***WABS STEM PBL Unit/Lesson Plan Template***

**Description:**

Problem-based learning (PBL) is focused, experimental learning organized around the investigation and resolution of messy and real world problems. The Final Unit will allow you to organize your lesson in a problem solving environment where students engage in learning in relevant and connected ways. Teachers function as a coach to guide student inquiry and facilitate learning to deeper levels of understanding for your students.

Research indicates that PBL is a superior pedagogy for promoting student engagement in the learning process. Torp and Sage (2002)1 broaden the impact of this pedagogy and confirm that it increases motivation, makes learning relevant to the real-world, promotes higher order thinking and self-regulated learning in students.

Generally, the teacher will present the problematic situation. The problem is ill-structured and messy (multiple sub-problems), not easily solved and **does not result in one right answer**. Students engage in active problem solving, and teachers guide and coach. A collaborative environment provides for the sharing of information within and between groups as they work to resolve - some may test and re-resolve - their problems. Authentic assessment compliments the problem solving process.

**WABS Final PBL Requirements**

1. With your team, develop a PBL unit and PBL unit overview.
2. Teach the PBL in your classroom
3. Gather artifacts from the lesson (such as student work, student interviews, photographs, or other ways to track student engagement and learning about content & practices, soft skills, pathways, or identity as a person who has potential in STEM)
4. Participate in a Lesson Study with your team and the WABS Program Director
5. Submit the unit using the agreed upon format to the WABS Program Director
6. Present the unit at the May 2020 WABS Showcase for Success

1 Torp, L., & Sage, S. (2002) Problems as Possibilities: Problem Based Learning for k16 Education (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development

**PBL Procedure[[1]](#footnote-0): What is in a PBL Unit?**

Use this page as a reference. The PBL procedure may be one lesson or may be the process throughout whole unit. Lessons may focus on a small part of the procedure or highlight the iterative process needed to get closer to a solution**.**

**Understand The Problem*:*** Describe how you will launch your problem. In this portion of the lesson, students will work towards a common understanding of what the problem is and what they need to know in order to solve the problem.

* Introduction/Problem Launch
* Brainstorm What Students Know/Need to Know
* Define/refine the Problem

**Explore the Problem*:*** How will students’ explore multiple ideas, pathways, and challenge their current conceptions? How will all students access the information/context? The students (groups) will develop multiple solutions to the problem based on their evidence that will be shared in the next section.

* Gather Information
* Share Information
* Generate Possible Solutions

**Resolve the Problem*:*** Students should be able to provide an argument for each of the possible solutions and be given an opportunity to share and critique arguments. How will students reflect upon and share what they’ve learned? How will students synthesize their learning? If there are presentations involved with this PBL, how do you plan to help the non-presenters learn from presentations?

* Determine Best Fit solution
* Present the Solution
* Debrief the Problem

**Unit Overview**

**Post Pandemic: Now What?**

Target Grade Level(s): High School

Subject(s): Computer Applications, Students with Special Needs, Math, Science, Careers

Author(s): Bill Butler, Katherine Meyer, Angela Nguyen

**Problem Statement:**

School was cancelled in mid-March. Everyone was told to stay home to keep from spreading a new virus: the COVID-19. Teachers try to keep school going online. Spring sports, prom and graduation ceremonies are cancelled. Essential businesses such as grocery stores, pharmacies, health care are open in a limited capacity, with vastly altered requirements such as social distancing. Most non essential businesses across the state (and around the world) are closed and when possible, employees can work from home. In the past month, 25 million unemployment claims have been filed and no one knows how far the unemployment rate will climb. You are about to graduate. Even though you had a HSBP, now everything has changed. How has this impacted the environment? How does this impact your future and the career you choose? How do we use what we have learned during this pandemic to inform others?

**Unit Overview and Table of Contents**

Understand the Problem:

* Impacts of COVID-19 on the environment
* Impacts of COVID-19 on the economy
* Impacts of COVID-19 on personal choices

Explore the Curriculum:

* Data analysis of the impact COVID-19 has/had on the environment, specifically air quality
* Economy, Jobs, and what that means for you and your High School and Beyond Plan
* Creating an effective PSA

Resolve the Problem:

* Students will create a PSA / Call to Action on a topic of their choice from the lesson. Ideas include:
  + Reducing carbon footprint on an individual level
  + Reducing carbon footprint at an industry level: Airport or Maritime
  + Job training programs: Port internships, certificate programs, etcetera
  + How to retrain and change careers

while thinking about the impacts their chosen career has on the environment and economy to the local region and/or the world?

|  |  |
| --- | --- |
| **Lesson** | **Learning Outcomes** |
| Environmental Impact | Students will be able to analyze data and images in order to determine the impacts of COVID-19 on the environment. |
| Economic Impact | The student will understand local and global impacts of COVID-19 on the economy and future careers. The student will research careers at SeaTac Airport and outline the expected industry growth. The student will synthesize information and update their High School and Beyond Plan. |
| Creating a Public Service Announcement (PSA) | The students will be able to create an effective Public Service Announcement. |

**Provide the following items for the entire unit: Standards (NGSS, CCSS, CTE):**

**CTE Common Career Technical Core Skills**

2. Apply appropriate academic technical skills

4. Communicate clearly, effectively and with reason

6. Demonstrate creativity and innovation

7. Employ valid and reliable research strategies

8. Utilize critical thinking to make sense of problems and persevere in solving them

10. Plan education and career path aligned to personal goals

11. Use technology to enhance productivity

12. Work productively in teams while using cultural/global competence

**ISTE Standards:**

Standard 6: Creative Communicator - Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals

Standard 7: Global Collaborator - Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally

**CCSS**

**Reading**

R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

R.7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

**Writing**

W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

W.8 Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

**Speaking and Listening**

SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

SL. 2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

**Math**

MP1 Make sense of problems and persevere in solving them.

**NGSS**

MS.ESS.3.3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

**Soft Skills:**

**21st Century Skills**

1. Learning and Innovation

* Creativity and innovation
* Critical thinking and problem solving
* Communication and collaboration

2. Information, Media and Technology

* Information literacy
* Media literacy
* Technology literacy

3. Life and Career

* Flexibility and adaptability
* Initiative and self-direction
* Productivity and accountability
* Leadership and responsibility

4. Core Subjects and 21st Century Themes

* Global awareness
* Financial, economic, business and entrepreneurial literacy

**Locally and/or Personally Relevant for Students:**

How are young adults going to adapt to be happy and successful in the new world we’re living in?

Environmental Impacts

Economic Impacts

Choice in the PSA created

**Connections to career and educational pathways:**

Direct connection to each student’s educational and career pathway and High School and Beyond Plan

1. The sub-sections of the procedure section (e.g., Understand the Problem, Explore the Problem) are from the Illinois Math and Science Academy’s PBL Teaching and Learning Template, however, the descriptions were developed by WABS and do not necessarily represent the views of IMSA. [↑](#footnote-ref-0)