EDPC5021 Foundations of the Learning Sciences Overview

Rationale

Technology affects how we learn, and what we consider worth learning, in many subtle and not so subtle ways. With the realisation that cognition is both situated and distributed, computer and communication media can no longer be considered mere conduits for information transport, but key players in learning, communication, and knowledge building. This course seeks to identify and compare important conceptual frameworks that shed light on the relationship between technology and learning, building on work in the learning sciences (psychology, education, cognitive and neurosciences). Modern educational technology use will be analysed from a number of perspectives, including classical information theory, psychological media and communication theories, activity theory, socio/cultural learning theory and models of distributed cognition.

Desired outcomes

As a result of successfully completing this unit of study students should be able to:

1. Demonstrate a basic understanding of the main contemporary learning theories
2. Apply a subset of these theories based on a more in-depth understanding
3. Describe the current state of the art in educational technology
4. Use a number of educational technologies for group learning
5. Apply concepts form the learning and communication sciences to assess the potentials and problems of technological developments
6. Apply conceptual knowledge to a number of authentic group projects

Topics

- Core theories of technology-enhanced learning
- Core psychology concepts in multimedia learning
- Cognitive learning theories: Representations and symbolic processing
- Instructional systems and design methods aligned with cognitive learning theories
- Situated learning
- Learning in a community
- Learning environments and design approaches aligned with situative view of learning
- Motivation and identity
- Overview of research approaches in the Learning Sciences
- Experiments in learning with technology
- Qualitative Research: Interaction and conversation through technology

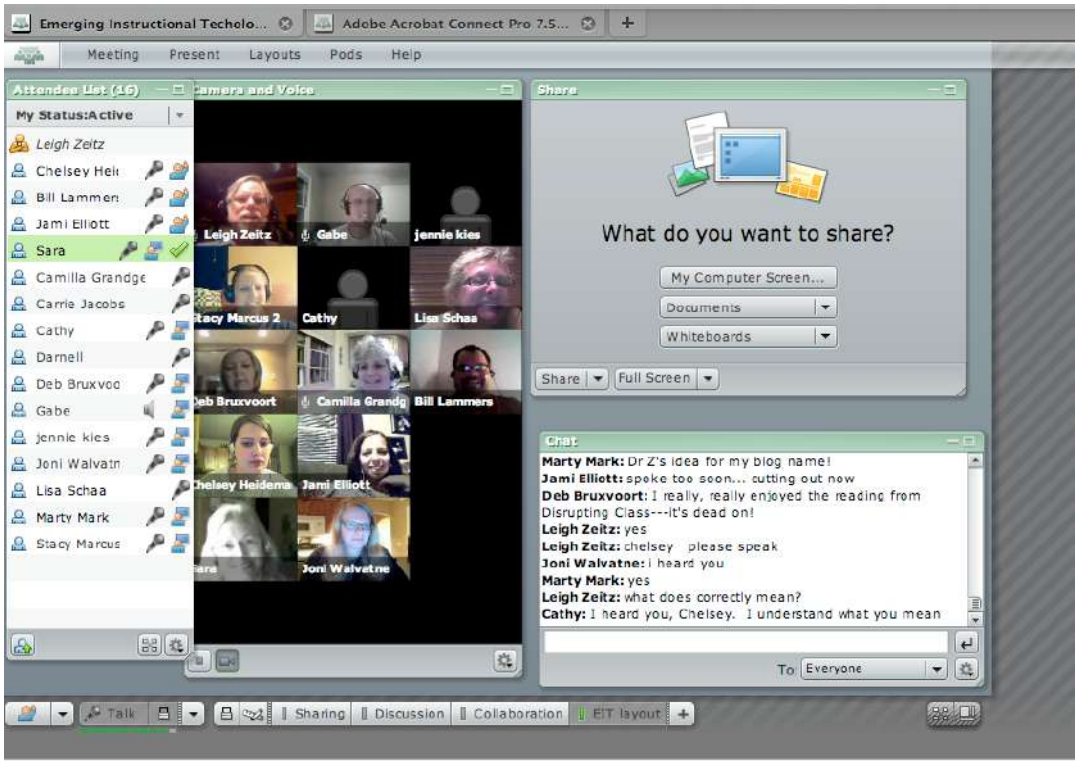
- Design-based research
- Modelling cognition and learning

Online learning mode

You can decide to participate in this course at uni (Room 229) or from every other location with sufficient internet connectivity. We are using Adobe Connect for synchronous meetings (every Monday, 5-7 PM), and Google Docs for asynchronous collaboration.

Adobe Connect

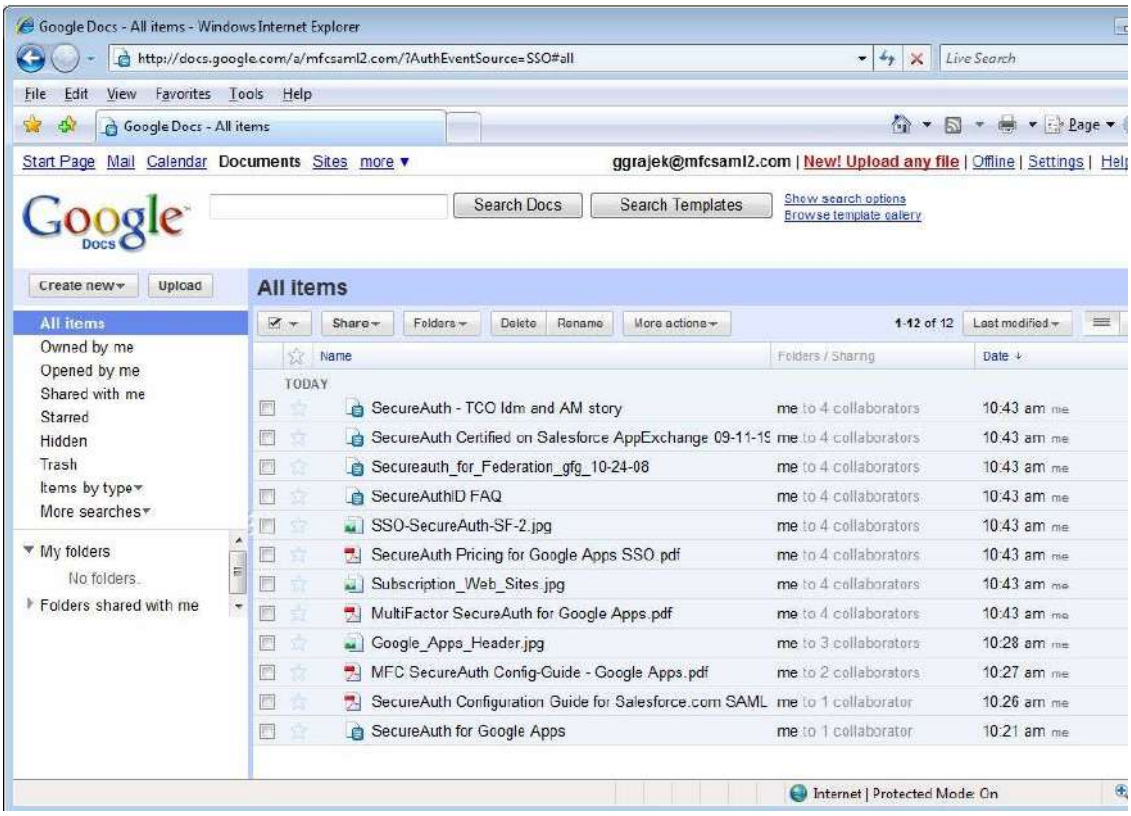
Adobe connect is a web conferencing system hosted by the university. It supports audio- and video-conferencing, chatting, polling, screensharing, whiteboarding sharing, and the sharing of documents of all kinds, including powerpoint presentations.



To participate in Adobe Connect sessions in this seminar, you need to have at least audio, but better video equipment available on your computer, since we use voice communication in addition to chat and other textual communication forms. You have to participate in the Monday sessions either through Adobe Connect, or by coming to Room 229 in person.

Google Docs

Google docs will be extensively used in this course. You will make individual as well group-based contributions. You will need a personal Gmail or Google Apps account to participate in this course.



The way Google Docs and Adobe Connect are used throughout a typical week, and the kind of activities you will be engaged in through these tools are explained next.

The weekly work scheme

You contribute to the course in three ways:

1. Bi-weekly contributions to a topic document (total of 6 topics, about 500-600 words on each topic);
2. Maintaining a learning journal;
3. Active participation in weekly synchronous meetings[1], and a bi-weekly short group presentation.

Here's how it works:

The course covers six main topics, see syllabus. Work on each topic last over a period of 2 weeks, then the topic switches. Writing teams of 4-5 students are formed around each topic. With 20 students there will be 4 teams working on the same topic in parallel, creating 4 topic

[1] You can participate on those in the course room, or on-line from outside uni.

documents every two weeks. You will work on each topic with different peers.

This is how each of the 6 topic cycles is structured:

Day in topic cycle	Main activities	Example
First week Monday	New topic cycle starts 5-7 pm "live" meeting with Adobe Connect starting in the "Plenary Room". 1. Discussions of readings and organisational matters; 2. Planning of the topic page writing for the week.	05 March: Topic 1 ("Knowledge and Epistemological Beliefs") starts; teams of 4-5 students formed; 2 readings from R1.1 - R1.6 allocated to each student; (no presentation as this is the first cycle.) Group and Reading Allocations, Tab "Topic1"
First week Tue-Sunday	Each student reads 1 paper and contributes to the topic document. Each student keeps track of her contributions to the topic document, and uses these and peers' contributions for reflection on writing process[2] and learning sciences concepts and ideas.	Readings R2.x in syllabus
Second week Monday	5-7 pm "live" meeting with Adobe Connect starting in the "Plenary Room". 1. Discussions of readings and organisational matters; 2. Planning of the topic page writing for the week;	12 March: Topic 1 continues;
Second Week Tue-Sunday	Each student reads 1 paper and contributes to the topic document. Each student keeps track of her contributions to the topic document, and uses these and peers' contributions for reflection on writing process and learning sciences concepts and ideas.	Readings R3.x from syllabus.
Next cycle first week Monday	Teams' (previous) topic documents due (2500-3000 words); new topic cycle starts. 5-7 pm "live" meeting with Adobe Connect starting in the "Plenary Room". 1. Discussions of readings and organisational matters; 2. Planning of the topic page writing for the	19 March: short presentation from each team on Topic 1; Topic 2 ("Views of Learning") starts; New team allocations; Readings assigned to each student. Group and Reading Allocations,

[2] You find a bit of background information on the relation between writing and learning here.

	week; 3. Short group presentations on the last topic. Each group presents it's topic document from last cycle in the synchronous session.	Tab "Topic2".

Readings and topic pages

There are six readings per topic (three per week). The readings are related, but nevertheless different in content. Since you will have to read only two of these[3], you will learn from others' contribution to the topic document about the papers you have not read.

Each team topic document should present the six readings and elaborate on them. By the end of a two week cycle, each team's topic papers should be 2000-3000 words long[4] and contain the following elements:

1. A short summary of each paper in terms of what *you* find most important, relevant, and/or surprising. Do NOT use the abstracts/summaries provided by the author(s).
2. A section that identifies relations between the papers (similarities and differences; synergies); this can include relations to other papers in the course.
3. A section that identifies the contribution of the papers to the 'big ideas' on learning and learning technologies, also those covered in previous cycles. In this section, you can also mention other sources you consider relevant for the topic, not covered in the course readings.

Here is a topic page template.

Each topic document has a topic and discussion (T&D) leader. Every student has to perform this role at least once. The T&D leader prepares and leads the Monday team session, and coordinates the bi-weekly presentation. No special presentation needs to be provided for this (no "slides"); the topic paper forms the basis for the short presentation, and the Q&A.

The lecturers prepare bi-weekly feedback sessions on the topic pages. The final topic pages are subject to grading, but this at the end of term, so that they can be improved after feedback (see Grading below).

The individual learning journal

With the learning journal, which is a 'private' document only to be shared with the lecturer, the goal is that you:

1. Keep a record of your individual contributions: you need to demonstrate that to each topic document you contributed about 500 words within the time allocated to that topic [5];

[3] Of course, you are more than welcome to read all papers, but you don't have to.

[4] This is based on a group size of 4-5 members. In cases were a team is smaller, the number will be adapted accordingly.

[5] This does not mean that all these 500 words will have to appear in the final version of the topic

2. Categorize and reflect on the nature of your contributions to the topic documents;
3. Identify and reflect upon learning opportunities that arose in the course or working on the topics and topic documents.

Here is a template of the learning journal (copy only).

Grading

1. The bi-weekly contributions and active work in the teams will assure a "Pass" (50 marks)[6]
2. The topic papers of the groups you worked in will be graded, worth up to 25 marks. You can decide on one topic paper that should be dropped from consideration for your grade.
3. You can get additional credit (up to 25 marks) by reflecting on the nature of the contributions you made and by reflecting on the learning opportunities that the readings and your peers' contributions opened up for you.

Demerit scheme:

- For each topic document where you have contributed less than 500 words in time:
    - 10-20% less than 500 words: - 5 marks
    - More than 20% less than 500 words: -10 marks

documents, because this is subject to revisions and discussions. Keeping an individual log of contributions will make sure that you can demonstrate that you did your regular contributions, independent of whether they show up in the final version or not.

[6] This will need to be documented in the Learning Journal.

Topics and readings for EDPC5021

If not indicated otherwise, readings will be available in the Readings folder.

Week	Topic		Readings
#1	Introduction and Overview		Introduction to the working and writing process. Optional reading: Alexander, P. A., Schallert, D. L., & Reynolds, R. E. (2009). What is learning anyway? A topographical perspective considered. Educational Psychologist, 44(3), 176-192. [PDF]
			Phase 1: Getting to know theoretical perspectives on learning
#2	**Topic 1: Knowledge and epistemological beliefs**	R2.1	Schraw, G. (2006). Knowledge structures and processes. In P. A. Alexander & P. Winne (Eds.), *Handbook of educational psychology* (pp. 245-263). Mahwah, NJ: LEA.
		R2.2	White, B. & Frederiksen, J. (2005). A theoretical framework and approach for fostering metacognitive development. *Educational Psychologist, 40*(4), 211-22.
		R2.3	c, B.K. (2004). Epistemological understanding as a metacognitive process: Thinking aloud during online searching. *Educational Psychologist*, 39(1), 43-55.
#3		R3.1	Knowledge as theory: Vosniadou, S. (2008). The framework theory approach to the problem of conceptual change. In S. Vosniadou (Ed.), *International Handbook of Research on Conceptual Change*. New York: Routledge. (Note: page 16 onwards are optional.)
		R3.2	Knowledge-in-pieces: diSessa, A. (1988). Knowledge in pieces. In Forman & Pufall (Eds.), *Constructivism in the Computer Age* (pp. 49-70). New Jersey: Lawrence Erlbaum. (Note: pages 61 onwards are optional.)
		R3.3	Knowledge outside of the head: Clark, A., & Chalmers, D. J. (2010). The extended mind. In R.

			Menary (Ed.), The extended mind (pp. 27-42). Cambridge, MA: MIT Press.
#4	**Topic 2: Views of Learning**	R4.1	Learning as memory change: Sweller, J. (2005). Implications of cognitive load theory for multimedia learning. In R. Mayer (Ed.), The Cambridge Handbook of Multimedia Learning (pp. 19-30). New York: Cambridge University Press.
		R4.2	Learning as change in perception: Allen, B. S., Otto, R. G., & Hoffman, B. (2004). Media as lived environments: the ecological perspective of educational technology. In D. H. Jonassen (Ed.), Handbook of Research on Educational Communication and Technololgy (2 ed., pp. 215-242). Mahwah, NJ: Lawrence Erlbaum.
		R4.3	Learning as change in the environment: Engeström, Y. (2001). Expansive learning at work: toward an activity theoretical reconceptualization. Journal of Education and Work, 14(1), 133-156.
#5		R5.1	Learning as enculturation: Kozulin, A. (2003). Psychological tools and mediated learning. In A. Kozulin, B. Gindis, V. S. Ageyev & S. M. Miller (Eds.), Vygotsky's educational theory in cultural context (pp. 15-38). Cambridge: Cambridge University Press.
		R5.2	Learning as participation: Greeno, J. G. (1998). The situativity of knowing, learning, and research. American Psychologist, 53, 5-26.
		R5.3	Learning as knowledge creation: Bereiter, C., & Scardamalia, M. (1996). Rethinking learning. In D.R. Olson, & N. Torrance (Eds.), The Handbook of education and human development: New models of learning, teaching and schooling (pp 485-513). Cambridge, MA:Basil Blackwell.
#6	**Topic 3: Motivation and engagement**	R6.1	Dweck, C. S., & Legget, E. L. (1988). A social-cognitive approach to motivation and personality. Psychological Review, 95(2), 256-273.
		R6.2	Kaplan, A., & Flum, H. (2010). Achievement goal orientations and identity formation styles. Educational Research Review, 5(1), 50-67.
		R6.3	Hamilton, E., & Jago, M. (2010). Toward a theory of personalized learning communities. In M.

			J. Jacobson & P. Reimann (Eds.), Designs for learning environments of the future (pp. 263-282). New York: Springer.
#7		R7.1	Waterman, A. S. (2004). Finding someone to be: Studies on the role of intrinsic motivation in identity formation. *Identity: An international journal of theory and research*, 4(3), 209-228.
		R7.2	Brophy, J. (2008). Developing students' appreciation of what is taught in schools. Educational Psychologist, 43(3), 132-141.
		R7.3	Hidi, S., & Renninger, K. A. (2006). The Four-Phase model of interest development. Educational Psychologist, 41(2), 111-127.
			Phase 2: Applying perspectives to educational technologies[1]
#8	**Topic 4: 'Acquisitive' learning with technology**	R8.1	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.
		R8.2	Mayer, R. & Moreno, R. (2002). Aids to computer-based multimedia learning. *Learning and Instruction,* 12, pp.107–119.
		R8.3	Engwall, O. (2012). Analysis of and feedback on phonetic features in pronunciation training with a virtual teacher. *Computer Assisted Language Learning*, 25(1), 37-64
#9		R9.1	Suebnukarn, S., & Haddawy, P. (2006). Modeling individual and collaborative problem-solving in medical problem-based learning. User Modeling and User-Adapted Interaction, 16(3-4), 211-248.
		R9.2	van der Meij, J., & de Jong, T. (2011). The effects of directive self-explanation prompts to support active processing of multiple representations in a simulation-based learning environment. *Journal of Computer Assisted Learning*, 27(5), 411-423.

[1] Details of readings for this phase will be developed in parts together with participants.

		R9.3	Hundhausen, C., Agarwal, P., Zollars, R., & Carter, A. (2011). The Design and Experimental Evaluation of a Scaffolded Software Environment to Improve Engineering...J*ournal of Engineering Education*, 100, 574-602.
#10	**Topic 5: Technologies for participation and Identity development**	R10.1	Squire, K. (2006). From content to context: Videogames as designed experiences. *Educational Researcher*, 35(8), 19-29.
		R10.2	Shaffer, D. W., & Gee, J. P. (Eds.). (2007). Epistemic Games as education for innovation. *British Journal of Educational Psychology*.
		R10.3	Peterson, M. (2010). Massively multiplayer online role-playing games as arenas for second language learning. *Computer Assisted Language Learning*, 23(5), 429-439
#11		R11.1	Boyd, d. (2008). Why Youth ♥ Social Network Sites: The Role of Networked Publics in Teenage Social Life. In D. Buckingham (Ed.), Youth, Identity, and Digital Media (pp. 119-142). Cambridge, MA.: The MIT Press.
		R11.2	Hämäläinen, R., & Oksanen, K. (2012). Challenge of supporting vocational learning Empowering collaboration in a scripted 3D game – How does teachers' real-time orchestration make a difference? *Computers & Education*, *59*, 281-293.
		R11.3	Luckin, R., Clark, W., Graber, R., Logan, K., Mee, A., & Oliver, M. (2009). Do Web 2.0 tools really open the door to learning? Practices, perceptions and profiles of 11–16-year-old students. Learning, Media and Technology, 34(2), 87-104.
#12	**Topic 6: Technologies for knowledge construction and modelling**	R12.1	Scardamalia, M. CSILE/Knowledge Forum®. In Educational technology: An encyclopedia. Santa Barbara: ABC-CLIO.
		R12.2	Olsen, R. (2011). Understanding virtual pedagogies for contemporary teaching and learning.

			Retrieved from http://www.ideaslab.edu.au/wp-content/uploads/2011/07/Understanding-Virtual-Pedagogies_CKC_ideasLAB.pdf
		R12.3	(Chapter 2 and 3 of) Dondi et al., (2011). Trialogical learning: A handbook for organisations and knowledge workers.
#13		R13.1	Reimann, P., & Thompson, K. (2009). Ecosystem modeling for environmental education: From stocks and flows to behavior and interactions. In P. Blumenschein, D. Hung & D. Jonassen (Eds.), Model-based approaches to learning: Using systems models and simulations to improve understanding and problem solving in complex domains (pp. 111-148). Rotterdam, The Netherlands: Sense Publishers.
		R13.2	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 and Instruction,* 24(2), 171-209.
		R13.3	Xie & Pallant (no year). The Molecular Workbench Software: An Innovative Dynamic Modeling Tool for Nanoscience Education. (Downloaded from http://mw.concord.org/modeler/. PDF in Readings collection.)