

# BBL...THE EXPERIENCE: CREATING NGSS BASED LESSONS (NEXT GENERATION SCIENCE STANDARDS)

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### **PBL CONCEPTS**

 An instructional strategy in which students confront contextualized, ill-structured problems and strive to find meaningful solutions.

# CONCEPTS

 Problem-Based Learning (PBL) is a guided-design pedagogical style based on the assumption that students are motivated to solve real-world problems and will actively work to acquire the knowledge needed to solve them.

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 Problem-based learning (PBL) is an instructional method that challenges students to "learn to learn," working cooperatively in groups to seek solutions to real world problems. These problems are used to engage students' curiosity and initiate learning the subject matter. PBL prepares students to think critically and analytically, and to find and use appropriate learning resources.

#### GOALS

- Orient students toward meaning-making over fact-collecting
- Develop group work & social skills
- Cultivate knowledge-forming skills
- Motivate and involve students

#### PBL BLUEPRINT PLANNING PAGE 1

PROBLEM BLUEPRINT PLANNING FORM

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CASE: Replace this text



#### PBL BLUEPRINT PLANNING PAGE 2



## 1. THE "SCENARIO"

 Instructors pose loosely-defined problems to individual students or groups, and then tacitly guide their progress toward their own unique solutions, offering suggestions, advice, and clarification.

# **OUTLINE FOR STUDENT PROCESSES**

- Determine whether a problem exists
- Create an exact statement of the problem
- Identify information needed to understand the problem
- Identify resources to be used to gather information
- Generate possible solutions
- Analyze the solutions
- Present the solution, orally and/or in writing

## IS THERE A PROBLEM HERE?

 Present the "Scenario" problem statement. Introduce an "ill-structured" problem or scenario to students. You may think that they do not have enough prior knowledge to solve the problem. This simply means they will have to gather necessary information or learn new concepts, principles, or skills as they engage in the problem-solving process.

# "FACTS" (WHAT DO WE KNOW?)

 List what is known. Student groups list what they know about the scenario. This information is kept under the heading: "What do we know?" This may include data from the situation as well as information based on prior knowledge.

# WHAT IS THE PROBLEM?

- A problem statement should come from the students' analysis of what they know. The problem statement will probably have to be refined as new information is discovered and brought to bear on the situation.
- It is suggested that you ask the students several times throughout the lesson "What is the problem?
- Typical problem statements may be based on discrepant events, incongruities, anomalies, or stated needs of a client.

#### WHAT DO WE NEED TO KNOW?

- What do we (students) need to know to move toward a solution?
  - Will there be resources needed?
  - Who do we need to speak to?
  - What do we need to create?

# WHAT IS YOUR HYPOTHESES?

- List possible actions, recommendations, solutions, or hypotheses. Under the heading: "Hypothesis
- Students list actions to be taken (e.g., questioning an expert), and formulate and test tentative hypotheses.

### **RESOURCE LIST & LAB MATERIALS**

- When presented with a problem, students will need to find information to fill in missing gaps. (Resources are provided by the facilitator (Teacher)).
- These questions will guide searches that may take place on-line, in the library, and in other out-of-class searches. (Teachers may provide access to an expert).
- What lessons have you taught before the PBL? Teachers may present a demonstration of how to work through a similar problem (Lab and resources).

#### COMPLETED PBL BLUEPRINT

#### **PROBLEM BLUEPRINT PLANNING FORM**

#### **CASE: Floating Bears**



#### COMPLETED PBL BLUEPRINT PAGE 2



#### ASSESSMENT

- How will you grade the project?
  - Rubrics\*\*
  - Written examinations
  - Practical examinations
  - Concept maps
  - Peer assessment
  - Self-assessment
  - Facilitators/tutor assessment
  - Oral presentations
  - Written reports

#### PRESENTATION

- Suggestion: Rubric is introduced prior to conducting Hypotheses to students know what to expect.
- Present and support the solution. As part of closure, teachers may require students to communicate, orally and/or in writing, their findings and recommendations.
  - Presentation of appropriate results from your work, such as maps and graphs
  - A metadata statement and/or log file sufficient that someone else could duplicate your project
  - Brief oral presentation of about 15-20 minutes, simply designed to share your work with the rest of the class

#### **DISADVANTAGES OF PBL**

- The academic achievement of students involved in problem-based learning
  - Solution: Begin to use PBL to assess a lesson or a unit).
- The amount of time required for implementation
  - Solution: Use pre-made PBL lessons or convert a less by including a Scenario.
- The changing role of the student in the process
  - Solution: Introduce over time. Start in the summer even!
- The changing role of the teacher in the process
  - Solution: Partner with other areas and co-teach lessons.
- Generating appropriate problems
  - Solution: Use pre-made lessons and edit them.

#### RESOURCES YOU CAN USE TO LEARN ABOUT PBL LESSON CREATION.

- PBL Works. <u>https://www.pblworks.org/</u>
- Lambros, A. (2002). Problem-based learning in K-8 classrooms: A teacher's guide to implementation. Corwin Press.
- Lambros, A. (2003). *Problem-based learning in middle schools and high schools: A teacher's guide to implementation.* Corwin Press.
- Delisle, R. (1997). How-to-use problem-based learning in the classroom. Association for Supervision and Curriculum.
- Duch, B. J., Groh, S. E., & Allen, D. E. (Eds.) (2001). The power of problem-based learning: A practical "how to" for teaching undergraduate courses in any discipline. Stylus Publications.
- Gordan, R. (Ed.) (2000). Problem based service learning: A fieldguide for making a difference in higher education. Education by Design.
- Hallinger, P., Slowinski, J., & Rodriguez, B. (Eds) (1999). Managing technological change for schools of the new millennium: Problem-based learning project. Eric Clearinghouse on Educational Management.

#### RESOURCES YOU CAN USE TO CREATE PBL LESSONS (CONTINUED)

- Levin, B. B. (Ed.) (2001). Energizing teacher education and professional development with problem-based learning. Association for Supervision and Curriculum Development.
- Savin-Baden, M. (2000). Problem-based learning in higher education: Untold stories. Open University Press.
- Stepien, W. J. (2002). Problem-based learning with the internet: Grades 3-6. Zephyr Press.
- Torp, L. & Sage, S. (2002). Problems as possibilities: Problem-based learning for K-16 education (2nd ed.). Association for Supervision and Curriculum Design.

#### GRADING RUBRIC RESOURCES

Rubric Maker

https://rubric-maker.com/

PBL Resources at Creative Educator

http://recipes.tech4learning.com/

Creating a Rubric using Chat GPT-See AI for Education

<u>https://www.aiforeducation.io/prompts/rubrics#:~:text=In%20ChatGPT%20or%20your%20favorite,the%20information%20for%20each%20rubric.&text=You%20are%20an%20expert%20teacher,assessments%20and%20evaluating%20student%20work.</u>

#### IDEAS FOR PBL AT YOUR SCHOOL?

# **Brainstorming Time**

# QUESTIONS AND ANSWERS? THANK YOU!