the evolving project, as well as the obvious requirement of doing assigned readings and participating in class discussions.

You will need to learn a few new software tools along the way; which ones will be decided jointly by the class (though everyone will need to know Diigo).

All work will be done on a flexible schedule, acknowledging the different timing needs you have as you continue with your jobs and so on. We will be sure to keep the workload at a manageable level, emphasizing quality of thinking over quantity of time spent on work for the class.

To augment our asynchronous discussions (that I will be fully participating in) and learning activities, I will also be sending frequent videos of my thoughts about what we are doing.

Provisional Schedule

[Depending on how the course proceeds, this schedule is most definitely *subject to change*. Please note that articles will occasionally be added as needed, and some may be dropped (so check with the instructor before reading too far ahead). Timing of topic coverage and reading assignments beyond the first couple of weeks will depend on how each topic is proceeding and will be announced well in advance. Again, we will be light on our feet and capitalize on opportunities that present themselves that we agree as a group would be beneficial for us to explore.]

Unit One: Weeks 1-4

Overview of the course and thoughts about new directions in cognition and technology.

Historical overview. (Behaviorism & associationism. Cognitivism & information processing. Schema theory. Situated cognition. Constructivism vs. explicit instruction. Cognitive load. Expertise. More...) This is one of the 2-3 times in the class where you will just watch a recorded lecture.

Basic issues in cognition and instruction. The effect of different types of domains.

Kirchener et al. (2006), Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, 41, 75-86.

Spiro, R. J., & DeSchryver, M. (2009). Constructivism: When It's the Wrong Idea and When It's the Only Idea. In *Constructivist Theory Applied to Instruction: Success or Failure*, S. Tobias & T. Duffy (eds.). Mahwah, NJ: Lawrence Erlbaum.

Readings from the Expertise Handbook. [A list and timetable for the readings in this book will be coming after we've had a chance to get to know our interests and have begun to formulate our plans for the joint project.]

Unit Two (in parallel with Unit One – we will split each session between the two units), Weeks 2-4

Popular conceptions of the relationship between cognition and technology: Possible directions for the field? (Valuable hints/suggestions from technology writing in the popular media, projections in government reports, etc.)

Unfettered and deep learning on the Web with self-directed searches. What's out there. How to search. New kinds of learning on the Web beyond "finding the answer."

Kuiper, E., et al. (2005). The Web as an information resource in K-12 education: Strategies for supporting students in searching and processing information. *Review of Educational Research*, 75, 285-328.

New literacies

Coiro, J. & Dobler, E. (2007). Exploring the online reading comprehension strategies used by sixth-grade skilled readers to search for and locate information on the Internet. *Reading Research Quarterly*, 42, 214-257.

Unit Four, Week 5

Expertise, Experience Acceleration, and Adaptiveness.

Readings from the Expertise Handbook.

Unit Five, Week 6

Learning, simulations and computer games.

Readings gathered collaboratively by the class online. [For some of the topics, like this one, we will internally crowd-source the readings, beginning with joint exercises in pulling together sets of fragments that have been compiled and shared using Diigo for scope of coverage, and then "drilling down" selectively for depth.]

Unit Six, Week 7

Social media and learning

Collaborative assembly of online readings (see above)

Unit 7, Week 8

Neuroscience and new media

Collaborative assembly of online readings (see above)

Unit 8, Week 9

Creativity and technology.

Readings from the Expertise Handbook.

Weeks 10-14: Miscellaneous topics, depending on how the class decides to proceed, but most likely including the following

The experimental psychology of multimedia learning.

Digital video cases for learning.

Online and distance education.

New technologies and the preparation of the 21st century workforce

Open educational resources, remixing/reusing/etc.

Readings from “Opening Up Education” (2008, MIT Press), available for free at:
<http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=11309&mode=toc>

New Technologies of Learning and Contemporary Grand Social Challenges

A new philosophy of science for educational technology that looks to the future more and builds incrementally on the past less?

Week 15 (the course will continue during Final Exam week)

Summing up the course

A “post-Gutenberg mind”? How new media may be changing the fundamental nature of learning and the mind itself.