Spring 2010
15:295:550 Learning through Problem-solving:
Issues for Research and Design
Instructors:
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Thursdays 4:50- 7:30
GSE 314

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Thursday 2:30-4:30.

Have you ever wanted to do problem-based learning? Have you wondered how project-based activities and anchored instruction help students learn? What makes a good problem for learning? This seminar will tackle these questions as we consider constructivist approaches to learning and teaching. These approaches emphasize student-centered instruction situated in complex, meaningful tasks. We will explore a number of strategies for accomplishing this including problem-based learning, anchored instruction, and project-based learning. We will discuss the factors that are important to the success and failures of these approaches as well as exploring 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 approaches, and looking at some examples of problem-based learning groups.

Requirements:
1. Students need to come to class prepared to discuss the assigned articles. That means that the articles need to be read before coming to class. To help prepare for the discussion, students should write down 3-5 questions raised by the paper and post these on Sakai at least 24 hours prior to the class meeting.

2. All students will be responsible for leading 1-2 discussions about the assigned articles. The discussion leader will briefly review the papers (no more than 15 min) and then pose questions for discussion. On several of the sessions, we will use a jigsaw approach to reading the articles. During those weeks, a subset of the class will read each article. The discussion leaders are responsible for reading all the articles to be discussed. The "article group" will meet during the first 15 min of the class to identify the important issues for those papers. We will then jigsaw to form groups of students that have read each of the articles for the next portion of the class. Students will present a summary of their article to the group and will discuss the questions generated in the article groups and from the discussion leaders. We will finish with a whole class discussion. Note that leading a

discussion means just that. It is important to get the class involved in a critical discussion of the important theoretical, methodological and pragmatic issues raised by the articles that we are reading. Please do not devise alternative activities without discussing with the instructors.

3. Students will develop and present a Learning through problem solving (LPS) unit. This may be used to form the basis of the class project. Initial ideas and complete will be posted on the class Sakai site. All students will comment on at least 3 other student LPS units. We will have an opportunity to do some small dry runs of these in class.

4. Project: There are four options for the class project: a proposal, a literature review, technology project, or a Video Mosaic project with case study.

Option A. Students will write a proposal for the development of a problem or project centered instructional intervention including a plan for student assessment. This paper should help integrate the theoretical and practical issues that we have discussed in class and should be applied to a new domain and/or age group from the ones that we have discussed. If you are able to actually implement a unit, you may submit this as an evaluation report.

Option B: Students choosing this option may conduct an integrative literature review of research on problem-centered environments. This will involve reading and synthesizing results from data-based research. Such a paper should begin with a theoretical framework and conclude with issues for further research. Various approaches to LPS should be compared and contrasted with the research methods and results critically evaluated.

Option C: Students will develop a problem-based web page with all inquiry materials included and links to relevant learning resources. *A short paper (approximately 5 pages) with the design rationale and evaluation criteria must be turned in*. The web materials must actually be a working website.

Option D: Use the Video Mosaic (www.videomosaic.org) to develop a PBL unit for teacher professional development. As part of this endeavor, you will need to create a written case study of how you used the VMC to create the PBL unit.

For options A and C students are strongly encouraged to work in groups of two. Option D requires working in a group.

Note: Class attendance is required. More than 2 unexcused absences will result in a lowering of the class grade.

Grading:

Participation in class and online discussions	10%
Leading discussions	15%
LPS unit	20%

Critiques of classmates' units and projects	15%
Project	40%

Texts and articles

1) Torp, L. and Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-12 education. 2nd Ed*. Alexandria VA. ASCD.

2) Polman, J. (2000). *Designing project-based science: Connecting learners through guided inquiry*. New York: Teachers College Press. Note: Although I have broken up this book so that we are discussing it in sections, you might want to skim the entire book to get a sense of the whole story of a project-based science classroom.

Additional articles and chapters are available online. **You must have a Rutgers NetID to use the library and Sakai. If you do not yet have an account, it may take a few days to get one so it is important that you take care of this immediately.**

Tentative Course Schedule

Date	Topic	Assigned Reading	Activities & Assignments
1/21	Problem and project-based learning	Torp and Sage, Introduction Polman, Chapter 1	*Introductions on Sakai*
1/28	Theoretical foundations	Torp & Sage, Chapter 1, 2, 3 Hmelo-Silver, 2004	Working through a PBL problem
2/4	Facilitating PBL	Torp and Sage, Chapter 4 and 6 Hmelo-Silver & Barrows, 2006 Polman, Chapter 10	Facilitation workshop
2/11	Facilitating		Reflections on sakai
2/18	Designing PBL units	Torp & Sage, Chapter 5 Polman, Chapter 2, 11 Handout	Problem design workshop
2/25	Designing and Facilitating PBL	Torp & Sage, Chapter 5 Polman, Chapter 2, 11	*Bring in drafts of problem to work on*
3/4	Dry run LPS units	Jonassen & Hung, 2008 Doppelt & Schunn, 2008	*Post and respond to problem drafts on Sakai*
3/11	Assessment	Torp & Sage Chapter 7 Polman, Chapter 9 Belland et al, 2008 Pellegrino, 2006	Student led-discussion *LPS unit hard copy due*
3/25	Support for PBL	Torp & Sage. Chapter 8 Polman, Chapter 7 **Jigsaw:** Derry, Hmelo-Silver, Nagarajan, Chernobilsky, & Beitzel (2006) Brush & Saye (2008) Herrenkohl & Guerra, 1998	Student-led discussion
4/1	Problem-based learning: Traditional models	Hmelo, 1998 Walker & Leary, 2009	Student-led discussion *Project proposals posted in Sakai*
4/8	Anchored instruction	Cognition & Technology Group at Vanderbilt (2000) Barron et al., 1998	Student-led discussion *Respond to project proposals on Sakai*
4/15	Project-based science PBL unit presentations	**Jigsaw:** Krajcik et al., 1998 Polman, Chapter 4-6, 8 Geier et al , 2008	Student-led discussion
4/22	Informal Contexts for PBL	TBA	Student-led discussion
4/29	Design contexts	Silk, Schunn, & Cary, 2009 Kolodner et al (2003)	Student- led discussion
5/6	Project presentations		*Projects due*

Bibliography

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Herrenkohl, L. R., & Guerra, M. R. (1998). Participant structures, scientific discourse, and student engagement in fourth grade. *Cognition and Instruction, 16*, 431-473.

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Jonassen, D. H. & Hung, W. (2008). All problems are not equal: Implications for problem-based learning. *Interdisciplinary Journal of Problem-based Learning, 2(2)*, 6-28. http://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1080&context=ijpbl

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