Using Problem-Based Learning to Teach Environmental Health Concepts

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"If you want to build a ship, don't herd people together to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea."

Antoine-Marie-Roger de Saint-Exupery

Author of *The Little Prince*
“When teachers recognize and honor the human impulse to construct new understandings, unlimited possibilities are created for students.”

(Brooks & Brooks, 1999, p. 21)
Objectives

1. Discuss the use and effectiveness of problem based learning (PBL) methods
2. Integrate PBL strategies and simulations methods into nursing classroom, online and clinical education
3. Apply PBL methods for teaching environmental health concepts
What is Problem Based Learning?

An experiential educational process in which students learn through working with small groups and a faculty tutor to investigate and resolve messy real-world problems.

(IMSA, 2011, http://pbln.imsa.edu/model/intro/)
Rooted in a Constructivist Pedagogy

- Learning occurs through development of new knowledge that builds upon previous education, experience and worldview.

- “... for students, schooling must be a time of curiosity, exploration, and inquiry, and memorizing information must be subordinated to learning how to find information to solve real problems” (p. 9).

Benefits of PBL Pedagogy for Nursing

- Long-term retention and recall
- Communication and collaborative team work
- Clinical reasoning and inquiry skills
- Metacognition awareness - self-monitoring of one’s reasoning and decision making skills
- Utilization of informatics
- Motivation of learning

- Strobel (2009)
Research on PBL Learning Outcomes

- Slightly underperforming in short-term retention
- Improves:
  - Long-term retention and recall
  - Clinical reasoning and inquiry skills
  - Metacognition
  - Utilization of informatics
  - Communication and collaborative team work
  - Motivation of learning
**PBL**

- Ill-structured case, complex, multiple pathways
- Faculty Facilitator, minimal support, use of probing questions
- Emphasis on self-directed learning and group problem-solving

**Case Study**

- Well-structured case, specific outcomes
- Faculty Expert, maximum support
- May not use self-directed learning or groups
What makes PBL different?

Experiential Curriculum

Problem as Curriculum Organizer

Student as Problem Solver

Faculty as Cognitive Coach

Adapted from IMSA: http://pbln.imsa.edu/model/intro/differences.html
Understand the Problem

Explore the Curriculum
(Investigate the problem and solutions)

Resolve the Problem
The Problem Solving Process

1. **Understand the problem**
   - Identify the problem — unknown
   - What are you asked to find/solve?

2. **What is known**
   - Define terms
   - Clarify assumptions
   - Remember previous knowledge
   - Identify relevant / irrelevant information

3. **What is unknown**
   - Gather further information

4. **Devise a plan**
   - Sketch a picture or a diagram
   - Determine operations
   - Take a risk

5. **Carry out the plan**
   - Write out steps
   - Perform operations

6. **Evaluate**
   - Is the problem solved?
   - Is it reasonable?
IMSA’s PBL Teaching and Learning Template

Understand the Problem
- Meet the problem
- Know/Need to Know
- Define the Problem Statement

Explore the Curriculum
- Gather Information
- Share Information
- Generate Possible Solutions

Resolve the Problem
- Determine Best Fit Solution
- Present the Solution
- Debrief the Problem

Source: http://pbln.imsa.edu/model/template/
Faculty present
“Meet the Problem”

• An “ill structured” problem that has an element of surprise of urgency
• Problems are authentic, “real world” practice, cross-disciplinary
• Requires students to generate multiple thoughts about the cause and strategies to solve it
The case of …

- Has 3 to 7 parts that are distributed in increments
  - initial part provides insufficient facts and the process for solving the problem is not obvious
  - subsequent parts deliver additional information
    - requires further data-gathering or other activity.
  - Source – Morales-Mann & Kaitell, 2001
Example: Meet the Problem: The Case of the Flying Toilets

- You are a PHN who has just arrived as a WHO worker in a low income country (pick a country) and find that the normal method for dealing with human waste is to collect it in plastic bags and throw them into the street.
Student Role

Understanding the Problem

- Students determine what they need to learn
- Generate lists:
  - What We Know
  - What We Need to Know
  - What We Need to DO
- Clarify the problem statement/question
Instructor Role

- Teachers act as facilitators or “tutors”
- Use scaffolding methods to guide students from what is known to what is to be known
  - Ask thought provoking questions
    - “How do you know that?”
    - “What assumptions might you be making?”
  - Model expert thinking
    - McMahon, M. & Christopher, K. 2011;
Students

- plan how to gather information from multiple sources
- share information with their group and discuss relevance to the problem
- synthesize information to generate possible solutions
Students

- determine a best fit solution
- present their solution and get feedback
  - (preferably from a real world stakeholder)
- debrief the presentation to emphasize learning from other groups’ presentations
How Do I Start Using PBL?

- Start with the course/class objectives
  - Review your exams and work backward
- Develop an authentic problem based in practice
- Design a one sentence statement that introduces the problem and engages the student
  - The case of the ……. 
Getting started con’t

- Identify the knowledge/competency being addressed in the exercise
  - Example addresses conducting a focused environmental assessment.

- Create a checklist that includes:
  - Information that will be provided in increments
  - Learning objectives – student learning outcomes
  - Link between the problem and the content being covered
    - Source: Rogal & Snider, 2007
Evaluation Methods

- Structured evaluation of the tutorial process and learning that occurred
  - Self-evaluation of their performance
  - Feedback from peers and faculty
- Presentation of the solution
- Exams, papers and projects
USING PBL TO TEACH ENVIRONMENTAL HEALTH

Sample PBL Exercise

- The Case of the Struggling Children
Materials and Directions

- **Materials**
  - Instructor Guide (take-away at end)
  - Student Handout *(The Case of the Struggling Children)*

- “Students” will work together to discuss the problem and determine next steps

- Education Committee Members will play the role of faculty for a group of tables
Directions

- Determine which roles each member will take (leader, encourager, skeptic, presenter and scribe).
- Employ the problem solving process on the handout.
- Generate lists:
  - What we know
  - What we need to know
  - What we need to DO next – report out
Meet the Problem:
The Case of the Struggling Children

Problem Statement: You are a county level maternal child public health nurse. In a recent report you notice there has been a statistically significant increase in learning disabilities in your community and you wonder why.

Question one: Given the above problem what would be your first steps?
Question 1 Group Reports

- Provide a brief report to the “class”
Anticipated Solutions
Question two:

Based on the actions taken, you find that the increase in learning disabilities is in girls in pre-K to third grade. You present the information to your boss and she asks you to rule out environmental causes. How would you proceed?

Resources:
Alliance of Nurses for Healthy Environments
http://www.envirn.org/
Question 2 Group Reports

- Provide a brief report to the “class”
Anticipated Solutions
Questions 3,4,5

**Question three:** Your boss approves conducting a focused environmental assessment. How would you proceed and what resources would you use to guide you?


**Question Four:** Based on your assessment, you find that the majority of the girls with a documented learning disability owned a popular type of a child’s jewelry that had been all the rage. How would you investigate this further?

**Question Five:** You find that Cadmium is present in the jewelry. What are your final recommendations to your boss?
Discussion

1. What do you like most about PBL?

2. What are your thoughts on using PBL in different modes of delivery (online, blended, clinical)?

3. Do you have other ideas and resources that would support the use of PBL?
Web Resources

- Alliance of Nurses for a Healthy Environment
  - http://www.envirn.org/

- Environmental Education Outreach Project

- Maricopa Center for Learning and Instruction. UBUYACAR Tutor Manual

- New Jersey University Medicine & Dentistry
  - http://cte.umdnj.edu/active_learning/active_pbl.cfm

- Samford University Center for Teaching, Learning and Scholarship (2009) Problem-Based Learning.

- Study guides and Strategies (student is focus)
  - http://www.studygs.net/pbl.htm

- University of California (faculty focus)
  - http://www.pbl.uci.edu/whatispbl.html

- University of Buffalo: meta cognition
  - http://gse.buffalo.edu/fas/shuell/cep564/metacog.htm
References


