Problem–Based Learning

Aim

Many complexities like biodiversity, meaning of life, and climate change do not have solutions that can be planned or mapped out ahead of time, and the journey towards a solution to these questions is often more fulfilling even if the result is more questions and sustained curiosity of life.

Ready, Set....

Focuses on student involvement (voice and choice) critical for eliciting active student participation in and ownership of the project because students are much more likely to actively participate in all phases of the learning process if they have considerable choice on which questions to address and which activities to undertake.

- Involves you in decisions on instruction and when and how to provide choices, especially when students are new to the processes in problem-based learning. At first, you may have considerable control over the steps and questions and then become more of a mentor, advisor, or facilitator of the learning, information gathering, and/or feedback.

- Contains collaboration, teamwork and knowledge essential to learning how to work within a group.

- Provides for ongoing opportunities for reflection and action on this reflection.

- Involves ongoing feedback and revision.

Go!

1. Select an anchor to introduce the topic and provide the hook to create a driving question.

2. Driving question, project or problem defines the process and develops the project; motivates and guides the work; and identifies important questions to answer and information to collect or research.

3. Facilitate students towards a response or solution to their driving question and help them develop plans for activities. This may involve brainstorming, mini-lessons, timeline generation, goal setting, information gathering, reflection on insights from class experiences; and information synthesis and determining relevance of the research. It will often be required to check-in with student groups on an "as needed" basis throughout the steps of their problem-based learning project.

4. Provide details on the options for students to create the artifacts, solutions, conclusions expected from student learning and they will share this learning with each other.

5. Communicate the outcome of their shared learning.

The activities in the list below, either assigned by you or arising from student group work, can be used to generate ideas, analyze information, and move learning forward within the five steps above.

Once an anchor is provided, and a guiding question, problem, or project is determined, students (facilitated by the teacher) will engage in a complex series of tasks to plan and organize their activities in order to move toward a solution to the problem.

These tasks may vary, but generally include the following process tasks:

- Brainstorming possible problem solutions to generate possible topics for investigation.

- Identifying a specific series of topics to guide information collection (prioritize topics).

- Examining any information provided by the teacher in mini-lessons with respect to project goals.

- Setting goals and developing timelines.

- Dividing up responsibilities for information gathering, deciding (with guidance) how to collect and store information.

- Searching for information on the problem or question.

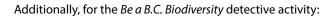- Reflecting on and recording insights from any related classroom experiences.

- Synthesizing the data collected (ie. determining relevance of information, brainstorming if and how it can serve the project, deriving conclusions or insights from applying information to project goals).

- Making collaborative decisions on how to move forward from a point.

- Determining what additional information might be essential.

- Meeting regularly with teacher to discuss progress, receive feedback, try out ideas.

- Proposing a product, or multiple products or artifacts, that incorporates and allows students to communicate the results of their work.

Within the information research phase, students will gather information that may come from completing the requests within the activities herein; interviews with local community members; sourcing information from media such as YouTube, newspapers, books, media center, etc; mini-lessons on specific topics to generate knowledge useful for the investigation.

Recommended structures to support this process include inquiry activities on genetic, species and ecosystem diversity such as those in the module *Connections: The Basics of Biodiversity's Complexity*. Additionally experiences from the *Biodiversity: The Spice of Life* module can be used to explore and reflect on concepts in biodiversity by adding a follow up section containing debriefing, reflection, or recording connections.

For example, in the *Animal Mania* activity, you could add one of these questions to students' understandings as appropriate to their guiding question:

- What are some differences among animals of the same species? How might these differences impact how they interact in an ecosystem or a new ecosystem?

- How might this diversity be an advantage if something in the ecosystem changes?

- How might each animal cope if their habitat was destroyed by a forest fire? How might animals respond to climate change?

Additionally, for the *Be a B.C. Biodiversity* detective activity:

- What are some examples of the genetic, ecosystem and species diversity in an ecosystem and describe how they contribute to biodiversity?

- How do these different types of diversity support the health and well-being of an ecosystem?

Follow-Up

In problem-based learning, students will be involved in ongoing collaboration, teamwork and learning how to work with a group of individuals to solve a problem and reflection on their learning. After the activities are finished and analysis completed, students will be designing a learning artifact to express their understanding and connections to biodiversity in BC and beyond. This stage requires feedback and revision of the artifact and these are essential to the learning journey. The artifact may undergo various revisions and the opportunity to redo or revise in response to feedback is an important part of the learning.

Feedback and revisions might include:

- Seeking additional information to develop prototypes more fully.
- Mini-lessons on specific topics.
- Revision of prototypes and storyboard with new information.

Final presentation development and communication of the final project includes:

- Storyboard revision/additions.
- Interdisciplinary aspects appropriately selected to express their learning, such as art, spoken word, videos, written text, etc.
- Final class wide evaluation (consider peer evaluation).
- Publication of projects or artifacts.
- Evaluation by an expert, such as a conservation scientist or environmental community organization member that might spark another revision.
- Extension and development of some solutions into collaboration with a community organization or conservation professional, this may involve participating in conservation projects and or field based skills development and training.