

Rutgers, The State University of New Jersey

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Learning through Problem Solving

Summer 2015

Online

<http://onlinelearning.rutgers.edu/ecollege>

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Office Hours: By arrangement	Prerequisites or other limitations: None
Mode of Instruction: <input type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Hybrid <input checked="" type="checkbox"/> Online <input type="checkbox"/> Other	Permission required: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes Directions about where to get permission numbers: ericka.diaz@gse.rutgers.edu

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Course Description

Course Catalog Description:

Sociocultural and situated cognition approaches to learning and instruction; overview and critique of various contextualized approaches; problem-based learning; anchored instruction; project-based learning; and design-based learning.

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.

Required Texts:

Torp, L., & Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria, VA: ASCD. ISBN-13: 978-0871205

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 every day for the assignment and for corrections or updates to the syllabus. Any major changes will be clearly noted in a course announcement and by email.

Grading Policy

Evaluation of Written Work:

Grading Breakdown by Course Assignment:

0. Online Participation	20%	Daily
1. Independent Research on PBL	20%	Due 6/1
2. Design of a PBL Unit Draft	20%	
A. Initial Problem Ideas	5%	Due 5/28
B. Complete PBL Unit Draft	15%	Due 6/5
3. Feedback on Peers' PBL Designs	20%	
A. Comments on Problem Ideas	5%	Due 5/29
B. Critiques of PBL Unit Drafts	15%	Due 6/10
4. Final Paper	20%	Due 6/15 (Step 1 – Due 6/8)

Grading Scale:

- A = 90-100
- B+ = 85-89
- B = 80-84
- C+ = 75-79
- C = 70-74
- F = Below 70

Academic Integrity:

Any violation of academic honesty is a serious offense and is therefore subject to an appropriate penalty. Refer to <http://academicintegrity.rutgers.edu/integrity.shtml> for a full explanation of policies.

Course Requirements

Website:

<http://onlinelearning.rutgers.edu/ecollege>

Attendance Policy:

Because this is an all-online course, there will be no mandatory face-to-face meetings. However, you will be expected to engage in various ways throughout every week of the course. This means active participation in online discussions and completing readings every day during the week, as well as doing major assignments during the week and on weekends. There is a lot to do in a short amount of time, as this course is a full three-credit course condensed into only three weeks.

In addition, you should feel welcome to contact me by email if you want set up a time to talk one-on-one either in person, on the phone, or virtually.

Features of this 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.
- C. We focus on asynchronous rather than synchronous activities. This course will—officially—be all asynchronous. Depending upon interest, I am open to setting up a (completely optional) face-to-face meeting with our class as a whole.
- D. Students do more of the integrative work than in a face-to-face class. This is likely to support long-term memory development.

Netiquette

This is drawn from Palloff and Pratt (1999, 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.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for the online classroom* (1st ed.). San Francisco: Jossey-Bass Publishers.

Norms

This is an example of norms for participating in constructive controversies from Smith, Johnson, and Johnson (1981):

- 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.

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(5), 651–663. <http://doi.org/10.1037/0022-0663.73.5.651>

General Daily Schedule:

Because this course is all online and highly condensed, you will be expected to engage in coursework at least five days a week throughout all three weeks of the course. In addition to being engaged each day, you will also be expected to work on multiple parts of the course simultaneously. In particular, we will have asynchronous discussions online each weekday about that day's readings. At the same time that these reading discussions are going on, you should be reading to prepare for the next day's discussions, and you should also be working on completing the major assignments as appropriate.

Summary of Requirements

In summary, a fifth of the requirements for the course will be the result of daily participation around the readings (online reading discussions). The other requirements for the course will focus on major assignments in which you will integrate ideas from the readings and apply them to your own professional or other interests. This will include both doing research on PBL in your area of interest and developing a PBL unit in your area of interest as well.

Course Schedule by Week

Day	Topics	Readings	Assignments
1: 5/26	Introduction	No readings (but start Day 2 readings right away)	<i>Post self-introductions (instructions via email)</i>
2: 5/27	Theoretical Foundations I	Savery (2006) Torp & Sage (2002), Chap. 1-3	
3: 5/28	Theoretical Foundations II	Hmelo-Silver (2004) Torp & Sage (2002), Chap. 4	<i>Due 5/28: Identification and posting of 3-4 potential "problems"</i>
4: 5/29	Problem Design	Jonassen & Hung (2008) Torp & Sage (2002), Chap. 5	<i>Due 5/29: Comments on "problems" shared by others</i>
5: 6/1	Facilitation I	Hmelo-Silver & Barrows (2006) Torp & Sage (2002), Chap. 6	<i>Due 6/1: Independent Research on PBL</i>
6: 6/2	Facilitation II	Azer (2005) Zhang et al. (2010)	
7: 6/3	Scaffolding Learning	Ertmer & Simons (2006) Pecore & Bohan (2012)	
8: 6/4	Assessment	Belland et al. (2009) Torp & Sage (2002), Chap. 7	
9: 6/5	PBL in Context	Cicchino (2015) Zhang et al. (2011)	<i>Due 6/5: PBL Unit Draft</i>
10: 6/8	Technology in PBL	Derry et al. (2006) Donnelly (2006)	<i>Due 6/8: Submit one-paragraph final paper proposal</i>
11: 6/9	Critical Features	Wirkala & Kuhn (2011) Yew & Schmidt (2012)	
12: 6/10	Anchored Instruction	Barron et al. (1998) Pellegrino & Brophy (2008)	<i>Due 6/10: Critiques of PBL Unit Drafts</i>
13: 6/11	PBL Criticism	Hmelo-Silver et al. (2007) Kirschner et al. (2006)	
14: 6/12	Final Reflections	Hung (2011) Torp & Sage (2002), Chap. 8	
15: 6/15	(None)	No readings	<i>Due 6/15: Final Paper</i>

Evaluation

Daily Assignments

0. Discussions of Readings

Each day, 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.

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.

Also, when you are contributing to the online discussions consider the length of your posts. Posts that are too short may not add much to the discussion (e.g., "Yes" or "I disagree"). Conversely, posts that are too long and wordy are not likely to be read fully. Sometimes it is okay and makes sense to make a long post or a short post, but for most posts try to put together a contribution that is about 2-3 sentences in length.

The minimum requirement for contributing to the discussion is **4 or more substantive entries** (including at least 2 responses to someone else's post) each day. 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 4 contributions each week. I hope that your goal will be to participate in meaningful, interesting discussions. Each discussion forum will only be made available on its designated day. I expect all contributions for that day to be made prior to 11:59 PM.

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

Major Assignments

1. 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.

2. Design of a PBL Unit Draft

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 shared and critiqued by other students in the class so that you all can see the different interpretations and potential implementation of PBL in different professional contexts.

This assignment has been broken down into 2 parts.

- A. *Initial Problem Ideas*: 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.
- B. *Complete PBL Unit Draft*: After generating and receiving feedback on your “problem statements”, you are to select one problem and develop it using a given template. This fleshed out template is the PBL unit draft.

3. Feedback on Peers’ PBL Designs

This assignment has been broken down into 2 parts.

- A. *Comments on Problem Ideas*: 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.
- B. *Critiques of PBL Unit Drafts*: After submitting your own 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 PBL unit. Critiquing other people’s drafts is also an opportunity for you to see how others implement the different aspects of a PBL unit in other contexts.

4. Final Paper

There are 2 options for the final paper. You will need to declare an option by 6/8 with a one-paragraph summary proposal.

Option 1: Write a paper describing the design of a complete PBL unit to meet specific learning objectives/goals in your area of professional practice. You should 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. Your paper will address the 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 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 in your area of professional practice. This will involve reading and synthesizing results from empirical research. You should use the independent research assignment submitted earlier as a starting point and build on it by integrating those sources, as well as class readings, and any other articles you find. 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.

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

Reading List

Four important notes:

1. Substitutions may be made for readings on this list. If substitutions are made, they will be announced before those readings begin. On the day when readings 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 may be additional online sources posted on eCollege. Each week, be sure to check what is listed under the main activities for that week.

Day 1. Introductory Activities

Because you have not yet had time to complete any readings, we will spend the first day on introductory activities. Please note that discussion threads will be active this day, so plan on contributing. Also, begin your readings for Day 2.

Day 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.
<http://doi.org/10.7771/1541-5015.1002>

Torp, L., & Sage, S. (2002). What does problem-based learning look like in classrooms? [Chapter 1]. In *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed., pp. 5–13). Alexandria, VA: ASCD.

Torp, L., & Sage, S. (2002). What is problem-based learning? [Chapter 2]. In *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed., pp. 14–28). Alexandria, VA: ASCD.

Torp, L., & Sage, S. (2002). What are the foundations of problem-based learning? [Chapter 3]. In *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed., pp. 29–34). Alexandria, VA: ASCD.

Day 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.
<http://doi.org/10.1023/B:EDPR.0000034022.16470.f3>

Torp, L., & Sage, S. (2002). What is our model for problem-based learning? [Chapter 4]. In *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed., pp. 35–45). Alexandria, VA: ASCD.

Day 4. Problem Design

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://doi.org/10.7771/1541-5015.1080>

Torp, L., & Sage, S. (2002). How do you design a problem-based learning curriculum? [Chapter 5]. In *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed., pp. 46–67). Alexandria, VA: ASCD.

Day 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. <http://doi.org/10.7771/1541-5015.1004>

Torp, L., & Sage, S. (2002). How do you implement problem-based learning? [Chapter 6]. In *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed., pp. 68–83). Alexandria, VA: ASCD.

Day 6. Facilitation II

Azer, S. A. (2005). Challenges facing PBL tutors: 12 tips for successful group facilitation. *Medical Teacher*, 27(8), 676–681. <http://doi.org/10.1080/01421590500313001>

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. <http://doi.org/10.7771/1541-5015.1097>

Day 7. 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. <http://doi.org/10.7771/1541-5015.1005>

Pecore, J. L., & Bohan, C. H. (2012). Problem-based learning: Teachers who flourish and flounder. *Curriculum and Teaching Dialogue*, 14(1/2), 125–138.

Day 8. Assessment

Belland, B. R., French, B. F., & Ertmer, P. A. (2009). Validity and problem-based learning research: A review of instruments used to assess intended learning outcomes. *Interdisciplinary Journal of Problem-Based Learning*, 3(1), 59–89. <http://doi.org/10.7771/1541-5015.1059>

Torp, L., & Sage, S. (2002). How do you assess learning in and through problem-based learning? [Chapter 7]. In *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed., pp. 84–101). Alexandria, VA: ASCD.

Day 9. PBL in Context

Cicchino, M. I. (2015). Using game-based learning to foster critical thinking in student discourse. *Interdisciplinary Journal of Problem-Based Learning*, 9(2). <http://doi.org/10.7771/1541-5015.1481>

Zhang, M., Parker, J., Eberhardt, J., & Passalacqua, S. (2011). "What's so terrible about swallowing an apple seed?" Problem-based learning in kindergarten. *Journal of Science Education and Technology*, 20(5), 468–481. <http://doi.org/10.1007/s10956-011-9309-0>

Day 10. Technology in PBL

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. <http://doi.org/10.2190/0576-R724-T149-5432>

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.

Day 11. Critical Features

Wirkala, C., & Kuhn, D. (2011). Problem-based learning in K-12 education: Is it effective and how does it achieve its effects? *American Educational Research Journal*, 48(5), 1157–1186. <http://doi.org/10.3102/0002831211419491>

Yew, E. H. J., & Schmidt, H. G. (2012). What students learn in problem-based learning: A process analysis. *Instructional Science*, 40(2), 371–395. <http://doi.org/10.1007/s11251-011-9181-6>

Day 12. 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*, 7(3-4), 271–311. <http://doi.org/10.1080/10508406.1998.9672056>

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* (pp. 277–303). Boston, MA: Springer. http://doi.org/10.1007/978-0-387-76898-4_14

Day 13. PBL Criticism

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(2), 99–107. <http://doi.org/10.1080/00461520701263368>

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. http://doi.org/10.1207/s15326985ep4102_1

Day 14. Final Reflections

Torp, L., & Sage, S. (2002). How do you support problem-based learning? [Chapter 8]. In *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed., pp. 102–114). Alexandria, VA: ASCD.

Hung, W. (2011). Theory to reality: A few issues in implementing problem-based learning. *Educational Technology Research and Development*, 59(4), 529–552.
<http://doi.org/10.1007/s11423-011-9198-1>

Day 15. Completing Paper

There are no readings for Day 15 to give you time to reflect on the course and to complete your Final Paper.