

**CCT 611: (Seminar in Critical Thinking)
Investigating Authentic Problems
Through Problem-Based learning (PBL)**

Fall 2007 Tuesday 7-9:30 PM
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"Tell me I forget; show me I remember, involve me I *understand*".

Description:

The best way to become a better problem solver is to experience the thought, habits of mind and actions needed to tackle real world problems. Problem-based learning (PBL) is a powerful process that simultaneously develops problem solving strategies and disciplinary knowledge bases and skills by placing individuals in the active role of problem solvers confronted with an ill-structured real world problem. This robust CCT process is shaped and directed by students with the instructor as metacognitive coach. Students, not the instructor, take primary responsibility for what is learned and how, using a PBL model developed by the instructor to investigate interest-based authentic problems. In PBL, the instructor "guides on the side", raising questions that challenge students' thinking and help shape self-directed learning so that the search for meaning and understanding becomes a personal construction of the learner.

REQUIRED READINGS:

Greenwald, Nina L. Science in Progress (1999). Pennsylvania Society for Biomedical Research (and self-published).

Woods, Donald R. Problem-Based Learning (1994). McMaster University.

Additional resources may include the following. Further resources may be added, as recommended by the tutor (coach) and learning teams, based on emerging needs and interests throughout the PBL process:

BOOKS: (selected chapters)

Amador, J., Miles, L., Peters, C.B. (2006). *The Practice of Problem-based Learning: a guide to implementing PBL in the college classroom*. Anker Publishing, Bolton, MA..

Evenson, D., Hmelo, Cindy E. (2000). *Problem-Based Learning: a research perspective on learning interactions*. Erlbaum Associates, Mahway, N.J..

ARTICLES:

Dillon, J. T. (1988). *Questioning and Teaching: A Manual of Practice*. London: Croom Helm.

Donald, J.G. (2002). *Learning to Think: Disciplinary Perspectives*. San Francisco, Calif.: Jossey-Bass Inc.

Dominowski, R.L. (1998). *How to use problem-based learning in the classroom*. Alexandria, VA: Association for Supervision and Curriculum Development.

Goh, Karen. "What do you think?" *The Art and Science of Questioning in the PBL Classroom*, Republic Polytechnic, Singapore

<http://scholar.google.com/scholar?q=Karen+Goh:+Art+and+Science+of+Questioning+in+PBL+Classroom&hl=en&um=1&ie=UTF-8&oi=scholar>

Hung.W., Bailey, J.H., & Jonassen, D.H. (2003). Exploring the tensions of problem-based learning: Insights from research. In D. S. Knowlton & D.C. Sharp (Eds.), *New directions in teaching and learning: No. 95 Problem-based learning in the Information Age* (pp.13-24). San Fransisco, CA: Jossey-Bass.

Novak, Joseph., Canas, Alberto. *The Theory Underlying Concept Maps and How to Construct Them*.

<http://cmap.ihmc.us/Publications/ResearchPapers/TheoryCmaps/TheoryUnderlyingConceptMaps.htm>

PROCESSES:

- 1) application of a 10 step model to an authentic problem
small group investigation of the problem and communication of results to a relevant audience; accompanying team written report to include group assessment of problem solving and team skills
- 2) PBL personal encounters portfolio (individual): ongoing reflection on thinking processes, personal and learning team experiences with PBL, to include exit self-assessment

WEEKLY PROGRESSION (note: after weeks 1-4, the nature of topics and full class discussion may vary contingent on learning team needs)

Week 1- Authentic Learning

Self-directed learning: some essential questions

What is learning?

What is authentic learning?

Self-directed learning?

What is understanding?

Constructivist teaching and learning (role shifts for students and teachers)

Activities

best learning experiences

solving problems with different intelligences

Readings (Week 2)

Woods, Chapter 1: Are You Ready for Change?

Greenwald 1-10

Selected articles (given in class)

HW: learning styles (Woods inventories)

Week 2- Authentic Learning cont'd.

Big ideas from the readings: ill-defined problems

Activities:

big ideas listing

sharing learning styles insights
what is PBL? (it starts with a "mess")
examples of messy problems

Reading: (Week 3)

Greenwald: What is PBL? (pp. 11-22)

Woods: What is PBL? Problem Solving Skills (2.1-3.26)

Greenwald: A Model for Guiding Students in PBL (p. 22-36)

selected articles (given in class)

Week 3- A PBL Model

PBL process: ill-defined problems

Activities:

A model for engaging PBL (Greenwald)
identifying/sharing messy problems

Reading: (Week 4)

Bradford: Effective Teamwork

Woods: What is small group PBL? (4.1-4.6)

Woods: Group Skills (5.1-5.10)

Week 4- Drafting Ill-Defined Problems

Activities:

ill-defined scenarios (free writing)
ill-defined problem: (PBL: Step 1)
teams vs. groups
team skills: listening

Reading: (Week 5)

selected reading (self-directed learning; problem finding)

Week 5- Questioning and Team Skills cont'd.

Unpacking information to identify problems

Activities:

IPF questioning: PBL Step 2
teambuilding behaviors/strategies
application of PF strategies to messy problem scenario:

strategies for recording PF results: PBL Step 3

Reading: (Week 6)

Woods: What is self-directed, interdependent, small group PBL? (6.1-6.5)

selected reading: pattern finding; concept mapping

Week 6- Mapping Problem Finding Results

pattern finding; problem representation

Activities:

synthesizing information to discern patterns, relationships

problem prioritization: PBL Step 4

strategizing: who does what, when, where, how?

Readings: Week 7

Woods: Self-directed interdependent learning skills (7.1-7.17)

Greenwald: Stages of Inquiry (31)

Week 7- Problem Investigation

What are your goals? What do you want to learn? How?

Activities:

KNF

Stages of Inquiry (Greenwald)

strategizing: who does what, when, where, how?

Readings: Week 8

selected reading: research design and methods

Week 8- Problem Investigation cont'd.

Readings: Week 9

selected reading: independent study; data analysis

personal encounters journal due (first half of semester)

Week 9- Problem Investigation cont'd.

What did you find out? From whom, what sources? Need to know?

Activities: PBL Step 5

data assessment (source credibility? gaps? paradoxes?)

intergroup sharing: "pits, berries" of the process

Week 10- Problem Investigation cont'd.

How will you organize/analyze your data? Activities: PBL Step 6
tools for making sense out of your data?
ways to present your data?

Readings: Week 11

selected reading: making inferences; drawing conclusions

Week 11- Problem Investigation cont'd.

What did you learned about your problem? Conclusions?
Activities: PBL Steps 6 and 7

Readings: Week 12

selected reading: metacognitive dialogue

Week 12- Solutions/ Recommendations

Who do you want to invite to learn about your findings? (relevant audience?)

Activities: PBL Steps 8/9

Readings: Week 13

Woods: Self-assessed, self-directed, small group PBL (8.1-8.5)

Woods: Self-assessment skills (9.1-9.16)

Week 13- Refine Solutions; Communicate Results

designing team self-assessment measures

Activities: PBL Steps 8/9

Readings: Week 14

Woods: Putting It All Together (10.1-10.6)

Week 14- Presentations to Relevant (guest) Audiences

- finalizing the team presentation: PBL Steps 9/10
- personal encounters portfolios due
- self-assessment due

Week 15- Presentations to Relevant (guest) Audiences

- team presentations to relevant audiences (35-40 minutes)
- team written report due

