

THE ENDS ARE THE MEANS: PROJECT-BASED LEARNING

Try and spot the differences between these two scenarios.

1. After teaching a unit on urban planning, Teacher A assigns a project that is due at the end of the semester. Students are to work in groups to build a city, with each student being assigned a separate area of focus. The teacher gives students a handout that lists each aspect of the city that they must include and how they need to show their research. The teacher reteaches concepts as necessary when she sees that students are having difficulty with the project. Occasionally during the semester, the teacher hold class discussions about the project timelines and students work outside class on their own time. The teacher works toward pre-planned outcomes and evaluates the cities under a pre-constructed rubric.

2. Teacher B assigns a project that is due at the end of the semester. Students are to work in groups to design and build a city. Students begin by brainstorming what they know about designing a city and come up with questions for items they are unsure of. The students are encouraged to inquire about anything they think of, even in areas of inquiry that may not seem obviously relevant. Throughout the project, the teacher introduces various scenarios/problems to her students. Each scenario deals with a different aspect of the city, such as the sewage system. As each new situation is presented, students think about the problem, identify the facts or what they might need to learn, brainstorm or imagine ideas about what the problem really is, and determine what they think about the situation. The students generate broad questions involving: How various systems work, alternative sewage systems, environmental issues, the role that soil plays in waste disposal, the impact on the water supply, waste disposal legislation, debates about the pros and cons of public/private operations, and water contamination and/or purification, etc. The students have focused their efforts on researching new facts, refining ideas, and outlining new possibilities. By the end of the semester, the city is built and in-depth research has been done on each piece of the city's infrastructure.

These are two different ideas of projects for the same lesson or unit. The first is a traditional project, assigned at the beginning of a unit that clearly and specifically states exactly what students should produce. The projects look virtually the same and are boring to grade. The second is an example of project-based learning. Project-based learning is based on inquiry directly related to the content that students need to know. Instead of summing up a unit, the project encapsulates the unit from beginning to end. The project is based on driving questions that engage real-world problems, forcing students to engage in critical thinking and problem solving, not simply giving answers. The tradition project is a supplement; in project-based learning, the project is the learning.

WHY BOTHER?

Projects this large can be difficult to organize. "You can't wing a PBL (project-based lesson). A project takes about 40 hours of [teacher] preparation, and during that there are certain key components that are necessary to address in order to create the body of PBL."¹ Even more so, since the project is the lesson and not an end cap, the project needs to be calibrated directly and specifically to standards. The teacher, starting within that framework, then has to design a scenario that allows students to tackle real-world scenarios. It's only at that point that a teacher can arrive at the driving questions which fuel a project.

Why bother to do something so difficult?

In German, the word *bulimie-lernen* (literally bulimia-learning) refers to information memorized in large chunks for a test and then promptly forgotten. Student retention suffers when the students have no stake in

¹ Paul Gautier, Jennifer Stotts. Interview by author. Phone interview. May 18, 2014 .

their learning. By contrast, a project-based lesson allows students to choose how they're going to show their understanding of their learning. The structure of the lesson leaves room for student voice and choice, allowing students to take ownership of their learning. A student may not want to engage in a role foisted on them, but they will often engage a role they've chosen. Project-based learning keeps students "authentically engaged"².

State and national standards have become increasingly geared toward real-world contexts and real-world problems in order to prepare students for the modern workplace. Students need to learn skills like communication, collaboration, creativity, problem solving, research, the ability to express and defend an opinion, and others related and are commonly called "21st Century Skills". Project-based lessons are designed to teach these skills.

Project-based lessons conclude with a significant presentation component, where the audience is composed of panels of experts, professionals who actually work in the area the students are studying. Students must field questions not only from their teacher, but also from industry experts, people who don't come from the education background, who know different things, who don't look or sound like teachers.

Project-based learning necessitates a cross-disciplinary approach to the lessons. A science project will often involve math, of course, but a project-based lesson goes deeper. Students might have to examine an interpretation of socioeconomic issues or history from their social studies class, and engage the processes they learn in English. Project-based learning engages all the cross-disciplinary standards of the CCRS, such as reading, writing, and research across the curriculum³, the integration of data and technology⁴, curiosity⁵, reasoning⁶, and problem solving⁷.

This is according to benchmark 5 of the T-STEM Blueprint directly includes project-based learning and its learning style of choice.

- 5.2A Delivers innovative STEM Programs that are well-defined, *embed critical thinking and problem solving, innovation, and invention*, and are aligned to state, and/or national standards, and industry expectations.
- 5.2B Develops *performance-based and project-based assessments* aligned to these innovative programs and state/national/industry standards.
- 5.2F Requires all students to complete an internship, and/or *a STEM-related senior capstone project*, presentation, and defense primarily focused in the state's STEM-related economic development clusters.
- 5.3C Organizes instructional expectations around *problem-based and project-based learning with clearly defined learning outcomes* for students and teachers that address state and national performance standards, college and career readiness standards, and industry expectations.
- 5.4C Promotes instructional strategies that *challenge students to think critically, innovate, and invent to solve real-world, contextual problems*.

MAKING THE SWITCH FROM PROJECTS TO PROJECT-BASED LEARNING

² Gautier, Stotts.

³T-STEM Blueprint II.A–C

⁴ II.D–E

⁵ I.A

⁶ I.B

⁷ I.C

Teachers often plan traditional units of instruction by choosing the standards and the time frame. Each day in the unit, new content is taught to students and the unit culminates in a written test. This traditional style of unit planning has some connection to planning a project-based lesson. The difference is both *how* the new content is taught and *how* the unit is assessed.

Below are some steps that you can use to make the switch from traditional projects to project-based learning. This list is designed to help you begin the process of switching. See the Resources Section for specific details.

1. Choose your unit. For your first PBL, pick a unit that is smaller in scope, one with content you know well.
2. Identify the content standards. Be specific about what students need to know and be able to do in order to demonstrate understanding of the standards: in other words, what you plan to assess them on. You are going to build this into the project.
3. Find a real world application or an issue in the real world that can be explored using the content standards. For example, if studying functions in a math class, you could choose an application of functions in the business world. In social studies, connect immigration in the 1800s to immigration in 2014. Be sure to choose topics that are relevant to student interests and concerns.
4. Based on the application of the content, decide which skills students will be assessed on. You may choose the cross-curricular standards of the [Texas College and Career Readiness Standards](#) or [21st Century Skills](#).
5. Create a driving question. The driving question should be one that will lead students to the content. In other words, in order to answer the question, students will have to learn the content that is the focus of the unit.
6. Create an entry event to introduce the project to your students. The entry event serves as a tool to engage students and leaves questions in students' minds. Based on the entry event, students will work together to decide what they *know* about the project and what they *need to know* about the project. When you create your entry event, make a list of what the entry event tells students and the questions that arise from the event. If your list isn't what you intended to force students to engage the content, then the event should be adjusted in order to get the desired outcome.
7. Decide what product students will produce as a result of the learning, but be sure to let students have some choice in the matter. Decide also how they will be assessed on the content. If you have a project that you traditionally do with this unit, use this as a starting place. What about this project lets you know that students know the content? How can the project be revamped so that there is more student choice? How can this project be revamped to peak students' interest?
8. Create a rubric that will be used to assess both content and skills.
9. Now create the beginning of the project and the summative assessment. Your goal is to ensure that students both learn the content and understand the rubric for assessment. This step is where teachers who are new to PBL sometimes get lost. In step 2, you identified what students are supposed to know and do to demonstrate understanding of the content. Decide some of the experiences that students will need in order to learn content. What can they research in their small groups? What assignments need to be given? What can be learned in a small workshop with the teacher? What needs to be taught to the whole group? Be careful that this does not become a day-to-day plan like a

regular unit. This is more of a prediction of what students will need than a day-to-day timeline. You will make day-to-day adjustments of your plan as you guide your students in investigating the driving question.

10. Create a calendar of events throughout the unit. When are rough drafts due? When will students present?
11. If there is someone on your campus who uses PBL, get their feedback on your plan and incorporate their ideas. They don't have to teach in the same content area as you do to provide useful feedback.
12. Jump in with both feet and teach! Don't be too hard on yourself and be ready to adjust if the project isn't going as well as you would like.
13. After the project, spend time reflecting on the PBL process itself and on the specific project.
Reflections on the PBL process:
 - Which parts did I feel comfortable with? Which do I need to do more research on?
 - Which parts worked well with students? Which parts do I need to teach them how to maneuver?Reflections on the project:
 - What content did students understand well? Which parts might need to be revisited?
 - Did students demonstrate the skills I thought they would?

Implementing project-based learning isn't just about changing the assignments; it's changing the entire culture of the classroom. It is about making the cultural switch from teachers telling the students what they should know to the teacher telling the students how to know, supporting them, and letting them create and curate what they want to know.

RESOURCES

[Sample Curriculum for PBLs](#)

[Driving Question Tubric](#)

[Rubric for Rubrics](#)

[Sample Project Design](#)

[Sample Project Assessment Map](#)

[Project Calendar](#)

[Self-Reflections on Project Work for Students](#)