

How and why would we expand
geothermal and hydropower sources
around the Harrisburg area?

Alternative Energy PBL

Instructional Tech for Active
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Phase 1: Write a driving question and explain how you'll launch your project through your entry event.

This PBL project is about geothermal and hydropower for my middle school students.

How and why would we expand geothermal and hydropower sources around the Harrisburg area? We all know it is windy in South Dakota and there are a lot of rivers and lakes around. But, how can we use that to our benefit? Geothermal and hydropower may be able to help!

We will begin by watching a couple different virtual tours. The first is a hydroelectric virtual plant tour. Students will be able to see how these plants work and what they can do for a community. Students will then watch a virtual tour for a coal power plant. This will lead into a discussion of the differences between the different types of plants. In order to better research and understand this topic students are going to work together to further their knowledge. Students will pair off into groups and begin researching what exactly geothermal and hydropower it is, how it works, and how it compares to coal sources.

Students can decide what type of presentation tool they want to use. They have a choice of creating a PowerPoint, Google Slides, Infographic, concept map, or poster.

Phase 2: What do learners need to know, understand, and be able to do to answer your driving question.

Students need to know and understand:

- Hydropower
- Geothermal
- Hydroelectric power plant
- Where is hydropower used in the world?
- Sustainable
- Turbine
- Challenges
- Reservoirs

Students need to be able to:

- Define the topics
- Discuss the challenges
- Demonstrate a model hydropower system
- Geothermal and hydropower area expansion

In order to understand these components students will complete their research project along with drawing pictures to illustrate what the models look like. Students will also use OneNote to keep an online journal of the research and information they are learning about. I will also have key questions for them to answer each day to make sure they are on track with the material.

Phase 3: Describe the products learners would create and how their completion of those products will assist them in building knowledge, understanding, and developing the skills needed to answer the driving question.

Students will first create a presentation to understand exactly what the topic is and how it works. This will lead into how each system works and creating a model of a hydropower system. Students will then have to create an argument on the use of geothermal and hydropower in the Harrisburg area. After students have created their presentation and continued through guided lessons, we will use Skype in the Classroom to Skype with an engineer from a hydropower plant. Students will have some questions they have thought of and written down ahead of time to ask during the interview. But, the engineer will also have information to share with them before they begin asking questions. Students can use OneNote to keep track of the information the engineer provides. Students are also going to create a model of a hydropower plant. We will use everyday materials and the designs they have drawn earlier to create these models so students can really see how these plants work.

Phase 4: Describe how learners will present their products and answers that address the driving question in the culminating event.

Students will present their products by sharing their presentations through the Seesaw app, comparing models with classmates, and then present their arguments to a small group of teachers and community members. Students will address the driving question by showing in their argument all they have learned from the research presentation and model building. Students will also complete a rubric on themselves and their group members in order to tell how they worked as a group.

- a. How are technologies used in your project to support active learning? Cite course readings to support your answer.
- b. What is the biggest barrier to implementing your project and how might you overcome that barrier to ensure learner success in meeting your overarching goal for the project? Cite course readings to support your answer.
- c. How can you, as a teacher leader within your organization, help your peers improve their practice so that they are teaching in ways that support technology-rich active learning? Cite course readings to support your answer.

Project Based Learning seeks to develop what cognitive scientists call “usable knowledge”- knowledge that’s not just recalled for a test, but that once learned, can be used in daily life and problem solving (Bransford et al., 2000, pg. 63). Using this criterion is what teachers who want to support active learning begin with when designing a gold standard project. Another key component in GSPBL is using technology as a support tool. After a lot of consideration and hard work, my first project for Project Based Learning teaches children about geothermal and hydropower.

The first technology component in my PBL project is a virtual tour showing what a hydropower system is, how it works, and the effects it has on society. We are starting this tour because students need to realize that this project way of learning is not like traditional learning. Larmer states, “A good entry event encourages students to access their prior knowledge about the challenging problem or question that’s the focus of the project” (pg. 107). This virtual tour will build into students’ prior knowledge because in the past we talk about power sources along with being environmentally safe. While watching this video, students should pull this previous knowledge. The next piece of technology that is used in the project is the research and presentation part. Students can do this to revisit the driving question, discuss emerging ideas about it and evaluate possible answers (Larmer, pg. 109). Not only will students be using

technology for big parts within the PBL experience, but also as a question and response recording tool.

In order to keep track of questions that students may have throughout the PBL experience, we are going to use OneNote, an online journaling tool. This tool will be useful to help student effectively generate and organize questions (Larmer, pg. 109). It will also be a great way for students to store information and collaborate with group members. Skype in the Classroom is the other piece of technology that will be used in the hydropower experience. Students will be able to ask questions to an engineer when in the Harrisburg area, it is not something that is very common. Students can use the OneNote journal throughout the interview as well for a project journal and to keep track of the questions and answers. Students can document the use of their time, thoughts about the project, and evolving answers to a driving question in their journals (Larmer, pg. 114). Technology is meant to be a component within a gold standard PBL. It is not something that should be used to just keep your students busy.

Barriers are something that will be a part of every project, but with good planning and preparation it can prevent many issues. A big barrier that is a part of my project is creating a project calendar. This part is going to be a struggle just because PBL is not a familiar experience so it won't be easy to know how much time is needed for each component of the PBL project. Larmer discusses, "Many teachers new to PBL can envision the beginning of a project and its culmination, but the middle part is cloudy" (pg. 102). There are a variety of components to this project including: teacher-led activities, student-guided parts, and group collaboration. A main part of launching a project is arranging any necessary resources; if you plan to involve outside experts, mentors, or organizations all need to be planned ahead of time (Larmer, pg. 103). Project Based Learning takes a lot of time to set up, but the benefit for students is going to make students

strong learners. PBL will help student retain knowledge better, learn deeply with understanding, and develop the success skills they will need in college, career, and life (Larmer, pg. 53).

The success of school reforms is dependent upon how teachers embrace and implement the opportunities that technology presents to them (Herring, pg. 240). As teacher leaders we have to show each other just that. Supporting these contextual factors is not something that will come quickly or easily, but with continued practice is something we can integrate into our schools. According to Herring, for teachers to integrate digital technology, the learning environment has to be both a catalyst and conducive to facilitate the design, development, and delivery of appropriate TPACK (pg. 235). This means that the more we work with technology in a technology-rich environment the more comfortable we will be with. According to Larmer, “Leaders can help pave the way for smoother PBL implementation by building a collaborative culture, anticipating challenges, and removing potential barriers” (pg. 144). Just like students, teachers want to see others succeed before they buy in to a new method of teaching. As a teacher leader, it is up to me to show teachers that even though it may be more work to begin with, once teachers become comfortable and see how much students love PBL, it will be the main teaching strategy in schools.

Students today often find school to be boring and meaningless; in PBL, students are active, not passive. A project engages their hearts and minds, and provides real-world relevance for learning (Larmer, pg. 154). Teachers can set up gold standard project based learning by planning and organizing projects that can show students projects and information that are important in their lives and futures. Something to keep in mind is to not wait for end-of-project events to share a PBL story. By educating the public and media about the benefits of PBL by offering open houses and school tours-perhaps led by engaged students, who tend to be

passionate will advocate for PBL (Larmer, pg. 155). Even though it won't be easy, with continued work, my PBL experiences will work to inspire both students and fellow teachers alike.

Sources:

Herring, M. C., Koehler, M. J., & Mishra, P. (2016). Handbook of technological pedagogical content knowledge (TPACK) for educators. New York: Routledge, Taylor et Francis Group.

Larmer, J., Mergendoller, J., & Boss, S. (2015). Setting the standard for project based learning: A proven approach to rigorous classroom instruction. Alexandria, VA: ASCD.