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Fall 2016
Learning through Problem Solving: Issues for Research and Design
15:295:620:90
3 Credits
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Office Hours: By arrangement	Prerequisites or other limitations:
Mode of Instruction: ___ Lecture ___ Seminar ___ Hybrid _x_ Online ___ Other	Permission required: _x_ No ___ Yes Directions about where to get permission numbers:

Introduction

Have you ever wanted to do problem-based learning (PBL)? Have you wondered how problem-based activities help students learn? What makes a good problem for learning? What is the role of the facilitator in a PBL experience? How can we assess learning and understanding in PBL? 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 discuss the factors that contribute 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, facilitation, and assessment issues in PBL by discussing the relevant literature, review suggested frameworks for PBL unit design, and look at some examples of problem-based learning. In addition, the course will offer opportunities for you to design a PBL unit in your own area of professional practice or personal interest.

Goals

My goals for you during this course are to have you:

- Become familiar with the basic components of the PBL process,
- Read and critique the theoretical background of PBL,
- Understand the differences between PBL and other related active learning/teaching approaches
- Discuss and critique the promise and challenge associated with design, collaboration, facilitation, and assessment components of PBL,

- Research whether and how PBL has been used for learning/teaching in your area of interest or professional practice
- Identify potential "problems" in your area of interest or professional practice
- Design a PBL unit in your area of interest or professional practice, adapting steps from the frameworks discussed in the course
- Review and provide feedback on "problems" and PBL units designed by peers in your class

Course Requirements

1.	Online Participation	20%	Weekly
2.	Questions about Articles	5%	Weekly
3.	Independent Research on PBL	15%	Due 10/04
4.	Design of a PBL Unit Draft	20%	
	a. Initial "Problems"	5%	Due 10/18
	b. Peer Comments on Problems	5%	Due 10/25
	c. Completed PBL Unit Draft	10%	Due 11/08
5.	Peer Critique of PBL Unit Drafts	15%	Due 11/22
6.	Final Project	25%	Due 12/02 (Step 1 – Due 12/21)

Required Readings

Torp, L. and Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria VA: ASCD. ISBN-13: 978-0871205742

The textbook can be ordered through the Rutgers Bookstore (http://rutgers.bncollege.com). This is an introductory textbook that will offer practical insights into design, facilitation, and assessment of a PBL unit. In addition to the textbook, additional articles and chapters will be posted online on the class eCollege website. You must have a Rutgers NetID to use eCollege. If you do not have an account yet, it may take a few days to get one so it is important that you take care of this immediately.

Important Note: This syllabus, along with course assignments and due dates, are subject to change. It is the student's responsibility to check the class website for corrections or updates to the syllabus. Any changes will be clearly noted in a course announcement and/or by email.

Features of an Online Course

An online course differs from a traditional face-to-face course in a number of ways. In particular, for this class:

A. There is a strong emphasis on student-driven learning. The instructor role is of overall facilitator and coordinator.

B. You will be able to work at your convenience. But it is important to be seriously engaged at least five days during each and every week. This is quite different from a traditional

course, in which it is perfectly fine to prepare the day before, go to class the day of class, and then not think about the course the other five days a week.

C. We focus on asynchronous rather than synchronous activities. This course will—officially—be all asynchronous.

D. Students do more of the integrative work than in a face-to-face class. This is likely to support long-term memory development.

Weekly Schedule

The asynchronous discussions require an extended time to reflect on what we have read. Here is a typical schedule:

Tuesday: Each weekly cycle begins. On this day, you will have already completed the readings for this week and submit a question about each of the readings (see Monday, below).

Tuesday through the following Monday: Participate in discussions of readings. It is important to start contributing promptly each week on these problems. I expect everyone to contribute at least once on Tuesday, for example, as well as on at least three of the first four days of the weekly cycle (Monday through Thursday).

I may pose follow-up questions on Friday or Saturday, so it is also important that you are participating in the discussion threads in the last two days of the cycle (Sundays and Mondays) as well as earlier in the week.

Simultaneously as the discussions are going on for this cycle's readings, you should be reading the articles for the following cycle.

To reiterate, it is important that you get onto the discussion threads and contribute on at least 5 different days spread out throughout the weekly cycle.

Monday: You should have completed the readings for the next cycle. By 10 pm on this Monday, submit a question about each of the next cycle's readings on this Google form https://goo.gl/forms/tdvaAGgepONlmuM63

If for some reason this form does not work, please email me your questions, and alert me that you couldn't get the form to work. These should be questions that you are interested in discussing. I will aim to include some of these questions in the discussion questions.

Schedule

Schematically, the weekly schedule looks like this:

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Discussions for current week begin.	Continue to contribute to discussions.	Continue to contribute to discussions.	Continue to contribute to discussions.	Continue to contribute to discussions.
		Begin next week's readings.	Continue next week's readings.	Continue next week's readings.	Continue next week's readings.	Continue next week's readings.
Continue to contribute to discussions.	Continue to contribute to discussions.	Cycle repeats in the next week.				
Continue next week's readings.	Complete next week's readings.					
	Submit discussion questions on each of the next week's readings.					

** Note that beginning with Week 12, the schedule shifts back three days due to Thanksgiving, and the week will start on Friday rather than on Tuesday.

Schedule by Week

Week	Topic	READINGS due before this week begins (before Tues)	Assignments
Week 1 9/6 to 9/13	Introduction		Post self-introductions
Week 2 9/14 to 9/20	Theoretical Foundations I	Savery (2006) Torp & Sage (2002), Chap. 1-3	
Week 3 9/21 to 9/27	Theoretical Foundations II	Hmelo-Silver (2004) Torp & Sage (2002), Chap. 4	
Week 4 9/28 to 10/04	Problem Design	Hung (2006) Jonassen & Hung (2008) Torp & Sage (2002), Chap. 5	Oct. 04: Independent research on PBL due

Week	Topic	READINGS due before this week begins (before Tues)	Assignments
Week 5 10/05 to 10/11	Facilitation I	Hmelo-Silver & Barrows (2006) Torp & Sage (2002), Chap. 6	
Week 6 10/12 to 10/18	Facilitation II	McCaughan (2013) Zhang et al. (2010)	Oct. 18: Identification and posting of 3-4 potential "problems"
Week 7 10/19 to 10/25	Facilitation III	Azer (2005) Donnelly (2006)	Oct. 25: Comment on "problems" shared by others
Week 8 10/26 to 11/01	Scaffolding Learning	Ertmer & Simons (2006) Pecore & Bohan (2012)	
Week 9 11/02 to 11/08	Assessment I	Torp & Sage (2002), Chap. 7-8	Nov. 08: PBL unit draft due
Week 10 11/09 to 11/15	Assessment II	Belland et al. (2009) Pellegrino (2006)	
Week 11 11/16 to 11/22	Developing a Workshop	Dalrymple et al. (2007a) Dalrymple et al. (2007b) Wuenschell et al. (2007)	Nov. 22: Peer critique of PBL unit drafts due
Week 12 11/26 to 12/02**	Technology-Supported PBL	Brush & Saye (2008) Derry et al. (2006)	Dec. 02: Submit one-paragraph summary of proposal for final paper
Week 13 12/03 to 12/09	Anchored Instruction	Barron et al. (1998) Pellegrino & Brophy (2008)	
Week 14 12/10 to 12/16	Final Reflections	Hung (2011)	
Week 15 12/17 to 12/21		No readings or discussion; this is a week to complete your final paper.	Dec. 21: Final paper is due

** Note that beginning with Week 12, the schedule shifts back three days due to Thanksgiving and the weekly cycle will start on Friday rather than on Tuesday.

Evaluation

1. Online Participation

Each week, you will discuss the readings within eCollege discussion threads. We will focus on:

- Clarifying understanding of the readings. For research articles, this includes the research question, what the method was, what the results were, and whether the authors' conclusions are appropriate.

- Discussing applications and implications of the ideas you have read about.

The minimum requirement for contributing to the discussion is 9 or more substantive entries (including at least 4 responses) to the discussion threads. Your contributions to the discussions should collectively indicate that you have read all the readings. I also expect that you will not simply stop at 9 contributions each week. I hope that your goal will be to participate in meaningful, interesting discussions.

Evaluation will be based on the number of contributions as well as the quality of your contributions.

Discussions are places to explore and entertain ideas. There should be no presumption that discussants are firmly committed to positions that they are presenting arguments for.

Discussion contributions should adhere to normal rules of English usage, etc.

2. Questions about Articles

Each week, by Monday at 10 p.m., submit discussion questions about the readings on the Google form: https://goo.gl/forms/tdvaAGgepONlmuM63. The description of activities for each week will give you more specific instructions about how many questions to write and about which readings. These should be questions raised by the readings that you would like to discuss.

3. Independent Research on PBL

The best way to learn about PBL, and how to incorporate and design a PBL experience for learners in your professional context, is to do research on what is being done currently in your area. The class readings will enable you to understand the basic framework of PBL, theoretical background, and examples of implementation. In order to make this experience more relevant and meaningful to you, you are required to find 4-6 research articles in your field where PBL has been implemented. This exercise will enable you to see how PBL is interpreted, ways in which a learning/teaching unit has been developed and implemented, potential issues and challenges, as well as potential benefits of this approach to student learning in your specific field of professional practice. Specific guidelines on structure, format, and submission will be provided.

4. Design of a PBL Unit Draft

As a precursor to designing a full-fledged PBL unit/project, you will develop a PBL unit draft adapting a template that will be provided. You will have some flexibility to modify the template as needed. These PBL unit drafts will be submitted in the online forum so all students can see the different interpretations and potential implementation of PBL in different professional contexts.

This assignment has been broken down into 3 parts.

1. Before working on developing your PBL unit draft, you will need to select and develop a "problem". The best way to do this is to brainstorm ideas online with your peers and me. You will identify 3-4 potential "problems" in your field of professional practice that can become possible topics for designing a PBL unit. You will post your ideas on the course website to get feedback as you are initially thinking of ideas. Specific guidelines on structure, format, and submission will be provided.

2. In order to effectively select and refine a "problem" that will be the focus of your PBL unit, getting and giving feedback is a useful process. After completing the first part, you will comment on the "problems" shared by others based on new information read and discussed, and your own ideas on what may work or not. You are required to comment on the "problems" of at least 5 students. This is beneficial for you as well as it will allow you to: see how "problems" are framed in different learning/teaching contexts, evaluate the viability and learning potential of a "problem", determine if it is framed correctly, and consider alternative ways to present "problems" to students. Specific guidelines on structure, format, and submission will be provided.

3. After giving and receiving feedback on the "problem statements", you are to select one problem and develop it using a given template. This fleshed out template is the PBL unit draft. More details and specific guidelines on structure, format, and submission will be provided.

5. Peer Critique of PBL Unit Drafts

After submitting your PBL unit draft, all students will provide feedback on at least 3 other PBL units. These will be particularly helpful as your classmates can use your feedback to modify the design of the PBL and/or identify additional components or pieces that can enhance their final PBL project. Specific guidelines on structure, format, and submission will be provided.

6. Final Paper

There are 3 options for the final paper. You will need to declare an option by 12/02 with a one-paragraph summary proposal.

Option 1: Design a complete PBL unit to meet specific learning objectives/goals in your area of professional practice. You may use the PBL unit draft submitted earlier as a starting point and build on it to design a fleshed-out PBL unit that is ready to be implemented. You will write a paper that will address theoretical background of PBL, the need and potential value of PBL in

your area of professional practice, and a detailed plan that includes design, implementation, and assessment of the PBL unit in a learning/teaching setting. This paper should help integrate the theoretical and practical issues that we have discussed in class. Suggested page length is 10-15 pages.

Option 2: Conduct an integrative literature review of research on problem-based learning 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 PBL should be compared and contrasted with the research methods and results critically evaluated. Specific topic and scope of the paper can be discussed on a case by case basis. Suggested page length is 10-15 pages.

Option 3: Develop an online PBL unit (webpage) which will present the problem, provide essential materials and links to relevant learning resources, provide collaborative tools and online support for facilitation and collaboration, scaffold the development of solution/product and include assessments. A short paper (approximately 5 pages) with the design rationale and evaluation criteria must be turned in. This online PBL unit must actually be a working website that can be implemented readily as a PBL unit.

Detailed guidelines and sample papers will be shared in class. There is some scope for modifying the requirements for the final project if it will help you in developing something that is meaningful, useful, and implementable in your area of professional practice. The scope of your project must be shared with and approved by me before any modifications to the requirements are made.

Netiquette

This is drawn from Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace*. San Francisco: Jossey-Bass, p. 101.

a. Check the discussion frequently and respond appropriately and on the subject.
b. Focus on one subject per message and use pertinent, informative, and not-too-long subject titles.
c. Capitalize words only to highlight a point or for titles. Capitalizing otherwise is generally viewed as SHOUTING.
d. Be professional and careful with your online interaction.
e. Cite all quotes, references, and sources.
f. It is inappropriate to forward someone else's message(s) without their permission.
g. Use humor carefully. The absence of face-to-face cues can cause humor to be misinterpreted as criticism or flaming (angry, antagonistic criticism). Feel free to use emoticons such as :-) or ;-) to let others know that you're being humorous.

Norms

This is an example of norms for participating in constructive controversies.

Smith, K., Johnson, D. W., & Johnson, R. T. (1981). Can conflict be constructive? Controversy versus concurrence seeking in learning groups. *Journal of Educational Psychology, 73*, 651-663.

1. I am critical of ideas, not people.
2. I remember that we are all in this together.
3. I encourage everyone to participate.
4. I listen to everyone's ideas, even if I do not agree with them.
5. I restate what someone has said if it is not clear.
6. I try to understand both sides of the issue.
7. I first bring out all the ideas, and then I put them together.

Although written for younger students, these norms work well for online discussions among adults, too. At the same time, however, let's add these norms:

Critical to the advance of knowledge are:

8. Criticizing ideas, and having our ideas criticized by others.
9. Taking up criticism.
10. Exploring ideas without fully believing them, or without believing them at all.

Reading List

Four important notes:

1. Substitutions may be made for readings on this list. If substitutions are made, they will be announced before that week's readings begin. On the day when readings for a week begin, please double check course announcements to be sure that there have been no substitutions. Please check with me if you decide to read substantially ahead.

2. Shorter readings may be added to some weeks to address issues that arise in our discussions.

3. TBA (to be announced) denotes that a reading will be added to the list.

4. In some weeks, there are additional online sources posted on eCollege. Each week, be sure to check what is listed under the main activities for that week.

Week 1. Introductory Activities

Because you have not yet had time to complete any readings, we will spend the first week on a variety of introductory activities. Please note that discussion threads will be active this week!

Week 2. Theoretical Foundations I

Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-based Learning, 1*(1), 9-20.

Torp, L. and Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria VA: ASCD. Chapters 1-3.

Week 3. Theoretical Foundations II

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review, 16*(3), 235-266.

Torp, L. and Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria VA: ASCD. Chapter 4.

Week 4. Problem Design

Hung, W. (2006). The 3C3R model: A conceptual framework for designing problems in PBL. *Interdisciplinary Journal of Problem-based Learning, 1*(1), 55-77.

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.

Torp, L. and Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria VA: ASCD. Chapter 5.

Week 5. Facilitation I

Hmelo-Silver, C. E., & Barrows, H. S. (2006). Goals and strategies of a problem-based learning facilitator. *Interdisciplinary Journal of Problem-based Learning, 1*(1), 21-39.

Torp, L. and Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria VA: ASCD. Chapter 6.

Week 6. Facilitation II

McCaughan, K. (2013). Barrows' integration of cognitive and clinical psychology in PBL tutor guidelines. *Interdisciplinary Journal of Problem-based Learning, 7*(1).

Zhang, M., Lundeberg, M., McConnell, T. J., Koehler, M. J., & Eberhardt, J. (2010). Using questioning to facilitate discussion of science teaching problems in teacher professional development. *Interdisciplinary Journal of Problem-based Learning, 4*(1), 57-82.

Week 7. Facilitation III

Azer, S. A. (2005). Challenges facing PBL tutors: 12 tips for successful group facilitation. *Medical Teacher, 27*(8), 676-681.

Donnelly, R. (2006). The academic developer as tutor in PBL online in higher education. In M. Savin-Baden & K. Wilkie (Eds.), *Problem-based learning online* (pp. 79-97). Berkshire, UK: Open University Press.

Week 8. Scaffolding Learning

Ertmer, P. A., & Simons, K. D. (2006). Jumping the PBL implementation hurdle: Supporting the Efforts of K–12 Teachers. *Interdisciplinary Journal of Problem-based Learning, 1*(1), 40-54.

Pecore, J. L., & Bohan, C. H. (2012). Problem-based learning: Teachers who flourish and flounder. *Curriculum & Teaching Dialogue, 14*(1),125-138.

Week 9. Assessment I

Torp, L. and Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria VA: ASCD. Chapters 7-8.

Week 10. Assessment II

Belland, B. R., French, B. F., & Ertmer, P. A. (2009). Validity and problem-based learning research: A review of instruments uses to assess intended learning outcomes. *Interdisciplinary Journal of Problem based Learning, 3*(1), 59-89.

Pellegrino, J. W. (2006). *Rethinking and redesigning curriculum, instruction, and assessment: What contemporary research and theory suggests*. National Center on Education and the Economy for the New Commission of the Skills of the American Workforce.

Week 11. Developing a Workshop

Dalrymple, K., Wong, S., Rosenblum, A., Wuenschell, C., Paine, M., & Shuler, C. (2007a). PBL core skills faculty development workshop 3: Understanding PBL process assessment and feedback via scenario-based discussions, observation, and role-play. *Journal of Dental Education, 71*(12), 1561-1573.

Dalrymple, K., Wuenschell, C., Rosenblum, A., Paine,M., Crowe,D., von Bergmann, H.C., Wong, S., Bradford, M., & Shuler, C. (2007b). PBL core skills faculty development workshop 1: An experiential exercise with the PBL process. *Journal of Dental Education, 71*(2), 249-259.

Wuenschell, C., Dalrymple, K., & Shuler, C. (2007). PBL core skills faculty development workshop 2: Training faculty in group learning facilitation skills through role-modeling and role-play activities. *Journal of Dental Education, 71*(5), 606-618.

Week 12. Technology-Supported PBL

Brush, T. & Saye, J. (2008). The effects of multimedia-supported problem-based inquiry on student engagement, empathy, and assumptions about history. *Interdisciplinary Journal of Problem-based Learning, 2*(1). 21-56.

Derry, S. J., Hmelo-Silver, C. E., Nagarajan, A., Chernobilsky, E., & Beitzel, B. D. (2006). Cognitive transfer revisited: Can we exploit new media to solve old problems on a large scale? *Journal of Educational Computing Research, 35*(2), 145-162.

Week 13. Anchored Instruction

Barron, B. J. S., Schwartz, D. L., Vye, N. J., Moore, A., Petrosino, A., Zech, L., Bransford, J. D., & The Cognition and Technology Group at Vanderbilt. (1998). Doing with understanding: Lessons from research on problem and project-based learning. *Journal of the Learning Sciences, 3/4*, 271-265.

Pellegrino, J. W., & Brophy, S. (2008). From cognitive theory to instructional practice: Technology and the evolution of anchored instruction. In D. Ifenthaler, P. Pirnay-Dummer, & J. M. Spector (Eds.), *Understanding Models for Learning and Instruction*. New York, NY: Springer, 277-303.

Week 14. Final Reflections

Hung, W. (2011). Theory to reality: A few issues in implementing problem-based learning. *Education Technology Research & Development, 59*, 529–552.

Week 15. Completing Paper

There are no readings in Week 15 to give you time to complete your class paper.