

15:262:622

Cognition, Collaboration, and Technology

Instructor: Dr. Anandi Nagarajan

Thursday 4:50- 7:30

GSE 314

Contact information: annagara@rci.rutgers.edu

Office hours: Thursday 3:30-4:30 and by appt.

Course Description

- 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 explore 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 Objectives

One main objective of the course is to enable students to examine a subset of the different educational technologies that are available and researched widely. The course design will encourage students in critically examining the research in educational technology and evaluating whether or not the technologies are helping to meet pedagogical goals. Another objective is to have all students evaluate the design of different learning environments and consider the pros and cons of specific design features, based on psychological research recommendations, with respect to instructional and learning goals. The students will also learn to use different online tools, demonstrate their understanding, and evaluate the affordances of different online tools and learning environments. Finally, the students will apply their understanding of best practices of online learning to develop/design a prototype of a new learning environment and/or evaluate an existing one. The students will demonstrate an understanding of how psychological research is important in making informed decisions with respect to the design of online learning environments that support collaboration.

Learning Goals

At the end of the course, you will be able to meet the following objectives:

1. You will be able to explain the cognitive, constructivist, and sociocultural theories underpinning different online learning environments discussed in the course.
 2. You will know and be able to demonstrate the collaborative, pedagogical, and technological affordances of numerous online learning environments discussed in the course and have a conceptual framework to examine other learning environments that were not discussed explicitly.
-

3. You will be able to critically examine research issues that are addressed in the design of online learning environments and evaluate the relative success and limitations of different learning environments in terms of meeting their predefined goals.
4. You will learn to use a new online tool (Web 2.0 or other) of your choosing, design a product, and evaluate the affordances of what the tool can and cannot accomplish and demonstrate your product and your understanding of its pros and cons.
5. You will collaboratively design and/or evaluate an online learning environment, based on a gap identified in the research and a needs analysis, and propose design recommendations.
6. You will examine the role of assessment of learning in different learning environments.
7. You will learn to engage in collaborative discourse and consider alternative perspectives and reflect on your individual, evolving understanding of course concepts and topics.

Course Readings

There is no textbook for this course. All research articles and links to online resources will be made available via eCollege. Please make sure that you have a valid NetId to access the eCollege site and the components of the course.

Course Structure and Expectations

My instructional goal is to make your experience in this course productive, practical, and personally meaningful. To accomplish this, it is important that you understand how the course will be structured and what my expectations are.

- We will implement a hybrid format in this course. We will meet for a face-to-face class at the GSE one week and then have an asynchronous discussion online the following week on eCollege. Please review the tentative schedule in the back, for the dates for face-to-face and online classes. For the most part this structure will not change unless there are unpredictable circumstances.
- Regardless of whether the class is face-to-face or online, we will be using eCollege extensively to continue our discussions, share resources, complete assignments and so on.

Communication

For the weeks when the discussion is online, we will participate in asynchronous discussion during the week. Participating in the online discussion is not limited to the day of the class but is ongoing and you should make the appropriate time to participate online.

In an effort to enhance our communication during the “online” weeks, I will upload mini-video segments discussing certain aspects of the week's discussion. “Seeing” the instructor may help in setting certain things in context. In addition, I will also host small group virtual meetings via Skype or GoToMeeting or Google Hangout whereby we could “meet” one-on-one and/or in small group settings at predetermined times and/or during the Thursday class time to review any queries you may have. I am always available on email and can also talk to you over the phone or skype if we set up a predetermined time.

Course Assignments & Grading

- Class Attendance and Online Participation 10%
- Facilitating Discussions 10%
- Journal Reflections (8*4) 40%
- Tool Portfolio 10%
- Final Project 30%

Grading Scale

90 and above = A; 87-89 = B+; 80-86 = B; 77-79 = C+; 70-76 = C; 60-69 = D; Below 60 = F

Details of Course Assignments are further discussed below

1) Class Attendance & Online Participation (10%)

Class attendance is mandatory. This will be a discussion-based seminar and being here is half the fun. If you are unable to attend the face-to-face session due to an emergency or unforeseen situation, please let the class know so we can plan the activities accordingly.

When class is online, be sure to check in every day to engage in scheduled activities. All students (non-facilitators) are expected to respond to the discussion questions and follow-up on other responses, identify additional questions that they have about the readings, and/or share critical ideas that stem from the readings. Posting 2-3 lines of general ideas is **NOT** considered as effective participation and **WILL** reflect on your participation grade. On a similar note, please **DO NOT** post a 4 page long summary on the discussion board. Make sure that you are addressing the question and not summarizing the entire reading.

In order to demonstrate your opinion, understanding, and critical analysis of the reading, you must contribute a significant number of ideas and also respond to other students' questions. I expect that you will each contribute at least 5 initiating comments and/or elaborated questions on different topics within the readings AND respond to at least 5 posts by other students each week. Remember, these postings need not be perfect or represent your final understanding on the topic. These are your thoughts, ideas, and reactions to the reading. Your understanding and final stances on the topics will evolve after sharing, discussing and reflecting on these ideas. **You will learn more if you focus on the content and depth of discussion rather than the number of posts required.**

2) Facilitating Discussions (10%)

All students will lead discussions on at least 2 readings; one scheduled for in-class and one scheduled for online discussion. Facilitators should post a minimum of 3 discussion questions by 11:00 pm Wednesday night on the discussion board regardless of whether it is a face-to-face or an online class. It will be helpful if the facilitators share the discussion questions with me prior to posting on the discussion board. If you are facilitating for the week starting Thursday (face-to-face or online), please email me your questions by Wednesday morning. Once I email back, please post them on the board by Wednesday night.

When meeting in class, the discussion should open with a brief summary of the reading and then lead into the discussion of the 3 main questions for each reading.

During the online weeks, the facilitator will moderate the discussion starting with posting the questions on Wednesday night and continue facilitation till the following Wednesday when we switch topics.

The role of the facilitator is to get the discussion started by either summarizing or asking a BIG IDEA question from the readings. The facilitator should also help keep the discussion going by asking students to justify their thinking and explain their ideas and how they fit with others in the class or group. If some students are not participating or haven't posted a single idea or comment, the facilitator can and should encourage and politely nudge these students to express their opinions. If a comment seems ambiguous, you can ask for elaborated explanations or clarifications.

3) Journal Reflections (8*5=40%)

An effective learning strategy that facilitates understanding and remembering is reflection and review. At the end of every week, you will complete a journal reflection that synthesizes your main understanding from the readings. These journal entries will provide opportunities for you to reflect on the readings, the course, and your role in discussion. You may consider how what is being discussed would apply in your classroom, or other real world situation. This is where you can demonstrate evidence of your understanding the course material and how it connects with various educational and practice settings. These should not be longer than 1 single spaced/ or 2 double spaced pages (but they should be about that length). If you try to write about everything in the readings, this will be a challenging task. It works a lot better if you select 2-3 topics that you connect with and/or you have a strong opinion or reaction to and then elaborate on your reflection on those topics. However, in addition to stating your opinion or reaction, substantiate it with examples, evidence, arguments, and or theories that lend support to your main idea. You can think deeper through an idea via these reflections. These are a useful medium to have a one-on-one conversation with me on topics that interest, perplex, and or intrigue you.

While these are not formal papers, they are also not meant to be bulleted outlines of the readings. Please do NOT summarize the readings or the online discussion. Your journal entries need to reflect your critical thinking and therefore should be given due thought. Feel free to share your experiences that are relevant to the readings, and also why you agree or disagree with the readings. Mere completion does not ensure full credit. This is an excellent opportunity to connect the course information to your own teaching and/or other professional experiences.

Please check the schedule for deadlines.

4) Tool portfolio (10%)

All students will learn to use a new tool such as any Web 2.0 tool that they are not already familiar with. Demonstration of minimal proficiency is negotiable but should involve creating an artifact. Some tool examples are: Prezi, glogster, animoto, net logo, Squeak, or any other that you wish to explore. More details and guidelines will be provided in class.

5) FINAL PROJECT (30%)

You are encouraged to work on these projects in teams of 2 or 3. Each project includes interim products that are to be submitted as per the deadlines listed on the Course Schedule.

a) Project proposal (3%). Due on 3/14

This will allow you to get early feedback. D 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).

b) Theoretical framework or design principles for your project (3%). Due on 4/4.

This should be 2-3 pages that explains the conceptual underpinning of your project..

c) Needs analysis or data analysis plan (4%). Due on 4/11

This should present the results of your analysis of interviews and/or any supporting literature for a needs analysis.

d) Presentation (5%). Due on 5/2

e) Final paper (15%) Due on 5/9

More details: There are two options for your project:

OPTION 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).

- a. For each design decision, explain why you made the decision you made.
- b. 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.
- c. 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.
- d. In a paint program, power-point 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.
- e. In your paper, make sure to cite the course readings and include a detailed bibliography that may also go beyond course readings.
- f. 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.
- g. 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

OPTION 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 or 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
Spring 2013**

	Date	Topic	Readings/Resources	Assignments and activities
1	January 24 RUTGERS	Introduction to the course	Bush (1945) available online* http://www.ps.uni-sb.de/~duchier/pub/vbush/vbush-all.shtml	Class facilitated by Anandi Facilitators picked for face-to-face and online topics Online Introductions, Pre-course Survey, Facilitation Schedule Journal Reflection # 1: Due on 1/31
2	January 31 Online	Technology for Learning: The big picture	Collins & Halverson (2009) Woolf (2010)	eCollege: Facilitator posts questions by Wed, Jan 30 th . Discussion continues from Jan 31 st – Feb 6 th . Anandi will facilitate this week. Journal Reflection # 2: Due on 2/7
3	February 7 RUTGERS	Design, Multimedia as a tool for learning	Kirschner et al., (2004) Dennen & Hoadley (in press) Liu & Hmelo-Silver (2009)	In class: Student Facilitators will lead discussion Tool portfolio Initial project ideas, team formation Journal Reflection # 3: Due on 2/14
4	February 14 Online	Computers as Metacognitive Tools, Technology and Culture	Winne et al., (in press) Zhang et al., (in press)	eCollege: Student facilitator posts questions by Wed, Feb 13 th . Discussion continues from Feb 14 th –Feb 20 th . Journal Reflection # 4: Due on 2/21
5	February 21 RUTGERS	Computers as Tools for Inquiry	Wilensky & Reismann (2006) de Jong (2006) Linn et al (2006)	In class: Student Facilitators will lead discussion Journal Reflection # 5: Due on 2/28
6	February 28 Online	Computers as Scaffolds	Reiser (2004) Fisher et al. (in press) Davis (2003)	eCollege: Student facilitator posts questions by Wed, Feb 27 th . Discussion continues from Feb 28 th –Mar 6 th . Tool Portfolio: Due on 3/7
7	March 7 RUTGERS	Tools for Knowledge Building	Chan (in press) Van Aalst & Chan (2007)	In class: Student Facilitators will lead discussion Project proposals due on 3/14
8	March 14 ONLINE	Learning and social media, CSCL	Greenhow et al. (2009) Stahl, Suthers, and Koschmann (2006) Jeong & Hmelo-Silver (2011)	eCollege: Student facilitator posts questions by Wed, March 13 th . Discussion continues from Mar 14 th – Mar 27 th Journal Reflection # 6: Due on 3/28
9	March 21		SPRING BREAK	
10	March 28 Online	Mobile computing	Looi et al (in press) Squire (2010)	eCollege: Student facilitator posts questions by Wed, March 27 th . Discussion continues from Mar 28 th – Apr 3 rd . Theoretical principles/Design principles of project: Due on 4/4
11	April 4 RUTGERS	Online communities, virtual worlds, games 1	Steinkuehler (2006) Gee (2008) Shute (2011)	In class: Student Facilitators will lead discussion Needs analysis: Due on 4/11

12	April 11 ONLINE	Multimodal literacies and new media	Jewitt (2008) TBD	eCollege: Student facilitator posts questions by Wed, Apr 10 th . Discussion continues from Apr 11 th – Apr 17 th . Journal Reflection # 7: Due on 4/18
13	April 18 RUTGERS	Video as a tool for learning	Derry et al. (2006) Hmelo-Silver et al. (2010)	In class: Student Facilitators will lead discussion Journal Reflection # 8: Due on 4/25
14	April 25 ONLINE	Online communities, virtual worlds, games II	Fields & Kafai (2009) Clark-Midura & Dede (2010)	eCollege: Student facilitator posts questions by Wed, Apr 24 th . Discussion continues from Apr 25 th – May 2 nd
15	May 2 RUTGERS	Project presentations		Project presentations are due Final papers are due on May 9th.

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.

Bush, V. (1945). As we may think. *Atlantic Monthly*. Available at <http://www.ps.uni-sb.de/~duchier/pub/vbush/vbush-all.shtml>

Collins, A., & Halverson, R. (2009). *Rethinking Education in the Age of Technology: The Digital Revolution and Schooling in America*. New York: Teachers College Press.

Davis, E. A. (2003). Prompting middle school science students for productive reflection: Generic and directive prompts. *Journal of the Learning Sciences*, 12, 91-142.

de Jong, T. (2006). Technological advances in inquiry learning. *Science*, 312, 532-533.

Derry, S. J., Hmelo-Silver, C. E., Nagarajan, A., Chernobilsky, E., & Beitzel, B. (2006). Cognitive transfer revisited: Can we exploit new media to solve old problems on a large scale? *Journal of Educational Computing Research*, 35, 145-162.

Fields, D., & Kafai, Y. B. (2009). A connective ethnography of peer knowledge sharing and diffusion in a tween virtual world. *ijCSCL*, 4, 47-68.

Gee, J. P. (2008). Learning and games. In K. Salen (Ed.), *The ecology of games: Connecting youth, games, and learning* (pp. 21-40). Cambridge, MA: MIT Press.

Greenhower, C., Robelia, B., & Hughes, J. E. (2009). Web 2.0 and classroom research: What path should we take now? *Educational Researcher*, 38, 246-259.

Hmelo-Silver, C. E., Maher, C. A., Agnew, G., Palius, M. (2010). The video mosaic: Design and preliminary research. In *Proceeding of ICLS 2010*. Gomez, K., Lyons, L., & Radinsky, J. (Eds.) Learning in the Disciplines: *Proceedings of the 9th International Conference of the Learning Sciences (ICLS 2010) - Volume 2* (pp. 425-426). International Society of the Learning Sciences: Chicago IL.

Jeong, H. & Hmelo-Silver, C. E. (2011). A Portrait of CSCL Methodologies. In H. Spada, G. Stahl, N. Miyake & N. Law (Eds.). *Proceedings CSCL 2011* (pp.550-557). International Society of the Learning Sciences, Hong Kong.

Kirschner, P., Strijbos, J.-W., Kreijns, K., & Beers, P. J. (2004). Designing electronic collaborative learning environments. *Educational Technology Research and Development*, 52, 47-66.

Stahl, G., Koschmann, T., & Suthers, D. D. (2006). Computer-supported collaborative learning: A historical perspective. . In R. K. Sawyer (Ed.), *Cambridge handbook of the learning sciences* (pp. pp. 406-427). NY: Cambridge University Press.

Linn, M. C., Lee, H.-S., Tinker, R., Husic, F., & Chiu, J. L. (2006). Teaching and assessing knowledge integration in science. *Science*, 313, 1049-1050.

Liu, L., & Hmelo-Silver, C. E. (2009). Promoting complex systems learning through the use of conceptual representations in hypermedia. *Journal of Research in Science Teaching*, 46, 1023-1040.

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

- Squire, K. (2010). From information to experience: Place-based augmented reality games as a model for learning in a globally networked society. *Teachers College Record, 112*, 2565-2602.
- Steinkuehler, C. A., & Duncan, S. (2008). Scientific habits of minds in virtual worlds. *Journal of Science Education and Technology, 17*, 530-543. doi: [DOI 10.1007/s10956-008-9120-8](https://doi.org/10.1007/s10956-008-9120-8)
- van Aalst, J., & Chan, C. K. K. (2007). Student-Directed Assessment of knowledge building using electronic portfolios. *Journal of the Learning Sciences, 16*, 175-220.
- Wilensky, U. & Reisman, K. (2006). Thinking Like a Wolf, a Sheep or a Firefly: Learning Biology through Constructing and Testing Computational Theories -- an Embodied Modeling Approach. *Cognition & Instruction*.
- Woolf, B. P. (Producer). (2010). A roadmap for education technology. Retrieved from <http://www.cra.org/ccc/docs/groe/GROE%20Roadmap%20for%20Education%20Technology%20Final%20Report.pdf>