PBL Assessment
WPI Project Based Learning Institute
June 2019
Rob Traver, Professor, Teaching Faculty

Assessment that educates underlies the assessment model presented in this workshop.
Assessment that educates can be called educative assessment (Wiggins, 1998).

Deliverables:
Example 1: What are we assessing? Aims and Means (Models, Practice, Feedback)
Example 2: Team Posters: First Year and Third Year
Example 3: Presentation Rubrics and Scores
Example 4: Penultimate Draft
Example 5: Peer Feedback
Example 6: Course Activities and Materials Evaluation

Processes:
Example 7: Joana Wolf Team Writing and a lot more.
Example 8: Team Charters and Team Capacity Assessment
Example 9: Teamwork and Problem Solving Rubrics a la AACU Value rubrics
Example 10: Participation Charts, first-year and third-year

Stakeholders:
Example 11: Presentation Score Sheets
Example 12: Instructions to Judges
Example 13: Sponsor Feedback

Another Way to Look at PBL
Example 14: Buck Institute for Education Gold Standard PBL
Typically indirect teacher-designed tests, because these are often to models and these typical tests each major test is examine questions and provide what we call self-corrective feedback. This discomfort with cause this is the look at problem-solving.

**Table 6.1: Key Points in How to Use Educative Assessment**

<table>
<thead>
<tr>
<th>AIMS of PBL ASSESSMENT</th>
<th>PROCESSES</th>
<th>STAKEHOLDERS</th>
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<tr>
<td><strong>DELIVERABLES</strong></td>
<td>Team work, coaching by instructor, adviser</td>
<td>Expectations and examples of student work</td>
</tr>
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<td>Videos, websites, portfolios, AV presentations, writing, drawing</td>
<td>Videos of student teams, rubrics and manuals, panel discussions, team charters</td>
<td>Rubrics, posters, criteria, discussion with experienced judges, advisors, or sponsors</td>
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<td>Examples of these at both professional and student levels, rubrics, interim or partial examples to emphasize iteration</td>
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**MEANS for PBL ASSESSMENT PRACTICE**

| Writing, presenting and critiquing, meetings | Team-building workshops, active listening exercises, drafts of papers | Respond to papers, respond to presentations, coach team meetings, discuss rubrics and their applications with judge and sponsors, master classes on advising |
| In-class writing exercises, presentation rehearsals, prototype tests, traditional testing for knowledge | |

**FEEDBACK**

| Tell what works and why, what doesn't work and why, and how to fix it | Same as feedback for deliverables | Tell advisers, judges, and sponsors how they're doing and what they can do to help the students |
| Be explicit and specific | |

**Assessment**

- Ill-defined aims and deliverables, such as fuzzy year projects
- Group dynamics, and the understanding of models and how they are used
- Practice in understanding and evaluation of models and practices

**Characteristics of Good Work**

- The values and sets of the course.
- Characteristics of good web sites, such as completeness, context, and the course.

- Audio-visual presentations, writing, drawings, or any other medium of deliverable—they can learn the essential features. Rubrics are excellent means to articulate the criteria and performance level of these essential features. It is paramount for the students to appear in specific, descriptive terms, preferably illustrated by appropriate, concrete examples (some from our courses can be found at www.wpi.edu/firstyearprojects).

2. **Models of process.** Examples of good teamwork provide students with images and criteria of what works well. These examples can be videos of...
Here is an example of a project proposal slide from an ID2050 team that seeks to protect the night sky from light pollution at Acadia National Park (Bar Harbor Project Center).

When the slide is projected, the team of four students introduces themselves and begins to walk the audience through the proposed project. They indicate its purpose, what they intend to deliver to fulfill the purpose, and what kinds of methods they’ll employ to generate the deliverables. The design is bold and memorable, even beautiful. The audience learns instantly what is at stake, why this project is underway. The succinct text makes it easy to key in on essential features and so the audience is not distracted from the presenters’ oral elaboration. Furthermore, hours of coached practice lead to expert verbal delivery. When the students end at 4 minutes and say, “This is our proposed project, do you have questions?” you can see the look on the audience faces: “That was really well done. I really understand what you’re up to.” And if there are questions, the students have back up slides ready to go.

In this Teaching Portfolio section, I include examples of many such slides (see section 3b). The styles vary. In addition, I offer some examples of back-ups, specifically, for the Bar Harbor Sound Archive Team and the Costa Rica Marviva Fishing project. And in the “Power of Peers” paper that appears in my Scholarly Artifacts section, there is an example of a first and second iteration of a project slide, with examples of student feedback, to show how the slides and their presentation improve with revision and practice.

Since introducing this style of slide, many ID2050 instructors have greatly reduced the number of slides that they ask students to show. Scott Juisto has requested copies of the slides to use with Project Based Learning Institute participants, and others, such as Anri Madian, have expressed much engagement when listening to student projects presented this way. It all alerts students and
Faculty to the need for more succinct--psychologically as well as intellectually planned--oral and visual communication for the needs and preferences of audiences outside the university.

For final IQP reports, I use a two-slide version of this presentation style. Here is an example from an IQP that I supervised that analyzed the feasibility of a WPI sponsored farm here in Worcester.

Note that the first slide works just like a single project proposal slide. There is a need or question statement, then a deliverable, and finally a checklist of methods. The second slide identifies the result (A WPI Farm is Feasible) and the analysis/discussion. Note that the analysis/discussion has two parts, a technical side and a social side. Within each of these two sides, there are several areas of inquiry, six for technical and four for social. The team presents these two slides in five minutes, giving a brief synopsis of each of the ten areas of analysis. At the end of the five minutes the team asks the audience, which of these areas of inquiry would you like us to elaborate for you? The audience may then say, tell us more about “Land,” how did you go about determining what land is available here in Worcester and how much it costs, or the audience might say tell us more about the value of such a farm to “WPI Interest”. In any of the ten areas, the team brings up anywhere from two to six back-up slides to show how the analysis was made. (A selection of backups for this project appear in the Teaching Portfolio section of this application.)

Needless to say, the effect on the audience is striking. In a few minutes the team has provided a succinct summary of its work. The “general” audience member gets it in a few short, easily remembered images and words. In addition, the team has used the slides to prompt inquiry, to make clear its desire to interact with the audience, and that the team is well prepared to do so. This converts a stand-and-deliver type of presentation with ten, fifteen, twenty or more Powerpoint slides into a dialogue that encourages audience engagement because the presentation is designed to elicit their thoughts and questions and so interact with them.

In Paraguay, employees of the project center sponsor, Fundación Paraguaya, called the two-slide final presentation with back-ups (by the way, these are written and presented in Spanish) a fabulous way to take an hour from their busy day to learn about the work of the WPI students. At
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incremental table was good
not sure I buy their purpose, looks like
interrupted your copy.

graph of attendance vs time would have
been awesome with dynasties noted!
what happened in 1885-1890? begins
for explanation
## Presentation Rubric

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Notes:
- Good stepping forward, minimized "Buffer" time and brought attention to speaker
- Chart is blurry - re-do in Excel
- I like how you threw in Japanese and explained it
- With text based slides use hands to point
- Good that you were all prepared to answer questions
- Overall most of you either used too many buffer words, spoke quickly, or skipped
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**Grading:** 86%
- Alp read the slides a lot; needs to be louder; speaks fast.
- Justin: good eye contact.
- Olivia: could speak a little bit louder; used filler word.
- Good comparison of charts/graphs visuals.
- Good connections.
Presentation: 3
Practice: 4
Grader: PLA
Organization: 2
Content/Knowledge: 4
Visuals: 3
Mechanics: 3/2
Volume: 3
Vocabulary: 4
Demeanor: 2
Pacing: 2
Hey Jorge - the writing here is excellent. It has a professional report tone to it. Outstanding. If you jump on writing then on your own, good work if you've found someone to help you. The organization is clear and effective. If the final version comes in with this kind of presentation you're in terrific shape.

Recommendations for a New Learning Management System at WPI - Final Report

Eva Barinelli, Brian King, Daniel Wivagg

November 30, 2015

Example

--- DRAFT ---

Final Project Report

First Year
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I. Introduction

This report examines the learning management system (LMS) used by WPI and recommends a replacement system. Currently, WPI uses Blackboard to provide supplemental course materials to students via the internet. Blackboard has serious drawbacks, such as the difficulty of use, the cost of operation, and the effort required to maintain the system. Three LMS's are considered as alternatives to Blackboard: Canvas, Desire2Learn (D2L), and Schoology. Each system meets WPI's needs better than Blackboard, however the best choice for WPI would be to implement Canvas as a replacement. Canvas best meets the needs of the school, of the students and faculty, and of the system administrators.

II. Problem Statement

WPI needs a more user-friendly LMS to promote teacher and student utilization. Complex LMS's discourage faculty and students from utilizing LMS's to enhance learning beyond the classroom (Naveh et al, 2010). Students and faculty feel they are wasting time learning to use complex LMS's such as Blackboard.

Research shows that faculty at institutions of higher education are more likely to use an LMS if it is user friendly and tailored to their needs. (De Vries, 2014) Similarly, students must be able to interact easily with the LMS for maximum benefit. (Zaeri, 2013) These conditions are not currently being met by Blackboard. As a result of the system's shortcomings, faculty and students have increased difficulties using the system.
cumbersonome. This leads to less usage system-wide, and students and faculty miss out on the chance to enhance learning. (Calisir et al, 2014)

### III. Approach

The first step to our approach was to use the Wilber AQAL Model (App. A). This model is a binary matrix that splits a problem into interior/exterior and individual/collective aspects. The quadrants are labeled intentional, behavioral, cultural, and social systems. The intentional quadrant evaluates an individual’s values and beliefs. The behavioral quadrant looks at an individual’s skills and behavior. The cultural quadrant assesses collective values and relationships. Finally, the social systems quadrant evaluates economic, governmental, educational, and transportational systems.

The Wilber AQAL Model was used to identify the sources of our problem. The intentional quadrant shows students understand the benefits of Blackboard, however faculty are reluctant to learn the complex system. The behavioral quadrant shows students and faculty are not using Blackboard to its full extent. The cultural quadrant shows a collective dislike towards Blackboard among students. Faculty have been reluctant to replace the system implemented in 1997. The faculty’s resistance was caused by the lack of viable options. There were no other LMSs with the functions WPI required. Lastly, the social systems quadrant shows students and faculty are bound to the use of Blackboard.
IV. Solutions

A. Recommend a Replacement for Blackboard

Based on the data from the Wilber AQAL Model, our solution is to recommend a replacement for Blackboard, including a timeline for implementation. Ideally, a new LMS would save WPI maintenance time, money, and data storage space. This solution would be fully implemented during the 2017-18 Academic Year, following the expiration of WPI’s contract with Blackboard.

There are several pros to this solution. Due to the intuitive and easy interface, the new LMS would encourage widespread use. A new LMS would also remedy negative attitudes towards online learning at WPI. However, there are a few cons. Historically, faculty have resisted changing the LMS. This plan will not be fully implemented until the 2017-18 academic year. There will still be no pressure on faculty to utilize the new LMS to its full extent, and some faculty may still choose to use personal websites. Finally, there will be a learning curve for those choosing to use the new LMS.

B. Faculty Training Program

An alternative solution, create a training program for faculty on effective use of Blackboard, was considered. The program would provide a WPI-specific curriculum that would likely include tutorial videos and PowerPoint presentations. This alternative solution is a simple short term solution. It avoids overhauling WPI’s LMS, so all data will be preserved. Additionally, all students and faculty have some experience with Blackboard, and most faculty would prefer to keep Blackboard. With better training, faculty would be more encouraged to use Blackboard. However, this solution is problematic. Students will still collectively dislike Blackboard because it
will remain cumbersome and unintuitive. Since training cannot be mandated, there is no guarantee of improved effectiveness of Blackboard usage. Considering both solutions, recommending a replacement for Blackboard is a better solution because of its long term benefits.

V. Methodology

A. Student and Faculty Surveys

The first step to our solution was to gain information on what faculty and students consider to be important functions in an LMS. This information helped us recommend a replacement LMS that better met the needs of students and faculty. We created a survey for the undergraduates at WPI (App. B). Students were asked to evaluate the current functions, and if there were any functions they wished the current LMS had. WPI’s LMS Evaluation Committee sent out a survey to the faculty (App. C). Faculty were asked how satisfied they were with certain Blackboard functions. Both surveys helped us figure out the functions our recommended LMS should have, in addition to what our research showed was important.

B. Student LMS Trials

In addition to the surveys, we had two students from each grade trial Canvas, Schoology, and D2L. Each student spent ten minutes on each LMS. During the trial, students were asked to complete certain tasks. Students were asked to navigate to a course, check the syllabus, take a quiz, post something on the discussion board, check their grades, and turn in an assignment.
After completing these tasks, the students were asked if they liked any of the LMSs better than Blackboard and which one they liked the best.

C. WPI Evaluation Criteria

WPI's LMS Evaluation Committee created a set of criteria that outline our school's needs in an LMS (App. D). These criteria helped us narrow down our initial list of LMS's. Using the results from the surveys, feedback from the student trials, and the criteria, we selected one LMS as the ideal replacement for Blackboard.

VI. Assessment Method

To assess the viability of our solution we will seek feedback from WPI's LMS Evaluation Committee. The solution will be successful if the committee decides our recommendation is legitimate and helpful. Data will consist of written and oral feedback from LMS Evaluation Committee members. We will ask the committee to review our finished report and give feedback about the feasibility and thoroughness of our solution. Improvements to the solution can be made if the feedback suggests they are necessary. The committee’s opinion of our solution will determine our solution’s success. If the committee thinks our solution is worthy of consideration while evaluating a new LMS for WPI, our solution will have been successful. If they think our solution is not thorough or helpful, our solution will have not been successful. Feedback from the committee is the only short term assessment of our success because our solution cannot be implemented immediately.
VII. Results

A. Unviable LMS’s

The initial pool of LMS’s included several that were not viable options for WPI. They are listed here, along with the reasons they were omitted from our final three.

1. BlackBoard Ultra (BB Ultra)

Blackboard Ultra was ruled out due to a lack of available information. The trial for BB Ultra will be released in the beginning of 2016, and there are limited screenshots of the new user interface available. While BB Ultra will meet the vast majority of WPT’s LMS Criteria, we also felt that Blackboard has historically been slow to upgrade its product. Remaining with a company with a track record for slow advancement seems backwards for WPI.

2. Google Apps for Education

Google Apps for Education has an excellent user interface and excellent customer support. Collaboration between students and faculty would be very simple and very effective. Additionally, Google Apps for Education is a free cloud-hosted LMS. However, Google Apps for Education does not currently support many functions vital to WPI. There is no capability for Banner, LTI, or textbook integration. The gradebook feature is subpar at best, and it is not possible to merge multiple sections under one course.

3. Lox

4. Moodle
It is possible to create a thorough and excellent LMS with Moodle. There is an extensive community of support and developers, and the LMS is free. However, implementation would require extensive development on behalf of WPI. Furthermore, it impossible to directly outsource Moodle to the cloud. These drawbacks immediately disqualify it as a possibility.

5. Pearson OpenClass
Pearson offers OpenClass, a free, cloud based LMS. Although OpenClass advertises many benefits such as a simple, modern, user interface, good collaboration tools, and a strong mobile platform, our team was unable to obtain access to OpenClass in any way, nor could we make contact with Pearson about the service. As a result, we could not evaluate it as a replacement for Blackboard.

6. Sakai
Similar to Moodle, Sakai can be very flexible and sturdy, but it is also open source and not immediately cloud based. It would require too much effort from WPI to create an LMS with Sakai.

7. Social Media
Facebook was the major social media that was considered. It was looked at because many students/faculty are familiar with it. Facebook groups encourage discussion and collaboration. However, Facebook groups for WPI were not originally created to support academic learning. Furthermore, Facebook does not have many functions necessary to be a WPI LMS. Facebook is a company with their own WPI site (Pennin, LTI as textbooks). There is no feedback.
function. Past studies have shown students have found it difficult to navigate the site to find specific assignments. Instructors complained of a privacy barrier being broken if Facebook was used as an LMS. “Many students too are not interested in this exposure; they prefer a separation between learning space and social space”(Meishar-Tal, 2012). Overall, Facebook was missing too many valuable functions to be considered an LMS.

B. Viable LMS’s

The three LMS’s we considered for final evaluation were Canvas, Desire2Learn (D2L), and Schoology. Each meets the basic WPI LMS criteria, and each would fulfill the needs of the WPI community.

1. Canvas

Canvas has been a rising competitor in the LMS community. Since 2008 Canvas’ market share has increased dramatically and is still increasing. Canvas has a modern interface with drag and drop functionality to make adding assignments and assessments to courses easy. The gradebook function is not as advanced as WPI would like. Besides its gradebook function, Canvas satisfies the LMS Evaluation Committee’s criteria. A majority of LMS users that converted to Canvas came from Blackboard. Moreover, Canvas’ experience would make configuring courses from Blackboard to Canvas a smooth process. Canvas is compatible with other WPI websites Banner, LTI integration, and textbook integration. Unlike Blackboard, Canvas is cloud based. Additionally, Canvas is free and would save WPI money.
3. Schoology

VIII. Recommendations to WPI

This is the deliverable of our project, where we will outline which LMS we chose and why, and a timeline for the replacement of Blackboard with that LMS.

IX. Assessment Results

Here we will present the feedback of the LMS replacement committee regarding our solution.
X. Appendix

A. Ken Wilber AQAL Model

**KEN WILBER'S AQAL MODEL**

- **Individual**
  - Interior - Individual (or Upper Left)
  - Intentional
    - (one's own thoughts, beliefs, and values)
  - Exterior - Individual (or Upper Right)
  - Behavior
    - (behaviors and skills one has learned and exhibits)

- **Collective**
  - Interior - Collective (or Lower Left)
  - Culture
    - (including family and relationships)
  - Exterior - Collective (or Lower Right)
  - Social Systems
    - (laws, transport systems, social services, government, etc)

B. Student Survey Results

The student body was surveyed to find out how satisfied students are with Blackboard, and what factors are most important. Students were asked the following questions:
1. What year are you?

2. How many times per week do you access Blackboard?

3. What functions of Blackboard do you use most often? (Select from: Checking grades; accessing assignments; submitting assignments; taking quizzes/tests; accessing lecture notes/videos and readings; accessing course information; discussion boards; checking class announcements; or fill in the blank for other uses.)

4. What functions of Blackboard need improvement? (Select from the categories listed in question 3.)

5. Why do these functions need to be improved?

6. Do you have any other comments about your experience with Blackboard?

7. Please rate the following LMS functions in terms of how important each is to you as a student: checking grades; accessing assignments; submitting assignments; taking quizzes/tests; accessing lecture notes/videos and reading; accessing course information; discussion boards; class announcements; simplicity; mobile app; calendar; task list. (Mark each function as Unnecessary, Unimportant, Neutral, Important, or Critical.)

8. Are there any other functions you would like to see in WPI’s Learning Management System?

9. Have you had any previous experience with a Learning Management System?

10. What LMS have you had previous experience with?

11. Please rate your opinion of this LMS on a scale of 1-10.

12. Please compare this LMS to Blackboard. (On a scale of 1-5, Worse-Better.)
14. What functions of this LMS did you use? (Select from functions in question 7.)

15. Are there any functions this LMS should have had?

16. Can you give any additional feedback about your overall experience with this LMS?

C. Faculty Survey Results

The LMS evaluation committee provided results from a survey of faculty members. These results highlight issues with Blackboard and what features of an LMS WPI faculty find important.

D. WPI Criteria for LMS Selection

According to the WPI LMS evaluation committee, the following are criteria for choosing a replacement to Blackboard.

The LMS should:

Provide a robust environment for content authoring:
Faculty should be able to easily create learning objects natively within the LMS as well as link in from third-party sources, content management systems, and learning tools. The system should possess functionality to reduce the number of clicks needed to generate quality content. The LMS should allow easy import/export of content from other LMSs.

Support WPI's teaching and learning needs:
WPI offers a variety of course formats, face-to-face, blended and online. The LMS should therefore support a variety of pedagogical approaches and course delivery methods and have flexibility for how teaching and learning takes place. The more important LMS teaching and learning tools identified by our faculty in the survey were Assignments, Grade Center, Announcements, Content Collection, Videos and Discussion Boards.

Support student and faculty collaboration:
Students are looking for a virtual meeting space solution where they can share and edit...
more modern collaboration solution. A new LMS would include or be able to integrate seamlessly with tools that support the need for flexible, synchronous and asynchronous virtual meeting and discussion spaces.

**Provide grading, assessment and grade management tools**
Grading and assessment were indicated as primary teaching tools used in myWPI. Assessments should be intuitive to set up as well as use. There should be a variety of question formats and should allow math formulas (LaTeX) and media embeds. The Gradebook should be accessible from all web browsers, not require plugins to function, including mobile or tablet devices. Student work should have a variety of ways to be graded: group work, individual, auto-graded, manually. Grades should be able to be exported to outside software programs (Excel), allow for formulas and weighting, displayed by letter, percentage, points, and complete/incomplete.

**Possess an intuitive interface and contemporary look and feel**
While all new software requires a breaking in period, a new LMS should not require significant investment in training to accomplish basic tasks. Technology should not get in the way of teaching and learning, it should enhance it. The amount of clicks required to achieve course design should be reduced. Modern design standards dictate a flat design (items not buried within levels of folders), drag-and-drop, multi-device compatibility and usability.

**Be mobile optimized and work on a variety of web browsers**
Faculty identified that they access the current LMS on desktop, laptop and mobile devices. WPI had 1,338 unique visitors accessing the LMS from a mobile device in 2015. The LMS should be responsive to the user’s device with little effort on the user’s part and/or provide an app for content creation and consumption.

**Meet 508 accessibility, Web Content Accessibility Guidelines WCAG 2.0 AA and disability standards**
The LMS should comply with all accessibility guidelines. It should be fully operable using only a keyboard, be readable and operable using commonly used screen readers, and add alt text to images and headings to text content. It should allow user personalization to modify presentation style.

**Support learning analytics and outcomes**
Analytics have the potential to help students, teachers and WPI make better choices and lead to improved learning outcomes. Teachers should be able to monitor and make informed choices of instruction to support student learning.
such as student retention. Having effective analytics tracking within an LMS can help improve student success and their overall experience at WPI.
XI. Bibliography

Works Cited


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The POWER of PEERS

Raise the bar on the quality of student learning by drawing on students' intrinsic interest in one another's work.

Even the best teachers ask themselves how they can motivate students to do well. One potential answer: Engage students in looking at—and learning from—one another's work. In classrooms that adopt these practices, students examine the efforts of their peers, discuss what is good and what needs to be done, and set out to improve their work.

What follows is a look into three such classrooms. In one case, students take part in a public critique of their classmates' work. In the two others, students respond to anonymous efforts in math and writing, but what's important is that the work has been done by students just like them, not drawn from arbitrary examples in a textbook. The point in common: When we capitalize on students' natural interest in their peers' work, we can foster motivated classrooms where they reach for—and meet—high standards.
Do you have a cool comment—a suggestion or question—that might help improve the slide?

The student with the blue flag pencil chimes in, "Yes, the colors are good, but the slide only has text. If it had some pictures, charts, or something graphic, I think it might be better."

What is going on here? Students in the class are preparing for project presentations. Working in teams of four, they have one slide and four minutes to inform the audience about their project. The rest of the students critique the slide and presentation.

After the warm compliment and cool suggestion are on the floor, the teacher opens the discussion to the whole class, first asking for more compliments.

"The horizontal display of the three parts of the proposal work really well," says one student.

Another adds, "Well, it's just a little thing, but the black spots for the bullet numbers look like coals, like you get from a fire. That's cool."

The audience also offers feedback on the delivery of the four-minute presentation, noting where the team members made good transitions between different parts of the talk and when someone was really articulate about one of the points.

Afterward, the teacher shifts to cool suggestions, reminding students to "be critical, but be nice." Several hands go up.

"I'm not sure, but I thought the team said something about a fifth kind of calculation," one student says. "Your slide shows there are four. I'm confused."

"I don't know what the SOL logo means at the bottom of the slide. Is that your sponsor? Maybe you need to students stand quietly. One person, with a tablet in hand, notes the class's feedback. There is only so much time in the class, and the point of the exercise is to collect as much feedback as possible. Later, the team can decide what they want to use, modify, or reject.

At the end of about six minutes of feedback, the team returns to a round of applause. They take their seats before the next team makes its presentation.

Practice and Repeat
The teams present their talks again
you can even overhear teammates checking with one another about timing, volume, and emphasis. Review and practice have strengthened their presentations, and they're looking forward to showing their classmates what they've accomplished.

It's the Structure Fire Gas Emissions team's turn again. The new slide flashes on the screen, and there are audible "ohs" and "ahhhs" from the class. The re-designed slide is striking (see fig. 2). With the slide displayed, the team delivers its presentation again.

The feedback routine is the same. First, the teacher asks for the red-flag feedback (the building graphic clarifies the purpose of the project, says a student) and the blue-flag suggestion (the black arrow is too big and out of scale with the buildings and text boxes, says another).

Then the class offers more warm comments, which include "The addition of the aggregate box now makes the five models easier to understand" and "I could hear everyone this time."

Students offer several thoughtful cool suggestions. Among them, one student says, "Last time we thought that maybe the sponsor logo was a problem, but now that it is gone, it seems like it should be put back. It's important that we acknowledge our sponsors and explain why we're doing our projects. I know the logo color scheme clashes with the fire colors, but I still think it should be there."

The Payoff
The following week, the teams make their final presentations for an audience of faculty, family, and friends. The students are professionally dressed, confident, and ready to go. After the six teams give their presentations and answer questions from the audience, the presentations are professional grade.

On the way out of the room, a mother turns to the instructor. "I've never seen my daughter look so confident," she says. "I hid in the back of the room—she told me to—but I could hear her. She's never been able to speak publically like that before. I'm so proud."

Students' reflections about the peer-review process reveal similar insights and revelations. "It works really well when we have to look at one another's presentations and make both positive and negative comments," one student writes. "It helps you learn how to give constructive feedback—and accept it."

"It's the revisions that work so well," another class member says. "Lots of teachers ask for presentations, but you only get to try once, so you never make it better. Here, we get to practice."

A third student offers: "After I made a comment about another team's presentation, I got to thinking I should probably do that [in my presentation], too."

Student Buy-In
The opportunity to look at and provide feedback about other students' work shouldn't be reserved for upper-level students. Elementary students can learn from the process as well.

In her classroom, 3rd grade teacher Kris displays two answers—shown in Figures 3 and 4—to a math problem. The responses, she tells the class, come from two 3rd graders who took the previous year's high-stakes statewide exam. Kris highlights the prompt at the top of the box, tells students to look at the problems for a minute or two, and then asks, "What do you notice?"
Some students pick up on small details. One member of the class says that the questions in the first answer are circled. Another points out that the number sentences are formatted differently in the two responses—one says $2/8 < 2/3$ and the other says $2/3 > 2/8$. When Kris asks the student if he thinks that matters, he puzzles for a moment before realizing that both are acceptable as long as the inequality symbols are positioned correctly.

Kris moves the lesson along by asking students to write some rules for themselves that will help them answer questions like the one on display. Her students offer multiple ideas: Circle the important parts of the question; make the parts of the pie equal; draw carefully; and make sure the inequality symbol points in the correct direction.

Afterward, Kris presents the class fractions in a mathematical sentence and to complete a pie chart model. She uses the time to review the concepts behind fraction size, simple math sentences, and graph models of fractions. Kris tells the students that when they understand math this well, it will be easy to get the full score for this test item, just like in the first student's work they studied.

Later in the day, Kris talks with another teacher about her lesson.
an example, point out the important parts, and let them try it on their own. Kris agrees, but argues that there is a difference.

When I start by showing the students what other students have done, it's intrinsically more interesting than just an example from the book or worksheet. The kids always watch one another, so an example from them uses their natural desire to compare with everybody else. Also, because the answer comes from an exam setting, it's real. People are always interested about other people in "high-risk" situations. I don't think kids are different. And, well, I think letting them try a similar kind of question right away gets them to follow the model.

Revise and Rewrite
The same concept holds true in writing. Students who look at the writing of their peers learn a lot about what differentiates strong writing from weak writing. And why shouldn't they? Professional writers attend workshops where they listen to others' narratives, read examples, write, and learn from the instructor and peer critique.

With young students, it is especially helpful to provide a strong example and a weak example side by side. This makes it easier for the students to identify differences.

For example, Kay, a 4th grade teacher, posts two pieces of writing for her students to study (see figs. 3 and 4 online at www.ascd.org/6b04160iawv). She tells her class that other 4th graders wrote these stories for an important test. Here is the prompt:

You are finally old enough to babysit, and your first job is this afternoon! You will be spending the entire afternoon with a one-year-old. When you open the door you realize that instead of watching a one-year-old child, you will be watching

It's especially helpful to provide a strong example and a weak example side by side.

elephant. Give enough details to show readers what your afternoon is like babysitting the elephant.

Kay reads the two compositions aloud. At the end she asks, "Well, what do you think? The stories are clearly different, but how?"

One student says that the second sample is better. "There are more things in the story, like what happens," he says. Kay prompts the student to say more, ultimately eliciting that there are more details and that the author uses dialogue to help tell the story. "It's more interesting," adds another student. "Sometimes you don't know what is happening, then you learn it."

Kay asks for an example.

"When she screams, you wonder, what's wrong? Then she tells you: it's an elephant," the student responds.

"Very good," affirms Kay. "Authors help us like their stories by making us wonder what is going to happen next."

And then there's the realist in the group. "I don't like the stories," counters one boy. When Kay asks why, he says matter-of-factly, "Nobody babysits an elephant."

But in Kay's mind, there's a point to be made about literature. "You're right in a way. When we read a story, it's important that we believe it's real. Think about fantasy or space travel stories. Well-written stories make us believe, even if they're pretend. But if pretend stories are badly written, they bother us. This story bothers at least

Kay then turns the class's attention to the first story, asking students to improve it. She instructs students to add dialogue and adjectives—perhaps describing the house in which the elephant lives.

Kay likes the idea of asking the students to improve an existing story that was started by someone else. That way, the students aren't invested in telling "their story," an investment that is often hard to set aside when changes must be made. With someone else's story, it's easier to see what might be done, and the students love the idea of helping another student writer, even if they don't know who the student is. Later on, it's easier to show students how to rewrite and do similar editing on their own compositions.

The Challenge of Good Work
Teachers like Kay know that there are more effective and less oppressive ways to teach writing. She believes that showing students other students' work, critiquing it, and trying to make improvements is powerful because it aligns with the way that most people learn.

Students are naturally inclined to watch their peers, to make suggestions and support them, to avoid mistakes, to copy what works and modify what doesn't, and to learn from one another. By building on the authentic desire to do well, teachers tap into a deep-seated motivation and elicit remarkably well-formed, high-quality ideas. It makes the challenge and achievement of good work much more manageable and attainable for kids—and a whole lot more enjoyable to teach.

Rob Traver (traver@wpi.edu) is a teaching professor at the Worcester Polytechnic Institute in Worcester,
exercise. I hope the same holds true for you." Such fine grained diagnostics and revision greatly strengthen a course. Students notice.

![Average Worthwhile/Interesting Scores (1-10) for Course Activities (Feed the World GPS, 2012 A)](image)

**Communication Innovation and Intensity.**

Innovation. I made a major change to the typical power-point style of final proposal presentations in ID2050. I had two concerns. First, if there is a public presentation of the proposals of seven, six, or even five teams of students, and each team takes the usual 15-20 minutes, an audience is expected to stick around for 75-140 or more minutes. Maybe a captive audience of students or a contingent of obliged faculty will do this; but the sponsors of projects, busy professionals—not likely. Second, most project teams don’t use Powerpoint well. Too many slides. Too much text. Images that serve as decoration rather than illustration. Frequently there is a busyness to the slide that reminds me of machine vibration, and every good engineer knows that machine vibration is a bad thing. It all amounts to what I call Death-by-Powerpoint. Alternatively, students need to learn to present a succinct, interesting, and interactive project proposal to ensure memorability, engagement, and sufficient time for subsequent teams to do the same. Four minutes, then, with additional time for questions, is all my ID2050 teams get. To make this happen, students put the whole proposal story on one slide, masterfully designed, and have ready a handful of back-up slides, to be used only if the audience asks for more information.
Watch collaboration in action!

Built around real group interactions, Team Writing: A Guide to Working in Groups, by Joanna Wolfe, is a flexible, hybrid resource that pairs short, Web-based videos with a brief print book. Five videos, available at bedfordstmartins.com/teammwriting, illustrate common challenges that student groups encounter. Accompanying exercises get students thinking about the group dynamics behind the scenarios. The book adds practical advice for each step of the collaborative writing process, with troubleshooting tips, sample documents, and worksheets that help students build productive and creative teams.

"This is a concise, well-designed resource for guiding students through effective, even enjoyable group work, preparing them for the kind of team projects they will face in the workforce."
— John Zuer, University of Hawaii at Manoa

You can package this book with Mike Markel's Technical Communication (package ISBN: 0-312-57560-2) or any Bedford/St. Martin's title at a discount. Contact your sales representative or visit bedfordstmartins.com for details.

ISBN-10: 0-312-55582-8
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The primary focus of the current project is to evaluate the effectiveness of various teamwork strategies in promoting a positive work environment. The study involves collecting data through surveys and observations to assess the impact of these strategies on team cohesion, communication, and overall productivity. The results will be used to develop recommendations for improving team dynamics in future projects.

Teamwork Strategies

1. Increased Communication: Enhancing open and honest communication among team members is crucial for effective teamwork. This includes regular meetings, feedback sessions, and transparent information sharing.

2. Conflict Resolution: Addressing and resolving conflicts in a timely manner helps maintain a healthy team environment. Mediation techniques and conflict resolution training can be implemented to support team members in resolving disputes.

3. Shared Accountability: Encouraging shared accountability fosters a sense of ownership and commitment among team members. Assigning responsibilities and setting clear goals can help achieve this.

4. Regular Team Building: Engaging in team-building activities can improve interpersonal relationships and promote a collaborative spirit. These activities can be scheduled regularly to maintain positive team dynamics.

5. Recognition and Rewards: Recognizing individuals for their contributions and rewarding teamwork efforts can boost morale and motivation. This can include public recognition, bonuses, or additional perks.

Conclusion

The successful implementation of these strategies requires ongoing evaluation and adjustment based on the team's needs and feedback. By focusing on improving communication, conflict resolution, shared accountability, team building, and recognition, the project aims to enhance the overall effectiveness of the team and contribute to a more positive work environment.
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**Diagram:**

[Diagram of a process or system with labels and connections]

**Text:**

Teamwork Valued Recap

- Collaboration is key.
- Communication is vital.
- Supportive team dynamics.
- Mutual respect and understanding.

**Conclusion:**

Effective teamwork leads to success.
Participation Chart
Participation Chart

- Created the cohort and the question. Bought the computer for presentation.
- Picked up the report. Redid the question paper by himself.
- Made the presentation.
- Talked to the parents. I helped them with the research.

P: 45%
M: 27.5%
G: 2.75%
Participation Chart

G
27.5%
- Rented camera for workshop
- Bought ingredients for snacks
- Made workshop presentation
- Worked on report
- Took pictures for workshop

P
45%
- Made poster
- Brought USB to ATC
- Worked on report
- Picked up poster

M
27.5%
- Read assignment
- Brought USB to ATC
- Created kezmod
- Gathered survey results
- Worked on report
- Picked up poster
Participation Chart

- Worked on report: 27.5%
- Picked up poster: 45%
- Made poster: 27.5%
- Brought USB to ATC
- Gathered survey results
- Picked up poster
- Brought USB to ATC
- Created Kahoot questions

Got Camera for workshop
Brought Ingredients
TOK PICS

Date: 12/10/18
Team Name: M
Participation Chart

Warm
- Always on time
- Enthusiastic
- Always ready to help each other work

Cold
- Try to finish work before meetings

Cool
- Working better as a group so far
- More time to edit some of the mistakes

Lead
- Lead set or solution we can all do

Other
- Got distracted

A8
- A8
Participation Chart

- Great about reaching out to outside resources.
- Try to have work done before coming to the meetings.
- Good initiative w/ lots of sources/research.
Participation Chart

- Warm:
  - You're always so accepting & seeing the good
  - You're a great writer

- Cool:
  - Don't be afraid to call me out
  - Too much getting your part done

- Neutral:
  - Try making meetings on time
  - Before meetings you part done
  - Try getting your part done before meetings
Meeting contributions from good communication with science fair kids doesn't always do the work you said you would do.

Australia stuff
Basity argumentative

ex: warm
Amazing school communication
organized.

Coal: Don't beat yourself up if you are having a bad day.

via: warm
Good attempts at trying to make up for lack of Spanish in other ways.

Coal: #Spanish... could be better. Makes me feel like I can't contribute as much.
GREAT PROBLEMS SEMINAR
Project Poster · Evaluation Form
December 12, 2017

Please check the course this poster is from:
☐ Extinction: Who Will Survive?
☐ Designing Progress: Living on the Edge
☐ Ignorance is Not Bliss: Can Schools & Teaching Help?
☐ The World's Water
☐ Heal the World
☐ Food Sustainability
☐ Livable Cities

Please circle your rating for each category

The Problem
- Exceptional
- Strong
- Adequate
- Deficient
- Poor

- Is clearly articulated
- Addresses a relevant issue

The Proposed Solution is
- Exceptional
- Strong
- Adequate
- Deficient
- Poor

- Well developed
- Thoroughly explained
- Supported by evidence
- Demonstrably effective
- Culturally appropriate

The poster
- Exceptional
- Strong
- Adequate
- Deficient
- Poor

- Is visually attractive
- Is well organized
- Is effective in communicating the project
- Has good use of visual displays of information

The students
- Exceptional
- Strong
- Adequate
- Deficient
- Poor

- Demonstrate professional communication skills
- Answer questions adeptly
- Are aware of the scope and limitations of the project
- Demonstrate genuine enthusiasm for the project

Comments: Really strong work! It was easy to see that all four team members had done the work. Passion was abundant, and they were...
GREAT PROBLEMS SEMINAR
Project Poster - Evaluation Form
December 12, 2017

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- [ ] Designing Progress: Living on the Edge
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- [ ] Livable Cities

Please circle your rating for each category

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Comments:

Loved project.
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Comments:
Well done! Sound basis for the proposed solution.
(only got to speak with 2 of 4 busy crowded w/ lots of visitors / judges)
• Check the names of the projects you have been assigned to judge. If you have any CONFLICT OF INTEREST (even something that could give the APPEARANCE of a conflict of interest), please let us know we will assign you a different project. Please do not switch or trade projects on your own.

• Your scoring helps us to distinguish our stronger projects from our weaker projects. In scoring, you should compare Academy projects to each other—not to projects at other science fairs. In general, a very strong project would receive a score of 90 or higher. A weak project could receive a score of around 50. It would be very rare to have a project obtain a perfect score of 100, which would imply there is nothing that could be extended or improved. We request that you see and score all of your projects and then turn in all of your scoring sheets at the end.

• A critical part of judging is the interview. Each student will be interviewed by five judges, and interviews should be done individually. Spend enough time with each student to allow the student to present his/her information. Develop a sense of the student's depth and breadth of understanding about the project. Look at the student's logbook and binder and take some time to read through the research paper. Ask questions about the project. Communicate with the student until you are confident about judging and scoring the project accurately.

• Be supportive and kind to all students. Remember that these are young adults. Regardless of the quality of the project, all students have had this project on their mind weekly, if not daily, since the summer. The educational experiences obtained throughout the year and during your interview are invaluable.

• All judging on the exhibit floor must be completed by 4 pm. You can write your own confidential questions and comments on the front of the project summary sheets. The comments on the back of the scoring sheet are copied and shared with the students.

---

We thank you for volunteering your time and expertise.
Instructions for Judges
Great Problem Seminars
First-Year PBL
WPI

1. Remember that these are first year students - only 6 months out of high school! These projects were done while the students were taking 2 other courses, and for most, the first time they had to work on a significant project as a team.
2. The posters may show considerable differences from course to course - different faculty have different ideas about what the ideal poster looks like.
3. These are not intended to be stand alone posters - the students themselves will be providing you with information not on the poster.
4. Please ask probing questions and provide oral feedback! You are an important part of the learning process for the students.
5. Most of all, enjoy yourself. These are great students who've worked very hard and are proud of their work. Talking to them will be fun.
To Sponsors of Junior Year Team projects in Thessaloniki, Greece from the sponsor advisers.

Στις Τρίτη, 7 Μαΐου 2019 στις 1:22 μ.μ., ο/η Vaz, Richard F <vaz@wpi.edu> έγραψε:

Dear Sponsor,

We hope that you had an enjoyable and restful Easter. We are back in Massachusetts now and miss Thessaloniki very much! We regret that we weren’t able to say a proper goodbye during our last few days in Thessaloniki. We are deeply grateful to you, your colleagues, and “Ariana” for providing our students, and the two of us, with such a rich learning experience, both intellectually and culturally, during our stay.

We now have the responsibility to assign each student a grade for the project using guidelines approved by the WPI Faculty. Many different criteria enter into our evaluation. We will consider how well the project outcomes achieved the goal the students defined, the quality of their thinking and their writing, the depth and creativity of their analysis, and how well they communicated an understanding of the issues underlying their project. We will also consider process factors: how well they worked together as a team, how well they communicated with advisors and sponsors, and the extent to which they were proactive, adaptable, and showed initiative.

Project sponsors often see aspects of the students’ work that we advisors do not. We would like to consider any observations you have made of your project team in the areas of teamwork, professionalism, and communication. We are also interested in your assessment of the quality of their project outcomes.

Please do not feel obligated to respond since we know you are very busy. But certainly, we will welcome and value any feedback you are able to provide. We will be able to consider any input we receive by email by May 15.

Thank you again for supporting WPI’s project program; we hope you will consider being involved again in the future. Both of us certainly hope to return to Thessaloniki again soon!

Sincerely, Chrys Demetry and Rick Vaz

From the Greek Sponsor to the Project Team Advisers:

Dear Chrys and Rick,

As I have already said it was both refreshing and inspiring for us as well, having the WPI students here! From our point of view, the students were able to adapt quickly to any changes proposed from us, they behaved as members of a team (good team workers), they were very polite, communicative, and pleasant and it was a pleasure to work with them. Additionally they took initiatives, made proposals and brought new ideas. Last but not least they as a team they presented an interesting even surprising variety of competencies like editing and publishing their report, video making, interviewing, coordinating a meeting etc.

I believe “Ariana” played a crucial role to the success of the project since she carried out the duties she was expected to do so but also facilitated the social needs of the team (so we had the perfect blend!).

Of course we would be interested to participate in the Thessaloniki project next year! There may be opportunities to facilitate more groups of students since we expect two more EECs to operate in the area of Thessaloniki, but we may be sure later on!

Have a nice time, hope to see each other again! Sincerely yours,
Gold Standard PBL: Essential Project Design Elements

Buck Institute for Education 2015

It's nice that Project Based Learning is becoming popular, but popularity can bring problems. Here at the Buck Institute for Education, we're concerned that the recent upsurge of interest in PBL will lead to wide variation in the quality of project design and classroom implementation.

If done well, PBL yields great results. But if PBL is not done well, two problems are likely to arise. First, we will see a lot of assignments and activities that are labeled as "projects" but which are not rigorous PBL, and student learning will suffer. Or, we will see projects backfire on underprepared teachers and result in wasted time, frustration, and failure to understand the possibilities of PBL. Then PBL runs the risk of becoming another one of yesterday's educational fads — vaguely remembered and rarely practiced.

To help teachers do PBL well, we created a comprehensive, research-based model for PBL — a "gold standard" to help teachers, schools, and organizations to measure, calibrate, and improve their practice. This term is used in many industries and fields to indicate the highest quality process or product. Our conception of Gold Standard PBL has three parts: 1) Student Learning Goals (in the center of the diagram below) 2) Essential Project Design Elements (shown in the red sections of the diagram), and 3) Project Based Teaching Practices (which we explain elsewhere).

Student Learning Goals

Student learning of academic content and skill development are at the center of any well-designed project. Like the lens of a camera, our diagram puts the focus of PBL on preparing students for successful school and life experiences.

Key Knowledge and Understanding

Gold Standard PBL teaches students the important content standards, concepts, and in-depth understandings that are fundamental to school subject areas and academic disciplines. In good projects, students learn how to apply knowledge to the real world, and use it to solve problems, answer complex questions, and create high-quality products.

Key Success Skills

Content knowledge and conceptual understanding, by themselves, are not enough in today's world. In school and college, in the modern workplace, as citizens and in their lives generally, people need to be able to think critically
and solve problems, work well with others, and manage themselves effectively. We call these kinds of competencies "success skills." They are also known as "21st Century Skills" or "College and Career Readiness Skills."

It's important to note that success skills can only be taught through the acquisition of content knowledge and understanding. For example, students don't learn critical thinking skills in the abstract, isolated from subject matter; they gain them by thinking critically about math, science, history, English, career/tech subjects, and so on.

We recommend all projects include a focus on these success skills: critical thinking/problem solving, collaboration, and self-management. Projects may also help build other skills, habits of mind and work, and personal qualities (such as perseverance or creativity), based on what teachers, schools, parents and communities value, but we believe the fundamental ability to think critically, solve problems, work with others and manage oneself and one's own work are crucial stepping stones to future success.

**Essential Project Design Elements**

So what goes into a successful project? Based on an extensive literature review and the distilled experience of the many educators we have worked with over the past fifteen years, we believe the following Essential Project Design Elements outline what is necessary for a successful project that maximizes student learning and engagement.

**Challenging Problem or Question**

The heart of a project — what it is "about," if one were to sum it up — is a problem to investigate and solve, or a question to explore and answer. It could be concrete (the school needs to do a better job of recycling waste) or abstract (deciding if and when war is justified). An engaging problem or question makes learning more meaningful for students. They are not just gaining knowledge to remember it; they are learning because they have a real need to know something, so they can use this knowledge to solve a problem or answer a question that matters to them. The problem or question should challenge students without being intimidating. When teachers design and conduct a project, we suggest they (sometimes with students) write the central problem or question in the form of an open-ended, student-friendly "driving question" that focuses their task, like a thesis focuses an essay (e.g., "How can we improve our school's recycling system, so we can reduce waste?" or "Should the U.S. have fought the Vietnam War?").

Students are learning because they have a real need to know something, so they can use this knowledge to solve a problem or answer a question that matters to them.

**Sustained Inquiry**

To inquire is to seek information or to investigate — it's a more active, in-depth process than just "looking something up" in a book or online. The inquiry process takes time, which means a Gold Standard project lasts more than a few days. In PBL, inquiry is iterative; when confronted with a challenging problem or question, students ask questions, find resources to help answer them, then ask deeper questions — and the process repeats until a satisfactory solution or answer is developed. Projects can incorporate different information sources, mixing the traditional idea of "research" — reading a book or searching a website — with more real-world, field-based interviews with experts, service providers and users. Students also might inquire into the needs of the users of a product they're creating in a project, or the audience for a piece of writing or multimedia.
Authenticity

When people say something is authentic, they generally mean it is real or genuine, not fake. In education, the concept has to do with how “real-world” the learning or the task is. Authenticity increases student motivation and learning. A project can be authentic in several ways, often in combination. It can have an authentic context, such as when students solve problems like those faced by people in the world outside of school (e.g., entrepreneurs developing a business plan, engineers designing a bridge, or advisors to the President recommending policy). It can involve the use of real-world processes, tasks and tools, and quality standards, such as when students plan an experimental investigation or use digital editing software to produce videos approaching professional quality. It can have a real impact on others, such as when students address a need in their school or community (e.g., designing and building a school garden, improving a community park, helping local immigrants) or create something that will be used or experienced by others. Finally, a project can have personal authenticity when it speaks to students’ own concerns, interests, cultures, identities, and issues in their lives.

Reflection on the content knowledge and understanding gained helps students solidify what they have learned and think about how it might apply elsewhere, beyond the project.

Student Voice & Choice

Having a say in a project creates a sense of ownership in students; they care more about the project and work harder. If students aren’t able to use their judgment when solving a problem and answering a driving question, the project just feels like doing an exercise or following a set of directions. Students can have input and (some) control over many aspects of a project, from the questions they generate, to the resources they will use to find answers to their questions, to the tasks and roles they will take on as team members, to the products they will create. More advanced students may go even further and select the topic and nature of the project itself; they can write their own driving question and decide how they want to investigate it, demonstrate what they have learned, and make their work public.

Reflection

John Dewey, whose ideas continue to inform our thinking about PBL, wrote, “We do not learn from experience. We learn from reflecting on experience.” Throughout a project, students — and the teacher — should reflect on what they’re learning, how they’re learning, and why they’re learning. Reflection can occur informally, as part of classroom culture and dialogue, but should also be an explicit part of project journals, scheduled formative assessment, discussions at project checkpoints, and public presentations of student work. Reflection on the content knowledge and understanding gained helps students solidify what they have learned and think about how it might apply elsewhere, beyond the project. Reflection on success skill development helps students internalize what the skills mean and set goals for further growth. Reflection on the project itself — how it was designed and implemented — helps students decide how they might approach their next project, and helps teachers improve the quality of their PBL practice.
Critique & Revision

High quality student work is a hallmark of Gold Standard PBL, and such quality is attained through thoughtful critique and revision. Students should be taught how to give and receive constructive peer feedback that will improve project processes and products, guided by rubrics, models, and formal feedback/critique protocols. In addition to peers and teachers, outside adults and experts can also contribute to the critique process, bringing an authentic, real-world point of view. This commonsense acknowledgement of the importance of making student work and student products better is supported by research on the importance of “formative evaluation,” which not only means teachers giving feedback to students, but students evaluating the results of their learning.

Public Product

There are three major reasons for creating a public product in Gold Standard PBL — and note that a “product” can be a tangible thing, or it can be a presentation of a solution to a problem or answer to a driving question. First, like authenticity, a public product adds greatly to PBL’s motivating power and encourages high-quality work. Think of what often happens when students make presentations to their classmates and teacher. The stakes are not high, so they may slack off, not take it seriously, and not care as much about the quality of their work. But when students have to present or display their work to an audience beyond the classroom, the performance bar raises, since no one wants to look bad in public. A certain degree of anxiety can be a healthy motivator. But too much anxiety can of course detract from performance — the trick is to find the sweet spot, not the sweat spot — so it’s important that students are well prepared to make their work public.

When students have to present or display their work to an audience beyond the classroom, the performance bar raises, since no one wants to look bad in public.

Second, by creating a product, students make what they have learned tangible and thus, when shared publicly, discussible. Instead of only being a private exchange between an individual student and teacher, the social dimension of learning becomes more important. This has an impact on classroom and school culture, helping create a “learning community,” where students and teachers discuss what is being learned, how it is learned, what are acceptable standards of performance, and how student performance can be made better.

Finally, making student work public is an effective way to communicate with parents, community members, and the wider world about what PBL is and what it does for students. When a classroom, school, or district opens itself up to public scrutiny, the message is, “Here’s what our students can do — we’re about more than test scores.” Many PBL schools and districts reinforce this message by repurposing the traditional “open house” into an exhibition of project work, which helps build understanding and support for PBL among stakeholders. When the public sees what high-quality products students can create, they’re often surprised, and eager to see more.

Adapted from Setting the Standard for Project Based Learning: A Proven Approach to Rigorous Classroom Instruction, by John Larmer, John Mergendoller, Suzie Boss (ASCD 2015).