Master of Education

MEDD 6201

The Learning Sciences (2014-15)

Overview
This module is core and foundational to the M. Ed. specialism <u>Designing Powerful Learning Environments (DPLE)</u>, offered by the Faculty of Education, University of Hong Kong. The module briefly reviews what is known about how people learn from research, introduces the field of the Learning Sciences, and explores several instructional approaches developed in this field.

The module is organized in such a way so as to provide an experiential process for participants to learn about the main contributions of the sciences of learning to education and to develop an agenda for learning throughout the specialism.

Aims
The module has three overarching aims, which also are the aims of the specialism:
- Enabling students to develop competence in locating and understanding research on learning
- Enabling students to develop competence in analyzing learning
- Enabling students to develop competence in designing and evaluating learning environments

Pre-requisites and Co-requisites
There is no pre-requisites or co-requisite for this module.

Textbook
- Sawyer, R. K. (Ed.) (2014). *The Cambridge handbook of the learning sciences*. New York, NY: Cambridge University Press (2nd ed.). (Referred to as CHLS2 in the remainder of this module outline) This module covers chapters 1, 2, 3, 14, 15, 22, 27, 30, 32, 33, 34, 35. Additional chapters will be covered in the other core modules of the specialism.

Module Learning Outcomes (MLO)

MLO No.	MLO Statement	Assessment Task
1	Knowledge and understanding of main concepts, results, and methods of the learning sciences	1, 2
2	Ability to gather and analyze evidence on learning in a personally relevant learning context	2
3	Beginning ability to implement ideas from the module in the design of learning experiences	2

These <u>Module Learning Outcomes</u> integrate aspects of two <u>Specialism Outcomes</u>:
- Understand the learning sciences as a field and a foundation for educational design
- Ability to conceive, plan, carry out, and evaluate educational designs

The Specialism Learning Outcomes are addressed in each core module (MEDD 6201, MEDD 6202, MEDD 6203, MEDD 7108 and MEDD 6014), and the level to which students are expected to demonstrate the outcomes improves each semester. This module covers only two of them, and the Module Learning Outcomes target the ways to demonstrate them.

The specialism and modules also address the <u>University Educational Aims</u> and 21st century skills through the work students do in class and in professional contexts:
1. Pursuit of academic/professional excellence, critical intellectual inquiry, lifelong learning
2. Tackling novel situations and ill-defined problems
3. Critical self-reflection, greater understanding of others, and upholding personal and professional ethics

4. Intercultural understanding and global citizenship
5. Leadership and advocacy for the improvement of the human condition

Module Facilitators

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Structure

The module is based on 10 sessions of 2.4 hours duration each, totaling 24 hours as well as an additional 80 hours of additional study time, to be spent on reading, group work, self-directed study, preparation and assessments. All sessions are on Mondays from 18:00 to 20:30.

	Schedule
Session 1	**Sept. 15, 2014, 18:00 to 20:30** **Introduction** ➜ How people learn/how learning works ➜ The new science of learning (CHLS2, chap. 1) ➜ Module overview and requirements **Activities** Students are already familiar with the main findings of the *How People Learn* report and the implications for designing learning environments. In this session, we review these, attempt to understand them more deeply, and explore research on learning since the report was published. - Explore our own experience with learning and with making learning happen - Discuss the key findings of research on learning **Resources** In general, students are expected to read one accessible paper before the session—often, but not always a chapter from CHLS2. Unless otherwise explained during class, the resources provide important literature related to the topic, some of which a particular student may need to delve into as part of their learning plan. • National Research Council (2001). *How people learn: Brain, mind, experience, and school* (expanded edition). Washington, DC: National Academy Press. • Ambrose, A. A., Bridges, M. W., diPietro, M., Lovett, M. C., & Norman, M. K. (2010). *How learning works: 7 research-based principles for smart teaching.* San Francisco, CA: Jossey-Bass. • Hattie, J. (2012). *Visible learning for teachers: maximizing impact on learning.* New York: Routledge. • Laurillard, D. (2012). *Teaching as a design science: building pedagogical patterns for learning and technology.* New York: Routledge. • Van Merrienboer, J. J. G., & Kirschner, P. A. (2012). *Ten steps to complex learning: A systematic approach to four-component instructional design* (2nd ed.) New York: Routledge.

Session 2

Sept. 22, 2014, 18:00 to 20:30
Foundations: Scaffolding and Metacognition

➔ Scaffolding (CHLS2, chap. 2)
➔ Metacognition (CHLS2, chap. 3)

Activities
- Examine our understanding of scaffolding and metacognition
- Examine practical approaches that use scaffolding and foster metacognition

Resources
We provide only a few recent references. Students who do not have a strong background in cognitive psychology may want to take MEDD 6442 as an elective, which deals with many theories about learning in more detail. There also is a website, sponsored by the Education Bureau, which summarizes the main theories about learning, http://kb.edu.hku.hk/home.html.

- Volet, S., & Vauras, M. (Eds.) (2013). *Interpersonal regulation of learning and motivation*. New York: Routledge.
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York: Ballantine Books.

Session 3

Sept. 29, 2014, 18:00 to 20:30
Authentic Tasks and Learning Environments

➔ Designing for learning: interest, motivation, and engagement (CHLS2 chap. 33)
➔ Learning as cultural process: Achieving equity through diversity (CHLS2, chap. 34)

Activities
- Unpack key points from each of the core papers
- Identify a set of learning issues (for us) for designing a learning environment that engages learners

Resources
- Edelson, D. C., & Reiser, B. J. (2006). Making authentic practices accessible to learners: Design challenges and practices. In R. K. Sawyer (Ed), *CHLS1* (pp. 335-354). New York: Cambridge University Press.

Oct. 6, 2014, 18:00 to 20:30
Literacy in the Learning Sciences

We have now, as much as possible in a 10-week course, laid a foundation. The next 5 sessions examine some of the major approaches in the learning sciences literature, something we will continue in MEDD 6202.

"Reciprocal Teaching" was an early program of work in the learning sciences with a goal to improve literacy in inner-city schools. Later on it gave rise to the notion of a learning community. This research has much to offer for thinking about developing a learning environment that is collaborative, metacognitive, and focused on achieving.

➔ Learning to be literate (CHLS2 chap. 30)
➔ Reciprocal teaching (RT) and fostering communities of learners

Activities
- Introduce the idea of RT
- Teacher sharing on RT
- Examine the idea of communities of learners
- Implications for teaching

Resources
- Palinscar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and instruction, 1*(2), 117-175.
- Brown, A. L., & Campione, J. C. (1994). Guided discovery in a community of learners. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 229-270). Cambridge, MA: MIT Press.
- Bielaczyc, K., Kapur, M., & Collins, A. (2013). Cultivating a community of learners in the K-12 classroom. In C. E. Hmelo-Silver, C. A. Chinn, Carol K. K. Chan, & A. O'Donnell (Eds.), *The international handbook of collaborative learning* (pp. 233-249). New York, NY: Routledge.
- Lightbrown, P. M., & Spada, N. (2006). *How languages are learned.* Oxford, UK: Oxford University Press.
- Common Core, Inc. (2012). *Common core curriculum maps: English language arts, Grades 9-12.* San Francisco: Jossey-Bass.

Oct. 20, 2014, 18:00 to 20:30
Classroom discourse and argumentation
Classroom discourse (including talk) is one of the key elements of a democratic and collaborative environment that focuses on achieving important things—and an aspect of teaching that many teachers need to work on. There is much research on this topic in science, mathematics, and some other subjects, and we examine some of the more recent research.

➔ From teacher-directed discourse to collaborative discourse
➔ Arguing to learn (CHLS2 chap 22)

Activities
- Examine your own classroom discourse techniques
- Examine different approaches to creating a collaborative discourse community
- Explore different approaches in your own teaching

Resources
- Mayer, S. J. (2012). *Classroom discourse and democracy.* Pieterlen, Switzerland: Peter Lang.
- Chin, C. (2007). Teacher questioning in science classrooms: Approaches that stimulate productive thinking. *Journal of Research in Science Teaching, 44*(6), 815-843.

Session 4

Session 5

Oct. 27, 2014, 18:00 to 20:30
Case-based Reasoning & Project-based Learning

➔ Case-based reasoning
➔ Project-based learning (CHLS2, chap. 14)

Activities
- Introduction to these approaches
- Examine instructional materials
- Examine implications for pedagogical design

Resources
- Kolodner, J. L. (2006). Case-based reasoning. In R. K. Sawyer (Ed), *CHLS1* (pp. 225-242). New York: Cambridge University Press.

Nov. 3, 2014, 18:00 to 20:30
Problem-Based Learning

➔ Problem-based learning in medical sciences (CHLS2 chap. 15)

Activities
- Workshop on PBL. The workshop will focus on designing problems, the collaborative problem-solving process, and the role of the tutor.
- In the weeks after the workshop we will explore several issues online, including the feasibility in K-12 education and some of the debate between instructional approaches and inquiry-based approaches to learning.

Resources
- Hmelo-Silver, C. E., DeSimone, C. (2013). Problem-based learning: An instructional model for collaborative learning. In C. E. Hmelo-Silver, C. A. Chinn, C. K. K. Chan, & A. O'Donnell (Eds.), *The international handbook of collaborative learning* (pp. 370-385). New York, NY: Routledge.
- Hmelo-Silver, C. E., & Barrows, H. S. (2008). Facilitating collaborative knowledge building. *Cognition and Instruction, 26*(1), 48-94.
- Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist, 42*, 99-107.
- Kirschner, P. A., Sweller, J., & Clark, R. E. (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*(2), 75-86.
- Tobias, S., & Duffy, T. M. (Eds.) (2009). *Constructivist instruction: Success or failure?* New York: Routledge.
- Wong, K. H. (2012). *Implementation of problem-based learning in junior secondary science curriculum.* Unpublished Ph. D. dissertation, The University of Hong Kong.

Nov. 10, 2014: 18:00 to 20:30
Math education and the learning sciences

- Research in mathematics education: what can it tell us about human learning? (CHLS2 chap. 27)
- Computational thinking

Activities
- Examine models of mathematics education produced in the learning sciences

Resources
- Clements, D. H., & Sarama, J. (2009). *Learning and teaching early math: The learning trajectories approach*. New York: Routledge.
- Kafai, Y., & Burke, Q. (2014). *Connected code: Why children need to learn programming*. New York, MIT Press.
- Hull, T. H., Harbin Miles, R., & Balka, D. S. (2012). *The common core mathematics standards: Transforming practice through team leadership*. Thousand Oaks, CA: NCTM/Corwin.
- Huang, R., & Leung, F. K. S. (2002). How Pythagoras' theorem is taught in Czech Republic, Hong Kong and Shanghai: A case study. *Journal of Cross-cultural Psychology*, *16*, 131-152.
- Hegedus, S. J., & Roschelle, J. (Eds). *The SimCalc vision and contributions: Democratizing access to important mathematics*. New York: Springer.
- Sfard, A. (2008). *Thinking as communicating: Human development, the growth of discourses, and mathematizing*. New York: Cambridge University Press.

Nov. 17, 2014, 18:00 to 20:30
Formative Assessment
Formative assessment—also known as assessment for learning in Hong Kong—has become an important feature of education, and is particularly relevant to implementing the third main finding of the *How People Learn* report. In this session we examine it in the context of Hong Kong's educational context.

➔ Assessment in a learning culture
➔ Learning in Chinese contexts
➔ Strategies for formative assessment

Activities
- Extensive discussion assessment practices in HK/Chinese culture
- Identify ways to move forward and promote more agency

Resources
- Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy, and Practice, 5*, 7-74.
- Carless, D. (2010). *From Testing to Productive Student Learning: Implementing Formative Assessment in Confucian-Heritage Settings*. New York, NY: Routledge.
- Chan, C. K. K., & Rao, N. (Eds.) (2009). *Revisiting the Chinese learner: Changing contexts, changing education*. Hong Kong: Springer/CERC.
- Noyce, P. E., & Hickey, D. T. (Ed.) (2011). *New frontiers in formative assessment*. Cambridge, MA: Harvard Education Press.
- Shepard, L. E. (2000). The role of assessment in a learning culture. *Educational Researcher, 29*(7), 1-14.
- van Aalst, J. (2013). Assessment in collaborative learning. In C. E. Hmelo-Silver, C. A. Chinn, C. K. K. Chan, & A. O'Donnell (Eds.), *The international handbook of collaborative learning* (pp. 280-296). New York, NY: Routledge.
- Wiliam, D. (2011). *Embedded formative assessment*. Bloomington, IN: Solution Tree Press.

Nov. 24, 2014, 18:00 to 20:30
Designing for Scale and Sustainability; Review of module

➔ Learning sciences and policy design and implementation (CHLS2 chap 32)
➔ A learning sciences perspective on teacher education (CHLS2 chap. 35)
➔ School leadership
➔ Identifying learning issues for the DPLE Specialism

Activities
- Review of the module
- Explore issues of scalability and sustainability. How do we get beyond innovative practices in some classrooms, that fade when a project is over? One angle on this issue is school leadership.

Resources
- Fishman, B., Marx, R. W., Blumenfeld, P., Krajcik, J., & Soloway, E. (2004). Creating a framework for research on systemic technology innovations. *The Journal of the Learning Sciences, 13*, 43-76.
- Whitaker, T. (2012). *What great principals do differently: 18 things that matter most* (2nd ed.). Larchmont, NY: Eye on Education.
- Piety, P. J. (2013). *Assessing the educational data movement*. New York: Teachers College Press.
- Datnow, A., & Park, V. (2014). *Data-driven leadership*. San Francisco: Jossey-Bass.

Assessment Components

There are two components of assessment for this course. You are required to achieve a pass for each of these components for successful completion of this course. Your assignments must be completed by TBA, 2014. Online feedback will be provided by TBA, 2014.

Assessment Component 1

Component	Title	Format	Weight	Due Date
1	**Paper**	Individual	70%	January 12, 2015

Students are required to write a paper in which they discuss the state of their own practice in light of the main concepts, methods, and results from the learning sciences discussed in this module. The paper should demonstrate understanding of relevant chapters from the IHLS, and should provide a framework for students' designing and inquiry during the remainder of the specialism. The paper can incorporate results from preliminary inquiry in an educational setting. The paper should be 2000 to 2500 words including references, and should follow APA (American Psychological Association) style.

Assessment Component 2

Component	Title	Format	Weight	Due Date
2	**Electronic portfolio**	Individual	30%	December 15, 2014

In this specialism we will use an electronic portfolio in the DPLE domain on Google to reflect on and showcase learning in each of the four core modules and MEDD 6014, using the four Specialism Learning Outcomes as a guide. In this module, students are expected to create their portfolio site, write several entries about their current practice, and a few entries to self-assess their emerging understanding of the Specialism Learning Outcomes relevant to this module. These outcomes are further articulated for this module by means of the Module Learning Outcomes.