



# Project-Based Learning

A Resource for Instructors and Program Coordinators



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**PARTNERSHIPS FOR AMERICA'S YOUTH**

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## Overview

This project-based learning resource, created as part of a partnership between the Pearson Foundation and the National Academy Foundation, focuses on digital storytelling as a tool and instructional best practice for Academies. The information included in this primer is designed to supplement three exciting, project-based digital arts opportunities available to schools in the NAF network:

**Capturing a Career** – a project where students create brief “video resumes” that highlight their interests, skills, experiences, and career aspirations.

**Digital Storytelling** – a project where students from any Academy or course develop and communicate insights about a topic through short video documentaries.

**Professional Development Technology Workshops** – a “teacher as student” professional development opportunity where participants build teamwork and technology skills as they create a useful video products to support their own programs.

These technology projects provide accessible models of project-based learning and serve as powerful opportunities to advance broader school reform goals through engaging project work.

Technology integration activities are a natural fit for project-based learning. Reasons why technology-based projects such as these serve as exceptional models of PBL and as examples of best practices of classroom instruction include:

- *Project Authenticity*, ensuring students use technology to create tangible products for real audiences beyond the classroom.
- *Student Engagement*, allowing students to shape the curriculum as they make significant production choices throughout the project.
- *Active Learning*, encouraging students to solve problems and communicate their understanding by using technology tools.
- *Rigorous Communications Skills*, developed in the reading, writing, listening, speaking, and presenting activities integral to technology-based projects.
- *Practical Life Skills*, developed through collaboration, decision-making, and critical thinking; transferable to other educational and work settings.

Beyond modeling best practices of classroom instruction, these kinds of technology-based projects also help advance the goals of broader school reform. These experiences align with the six elements in NAF’s framework for school change:

1. **Personalization:** Technology projects foster a classroom setting that is focused on teamwork, inquiry, and shared expectations for student work.
2. **Academic Engagement of All Students:** Technology projects allow all students, regardless of background, to participate in deep learning experiences and develop workplace skills.
3. **Empowered Educators:** Technology projects encourage teachers to make key decisions about how to design curriculum and instruction and provide opportunities for teachers to develop their own technology skills.
4. **Accountable Leaders:** Technology projects give site officials tangible evidence of student learning through student products and performances.
5. **Engaged Community and Youth:** Technology projects provide ample opportunities for parents, employer partners, and other community members to interact with students and their work in meaningful ways.
6. **Integrated System of High Standards, Curriculum, Instruction, Assessments, and Supports:** Technology projects can provide a school or Academy with excellent, performance-based assessment options for their overall instructional system.

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## What Is Project-Based Learning?

From the primary-grade teacher who engages students in studying spiders for a month to the high school physics teacher who has students build a bridge from balsa wood, nearly all teachers say that they include “projects” in their teaching repertoire. Upon closer examination, however, the distinctions between *units*, *exercises*, *activities*, *performance assessments*, *problems*, and *projects* are not particularly clear. While educators differ in their use of these terms, the definition here pulls together ideas from best practices, research, and curriculum experts.

Well-designed projects ask students to:

- **Tackle real problems and issues that have importance to people beyond the classroom.**  
Projects emanate from issues of real importance to students and adults in the community and answer the age-old student question “Why do we need to know this?”
- **Actively engage in their learning and make important choices during the project.**  
Projects make room for student choice and creativity while still demanding student mastery of essential content, enabling students and teachers to interact as co-learners in the experience, rather than in the traditional student-teacher relationship.
- **Demonstrate in tangible ways that they have learned key concepts and skills.**  
Projects provide opportunities for students to produce observable evidence that they have mastered rigorous curricular standards as they apply their learning and solve the problem at hand. Projects and exhibitions also provide extensive evidence of process work and self-directed learning.

## Projects vs. Activities

Many so-called “projects” found in schools are more accurately termed “activities.” Here are some examples of both:

ACTIVITY	VS	PROJECT
Students in a history class study Westward Expansion for three weeks, culminating with a “Frontier Feast” where students dress in period costumes and eat typical western fare from the era.	VS	Students in a history class spend three weeks focused on the essential question “How did Westward Expansion impact our community?” Students learn about the period, research local connections, and design a museum exhibit featuring historical artifacts, primary source documents, and expert commentary from local historians. The exhibit is mounted in the community center lobby, and students serve as docents to the general public.
Students in a Spanish class study Central American nations for five weeks. Students select a country, conduct research, write a two-page report, and give a three-minute oral presentation (in Spanish) about their country to the class.	VS	Students in a Spanish class spend five weeks collaborating with a travel destinations course to design travel briefings for members of a local service club who are considering planning a volunteer work trip somewhere in Central America. Integrated student teams provide club officials with written and oral reports outlining important considerations when traveling to various Central American countries. Students learning Spanish translate oral presentations onto audio for later critique.
Students in a principles of business class study management skills, complete a “personal skills inventory” assessment, interview a manager at a local business, and write a paper that describes what they think are the three most important skills for managers to succeed in the workplace.	VS	Students in a principles of business class study management skills and work with a local business partner to answer the question “How can we help managers develop new skills on the job?” After conducting surveys and research, students design a website that provides managers with links, resources, and tips for developing their skills in 10 key areas. To launch and promote the website, students make a formal presentation to three actual managers at their employer partner’s workplace.

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## Types of Student Work

Curriculum experts Grant Wiggins and Jay McTighe describe distinct types of student work in their book *Understanding by Design* (Association for Supervision and Curriculum Development [ASCD], 2005).

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### Quiz and Test Items

- Highly structured
- Close-ended, have a “right answer”
- Focused on factual information, concepts, or discrete skills out of context

**Examples:** worksheets, end-of-chapter questions, state or national exams

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### Academic Prompts

- Often “ill structured” – require a strategy to answer
- Open-ended, require judgments to be made during scoring
- Usually under “exam conditions” with the teacher as the audience

**Examples:** essay questions, problem solving on class exams

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### Performance Tasks (includes projects)

- Complex challenges that culminate in one or more products or performances
- Range from short-term tasks to multidimensional projects
- Require students to apply knowledge and skill to solve a problem
- Real-world audience and context for the work

**Examples:** science fair projects, formal debates, video documentaries

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## Links

Stanford University’s [School Redesign Network](http://www.schoolredesign.net/srn/server.php?idx=850) includes links to many resources that help define and understand PBL. (<http://www.schoolredesign.net/srn/server.php?idx=850>)

PBL is consistent with best practices in instructional design. To learn more, visit ASCD’s [Understanding by Design Exchange](http://www.ubdexchange.org/default.html). (<http://www.ubdexchange.org/default.html>)

## When to Use Project-Based Learning

Project-based learning is a powerful tool in a teacher's repertoire of strategies. Given the effort required to design and implement a good project, teachers need to ensure that they are using the strategy at the right time and for the right reasons. Here are some key questions that teachers should consider when deciding if a PBL experience is suited to their instructional needs:

- **Do the content standards call for demonstration, application, performance, or understanding?**

PBL lends itself perfectly to performance-based assessments, applied learning, and demonstration of deep content understanding. During the project planning phase, teachers must make sure that the project will result in student-generated evidence of learning that aligns closely with intended skill and content standards. However, PBL is not the best solution for teaching discrete skills out of context, such as spelling or keyboarding.

- **Is there a way to capitalize on opportunities in the community through a PBL approach?**

While beginning project design with the content standards can work, some teachers find it more useful to start instead by uncovering timely issues from their school or community. Using this approach, project ideas can emerge from local environmental conflicts, regional development proposals, or national political issues. Once they've found the "hook" for the project, teachers can "backward map" their design to ensure that required content standards are adequately addressed.

- **Is there enough time and are the necessary resources available?**

Practical considerations must be made when deciding if a project is appropriate. In terms of instructional time, projects can actually save time if standards and content are delivered through – and not separate from – the project. If resources are an issue, project plans can often be scaled back to accommodate constraints while preserving the power of the experience. However, there are instances when time and resources conspire to make PBL a less-than-appropriate choice.

- **Can standards, skills, and habits of mind be prioritized and sequenced so that the project is doable?**

While PBL does enable teachers to meet simultaneous outcomes in the classroom, project plans can become unwieldy and undoable if too many standards and learning objectives are packed into a limited timeframe. Through experience, teachers can learn to design and deliver projects that fit and further their course objectives.

- **Can all students be supported to produce high-quality work?**

Well-designed projects include appropriate scaffolds that set students up for success. These supports, which can include things such as peer tutoring on important concepts or additional training on key technological skills, are often the difference-makers for students on the margins. Examples of quality products, explicit feedback on draft work, and careful sequencing of necessary skills are other key components in helping all students to achieve at high levels.

## Conditions that Support Project-Based Learning

Project-based learning strategies thrive within classrooms that are learning-centered environments. The classroom, school, and community conditions described here – many of which are precursors to powerful instruction of any type – help teachers and students alike in their PBL work.

### In the Classroom

Conditions within the classroom itself have the greatest impact on successful project design and implementation. Key factors include:

- **Safe, respectful learning environments**

The physical and intellectual safety of all learners must be protected so that students can take the learning risks demanded by complex project situations. Teachers must set clear behavioral boundaries and encourage an atmosphere where competing ideas can coexist respectfully.
- **Personalized teacher-student relationships**

Skillful teachers get to know their students well enough to be able to customize (or “differentiate”) project instruction to the needs and interests of individual learners. This requires intentional relationship-building with students; active, respectful listening on the part of teachers; and real opportunities for students to co-create their learning environment.
- **Productive peer relationships**

The advanced teamwork skills that most projects require of students call for a classroom environment where students know, trust, and value each other and are ready to engage in intense collaborative situations. Skillful PBL practitioners also know how to limit and redirect standard competitive urges students may exhibit and instead build a true community of learners.
- **Transformed teacher roles**

PBL transforms the role of the teacher from content provider to learning coordinator. As a result, teachers spend less time lecturing and leading and more time planning, observing, listening, coaching, and facilitating.
- **Intensified teacher engagement and commitment**

In a PBL environment where teachers ask students to engage fully in their own learning and exhibit their work beyond the classroom, teachers must reciprocate and model an elevated level of commitment in return. This means going the extra mile for students, responding to individual needs, maintaining expectations of success for all, and refusing to let students “hide” or get by with halfhearted efforts. Teaching in this way is not for the faint of heart, but it is deeply rewarding. Ultimately, students do not care how much teachers know until they know that they care.

### At the School

Beyond the classroom, PBL works best when the broader school environment provides numerous supports. Schools can foster PBL through:

- **Supportive school structures**

Schools that most successfully personalize instruction tend to be small or feel small, often by grouping students into cohorts of around 100 students. Small schools and small learning community programs allow teachers to team up on project design and implementation and provide ideal settings for curricular integration. In addition, schools that provide daily schedules with extended blocks of instructional time are well suited to the use of PBL as an instructional strategy.

- **Professional collaboration**

With or without teacher teaming, PBL benefits from quality collaboration between teachers. The ability to share project ideas, strategies, resources, and results can make a tremendous difference for educators, particularly during the early stages of their careers or PBL efforts.

- **Administrative support**

The active support of principals and other building-level leaders is essential if teachers and students are to sustain their PBL efforts over time. Tangible supports that administrators can provide include funding for project materials, staff development opportunities, and verbal and written support for teachers using PBL strategies.

## In the Community

The broader local community is the final piece of the PBL support puzzle. Potential supports that exist beyond the school grounds include:

- **Parent involvement in learning**

Parents can play a key role in supporting PBL by engaging with their students in the inquiry process, providing additional resources to the classroom, and serving as audience members for public exhibitions of student learning. Some teachers even train parent teams to provide formative assessment feedback to students on draft project work. The authentic nature of well-designed projects helps teachers move parental involvement beyond the bake sale into truly meaningful engagement in learning.

- **Community partnerships**

Community organizations, employer partners, and institutions of higher education can also support classroom PBL efforts in a multitude of ways. Some of these partners can provide the impetus for a project by “subcontracting” students to solve real problems for their school, business, or organization. Others can work with classroom teachers to provide adult mentors, project directors, content experts, and exhibition panels. It turns out that the old adage is true – it really does take a village to raise a child.

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## Links

The [Small Schools Project](http://smallschoolsproject.org/) boasts an amazing collection of resources to assist those educators creating small learning communities and small schools where PBL can thrive. (<http://smallschoolsproject.org/>)

The [High Tech High](http://www.hightechhigh.org/) network features schools designed to support PBL in the classroom. (<http://www.hightechhigh.org/>)

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## Research Supporting Project-Based Learning

The wide variety of project-based learning definitions, theories, strategies, and supports poses challenges to those conducting academic research on the approach. Despite these limitations, an increasing body of knowledge in the field suggests that PBL benefits both students and teachers.

For example, research by Dr. Fred Newmann of the University of Madison-Wisconsin shows that “authentic intellectual work” – a strategy that shares many of the features of high-level PBL – boosts student achievement, *even when assessed by standardized measures*. Newmann used three criteria to define instruction that was “authentic”:

- **Construction of knowledge** – authentic work asks students to engage directly in experiences designed to build their understanding of new content.
- **Disciplined inquiry** – authentic work connects new learning to students’ prior knowledge base, requires them to develop an in-depth understanding of concepts, and asks them to communicate their learning through oral and written methods.
- **Value beyond school** – authentic work ensures that student inquiry and work products operate within a real-world context that students and adults outside the classroom consider worthwhile.

In addition, according to an analysis of PBL research completed in 2000 by Dr. John W. Thomas, evidence can be found to support the following:

- PBL is more popular with students and teachers than traditional methods.
- Compared to other instructional models, PBL enhances the quality of student learning in subject matter areas.
- PBL seems to be equal to or slightly better than other models of instruction for producing gains in general academic achievement.
- PBL is an effective strategy for teaching complex skills such as planning, communicating, problem solving, and decision making.
- PBL can help increase student attendance, attitude, and self-reliance. For teachers, PBL can help increase professionalism and collaboration.
- In order for PBL to succeed, teachers must provide support for students in skills such as inquiry learning, effective technology use, metacognition, and workplace skills (for example, time management).
- PBL effectiveness is enhanced when incorporated into whole-school change efforts.

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### Links

Read about [Dr. Fred Newmann’s research](http://www.consortium-chicago.org/publications/p0a02.html) on authentic intellectual work. (<http://www.consortium-chicago.org/publications/p0a02.html>)

Read [Dr. John W. Thomas’s study](http://www.bobpearlman.org/BestPractices/PBL_Research.pdf) of PBL as an instructional strategy to create rigorous and relevant learning experiences. ([http://www.bobpearlman.org/BestPractices/PBL\\_Research.pdf](http://www.bobpearlman.org/BestPractices/PBL_Research.pdf))

## PBL Examples and Links

Many outstanding project-based learning examples and resources are available online thanks to educators around the world. Here are some of our favorite sites:

### Project Examples

[PBL at NAF, Digital Storytelling for Academy Students and Instructors](http://pearsonfoundation.org/NAF)

(<http://pearsonfoundation.org/NAF>)

The NAF/Pearson Foundation Digital Storytelling Project is modeled on exemplary PBL principles.

[What Kids Can Do](http://www.whatkidscando.org/index.asp) (<http://www.whatkidscando.org/index.asp>)

This national nonprofit organization focused on student voice has links to several outstanding projects in their “projects and products” section (under “Student Work & Voice”).

[STEPS](http://itd.usd259.org/steps/pbl.htm) (link to <http://itd.usd259.org/steps/pbl.htm>)

The Standards for Teachers through Educational Projects site includes video downloads of exemplary projects.

[Edutopia – The George Lucas Educational Foundation](http://www.edutopia.org/) (<http://www.edutopia.org/>)

The George Lucas Educational Foundation’s includes video clips highlighting exemplary projects.

[Great Student Work](http://www.bobpearlman.org/BestPractices/StudentWork.htm) (<http://www.bobpearlman.org/BestPractices/StudentWork.htm>)

Educational reform expert Bob Pearlman offers links to exceptional project examples and assessments from around the globe.

### Project-Based Learning Resources

[The Buck Institute for Education](http://www.bie.org/) (<http://www.bie.org/>)

The website offers an outstanding primer on all aspects of PBL, including design, implementation, assessment tools, and examples of quality projects.

[WestEd PBL Network](http://www.pblnet.org/) (<http://www.pblnet.org/>)

A national network of schools and resources focused on PBL produces this support site.

[International Education and Research Network \(iEARN - Canada\)](http://www.iearn-canada.org/guideontheside.html)

(<http://www.iearn-canada.org/guideontheside.html>)

A vast array of PBL-related topics, examples, tools, and ideas for teachers is provided by the Canadian chapter of the iEARN network.

[Global Schoolhouse](http://www.gsn.org/web/pbl/pedagog.htm) (<http://www.gsn.org/web/pbl/pedagog.htm>)

This site includes a great synthesis of PBL information, as well as opportunities for teachers to become involved in projects around the world.

### Project-Based Learning Training

[Swanson & Cosgrave Consulting](http://www.swansonandcosgrave.com) (<http://www.swansonandcosgrave.com>)

With over 25 years of PBL teaching and training experience, this team of educators provides customized PBL training for schools and districts.

[The Buck Institute for Education](http://www.bie.org/pbl/training/index.php) (<http://www.bie.org/pbl/training/index.php>)

This California-based foundation provides K-12 training as well as problem-based learning workshops for economics educators.

[Leslie A. Texas](mailto:texasconsulting@bellsouth.net) ([texasconsulting@bellsouth.net](mailto:texasconsulting@bellsouth.net))

A teacher trainer with deep experience in math and science, Leslie Texas is known for engaging PBL seminars.

## Project Design

Designing projects that are rigorous and relevant is no simple feat. To ensure that instructional time spent on projects is worthwhile, teachers need a design framework that enables them to think through the many levels of standards, skills, and other course objectives that their PBL experience will address. One such framework is the “simultaneous outcomes” model. This complex overview of project learning outcomes, adapted from the work of Dr. Art Costa and Dr. Bena Kallick, provides a powerful argument for the use of sophisticated instructional methods such as project-based learning.

### Simultaneous Project Outcomes



### Framework Overview

When applied to PBL design, the simultaneous outcomes framework shows how teachers can create projects that operate on several levels at the same time. The best projects skillfully weave together opportunities for students to engage in classroom activities (Level 1) that address content standards (Level 2) while encouraging them to develop habits of mind (Level 3) and the ability to take responsibility of their own learning (Level 4). Below are detailed descriptions of each design level.

### Outcome Level Descriptors

#### Level 1: Classroom Activities

At the most basic level, teachers involve students in activities that determine how they spend their time in school. Teachers must ensure that activities are engaging and aligned to the next three outcome levels. Good classroom activities provide a context for learning and help students to understand key academic concepts. In addition, well-designed activities allow students to practice the process and thinking skills needed, such as comparing, analyzing, and evaluating.

#### Key project design questions:

- What will students *do* as part of this lesson or project?

#### Examples:

- Read an article
- Work in a group to write a script
- Edit a video

## Level 2: Content Standards

The activities planned on Level 1 must help students to learn the concepts and skills from course content standards (Level 2). It must be noted that the current focus on accountability, testing, and standards puts tremendous pressure on teachers to emphasize – and stay – at this level of instructional design, despite the essential learning that lies in the next two levels.

### Key project design questions:

- What are the essential concepts and skills that I want students to learn during this project?
- What will I accept as evidence that they have learned it?

### Examples:

- Concepts that come from the heart of the discipline, such as cell division, federalism, credits vs. debits
- Evidence of learning credits vs. debits might include designing an accounting spreadsheet and entering receipts and accounts payable data for a real or simulated business

## Level 3: Habits of Mind

The third outcome level addresses the habits of mind, a set of “intelligent behaviors” that all people exhibit when they’re acting intelligently (also developed by Costa and Kallick). Teachers and university scholars often cite these 16 habits as the most critical outcomes of all.

### Key project design questions:

- Which habits of mind do I want students to develop during this project?

### Examples:

- Flexibility in thinking
- Metacognition
- Persisting

## Level 4: Self-Directed Learning

Finally, the outmost level addresses self-directed learning and the skills students can transfer to all aspects of their life. Ultimately, teachers create project opportunities to teach students to learn on their own in all sorts of contexts and settings.

### Key project design questions:

- What will students ultimately learn about their learning as a result of this project?

### Examples:

- Self-managing – teaching students to organize their own time and resources
- Self-monitoring – teaching students to evaluate their own progress and work quality
- Self-modifying – teaching students to make their own changes and adaptations

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## Links

Learn more about Costa and Kallick’s [Habits of Mind](http://www.habits-of-mind.net/) at the official HOM website. (<http://www.habits-of-mind.net/>)

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## The Six A's of Project-Based Learning

The Six A's constitute a powerful list of features that are present in high-quality classroom projects. Many teachers use these six factors as a quality check during the project design process. The Six A's were first developed by Adria Steinberg of Jobs for the Future. Click on highlighted titles to learn more about incorporating each feature into project plans.

### 1. [AUTHENTICITY](#)

Projects designed with **authenticity** infuse student work with purpose and passion by connecting project work to real-world issues that students care about.

### 2. [ACADEMIC RIGOR](#)

Projects that feature **academic rigor** challenge students to fully engage their minds by mastering content standards and using professional-level thinking skills.

### 3. [ADULT CONNECTIONS](#)

Projects that incorporate **adult connections** support and inspire students through the meaningful involvement of adults beyond the classroom.

### 4. [ACTIVE EXPLORATION](#)

Projects with **active exploration** engage the bodies and minds of students through hands-on, field-based work.

### 5. [APPLIED LEARNING](#)

Projects that integrate **applied learning** push students to use their learning right away and to practice important skills demanded by the workplace.

### 6. [ASSESSMENT PRACTICES](#)

Projects with quality **assessment practices** provide opportunities for students to receive relevant feedback during and after their project work.

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## Links

The [Six A's Rubric](http://pearsonfoundation.org/NAF/downloads/SixAsProjectDesignRubric.pdf) from the Buck Institute for Education assesses project designs against Six A's criteria. (<http://pearsonfoundation.org/NAF/downloads/SixAsProjectDesignRubric.pdf>)

Adria Steinberg's book [Real Learning, Real Work](http://www.amazon.com/gp/product/041591793X/104-2992838-7883901?v=glance&n=283155) first identified the Six A's in 1998. (<http://www.amazon.com/gp/product/041591793X/104-2992838-7883901?v=glance&n=283155>)

## Authenticity

Arguably the most critical of the Six A's elements, authenticity infuses student work with purpose and passion. Projects that feature authenticity:

- Solve a problem or question that has meaning to the student.
- Involve a problem or question is actually tackled by adults at work or in the community.
- Require students to produce something that has personal and/or social value beyond the classroom.

Part of the secret to designing authentic projects is to ensure that there is a real-world use for the products or services that students produce. Traditionally, most student work is created for the insulated world of the classroom and is rarely seen by anyone except a teacher. In contrast, authentic projects seek to create work that fills needs or interests in the broader school, community, or world. And, by wrapping course content around truly relevant issues and challenges, teachers can ensure that learning takes place within a meaningful – and memorable – context. Students engaged in truly authentic projects don't ask the question, "Why do we need to know this?"

### Examples of projects that feature *authenticity*

<p><b>FINANCE</b></p> <p>Students teach workshops on predatory lending practices to parents and community members who are targeted by lending scams.</p>	<p><b>INFORMATION TECHNOLOGY</b></p> <p>Student teams provide networking services to needy community entities such as nonprofit agencies.</p>	<p><b>HOSPITALITY AND TOURISM</b></p> <p>Students assist school staff in planning their actual vacation travel.</p>
<p><b>FINE ARTS</b></p> <p>Students study and practice specific painting techniques, develop lesson plans, and teach the techniques to students at a local elementary school.</p>	<p><b>LANGUAGE ARTS</b></p> <p>Students study local development issues and use their written and oral communication skills to develop persuasive essays and presentations that are shared with government officials.</p>	<p><b>MATH</b></p> <p>Students use their computational skills to calculate the surface area of buildings at their school that are scheduled to be painted at an upcoming volunteer work day. Their findings are used to determine the amount of paint needed for the job.</p>
<p><b>SCIENCE</b></p> <p>Students conduct research about how lifestyle choices contribute to health problems found in their community and develop informational brochures aimed at teaching others how to stay healthy.</p>	<p><b>SOCIAL STUDIES</b></p> <p>Students conduct research on historical issues that have local significance and prepare informative museum exhibits that are displayed at local businesses and community display cases.</p>	<p><b>WORLD LANGUAGES</b></p> <p>Students use their language skills to provide basic translation services to immigrant families in the community who need assistance in dealing with school officials, employers, etc.</p>

## Links

The [Virtual Schoolhouse](http://virtualschoolhouse.visionlink.org/pbl.htm) documents exemplary K-12 projects that reflect a range of school, district, and classroom models. (<http://virtualschoolhouse.visionlink.org/pbl.htm>)

UC Berkeley's [Urban Plan Project](http://citiesandschools.berkeley.edu/) site shows how UC students pair with inner-city high school kids to learn urban planning and present their ideas to the various commissions and communities they impact. (<http://citiesandschools.berkeley.edu/>)

## Academic Rigor

When projects feature academic rigor, students face challenges that fully engage their minds. Academically rigorous projects:

- Lead students to master and apply content standards and knowledge central to one or more disciplines or content areas.
- Challenge students to use methods of inquiry central to one or more disciplines (for example, to think like a scientist, historian, etc.).
- Require students to develop higher-order thinking skills and habits of mind (for example, searching for evidence, taking different perspectives).

Designing academically rigorous projects requires teachers to build in opportunities for students to wrestle with big ideas and produce clear evidence that they have mastered content standards. Ensuring rigor may also mean that favorite activities – such as producing artistic products that are all “sizzle” but no “steak” – may need to be altered or abandoned in favor of more authentic demonstrations of learning. Some experienced PBL teachers use essential questions to help focus their projects on issues that require significant intellectual work.

### Examples of projects that feature *academic rigor*

<p><b>FINANCE</b></p> <p>Students create print and web-based financial literacy materials for use with other students and young adults.</p>	<p><b>INFORMATION TECHNOLOGY</b></p> <p>Student teams develop “how-to” manuals explaining how to set up and troubleshoot a computer network.</p>	<p><b>HOSPITALITY AND TOURISM</b></p> <p>Student teams create an informational website for students interested in careers in hospitality and tourism.</p>
<p><b>FINE ARTS</b></p> <p>Students apply learning about playwriting and dramatic genres by writing and producing short scenes that reflect different styles.</p>	<p><b>LANGUAGE ARTS</b></p> <p>Students write, edit, and produce a school paper or newsletter.</p>	<p><b>MATH</b></p> <p>Students use their understanding of trigonometry to calculate the height of buildings.</p>
<p><b>SCIENCE</b></p> <p>Students analyze the quality of city drinking water and produce, present, and defend their report in front of a panel of local scientists and city officials.</p>	<p><b>SOCIAL STUDIES</b></p> <p>Students conduct oral interviews with Vietnam veterans and write papers comparing the vets’ experiences with accounts found in their history texts.</p>	<p><b>WORLD LANGUAGES</b></p> <p>Students write, edit, and publish a newspaper or newsletter in the language they are studying.</p>

## Links

The [Standards for University Success](http://www.s4s.org/cepr.s4s.overview.php) are a carefully designed set of standards for incoming college freshmen and can form the basis of deep and meaningful projects. (<http://www.s4s.org/cepr.s4s.overview.php>)

Mt. Diablo High School’s [Digital Safari](http://72.18.226.120/dsweb/) shows several projects aligned to California state standards. (<http://72.18.226.120/dsweb/>)

## Adult Connections

Powerful project-based learning experiences require meaningful involvement from adults beyond the classroom. Projects that feature adult connections:

- Allow students to meet and observe adults with relevant expertise and experience.
- Give students an opportunity to work closely with at least one adult.
- Ask adults to collaborate on the design and assessment of student work.

While teachers still play the pivotal role in PBL experiences, the best projects also involve other adults from the broader school community. These individuals can support the project in a variety of different capacities, including guest speaker, content expert, interviewee, mentor, project coordinator, guest artist, client, and presentation audience member. Some projects involve multiple adults serving in several of these roles. For project designers, the key is to find opportunities for meaningful, personalized contact between students and adults committed to their learning and growth.

### Examples of projects that feature *adult connections*

<p><b>FINANCE</b></p> <p>Student teams work with employer partner mentors to develop balanced portfolios for prospective investors.</p>	<p><b>INFORMATION TECHNOLOGY</b></p> <p>District IT staff reviews student drafts of school networking plans and provides feedback on how to improve the plans.</p>	<p><b>HOSPITALITY AND TOURISM</b></p> <p>Students interview managers in different sectors of the hospitality and tourism industry to learn about effective leadership strategies.</p>
<p><b>FINE ARTS</b></p> <p>Students work with a local guest artist to produce an art exhibit on homelessness in the community.</p>	<p><b>LANGUAGE ARTS</b></p> <p>Writers and editors from the local newspaper staff act as guest speakers in a journalism class that produces a monthly paper.</p>	<p><b>MATH</b></p> <p>Students interview employees from local companies to discover how math skills are used on a daily basis in a variety of jobs.</p>
<p><b>SCIENCE</b></p> <p>Scientists from a local university act as project mentors for student teams researching native plant species.</p>	<p><b>SOCIAL STUDIES</b></p> <p>Students in a government class poll local voters to determine their views on key issues in an upcoming election.</p>	<p><b>WORLD LANGUAGES</b></p> <p>Students serve as interpreters for parents and community members at important school events.</p>

## Links

Read the American Institute of Biological Sciences' [case study on mentoring](http://www.aibs.org/eye-on-education/eye_on_education_2005_07.html) at the high school level. ([http://www.aibs.org/eye-on-education/eye\\_on\\_education\\_2005\\_07.html](http://www.aibs.org/eye-on-education/eye_on_education_2005_07.html))

UC Berkeley's [Career Academy Support Network](http://casn.berkeley.edu/resources/mentor_handbook.html) (CASN) offers an online Mentor Handbook that includes templates and other practical tools for formally working with adults beyond the classroom. ([http://casn.berkeley.edu/resources/mentor\\_handbook.html](http://casn.berkeley.edu/resources/mentor_handbook.html))

[MentorNet's](http://www.mentornet.net/Documents/About/Programs/one_on_one.aspx) site helps connect mentors with high school science and engineering students. ([http://www.mentornet.net/Documents/About/Programs/one\\_on\\_one.aspx](http://www.mentornet.net/Documents/About/Programs/one_on_one.aspx))

[Oregon Mentors](http://www.orientors.org/) is an example of a statewide consortium to provide mentors for classroom and internship work. (<http://www.orientors.org/>)

## Active Exploration

Great projects involve students in active, hands-on work that engages their bodies and minds. Projects that feature active exploration:

- Ask students to spend significant amounts of time doing field-based work.
- Require students to engage in real investigation, using a variety of methods, media, and sources.
- Expect students to communicate what they are learning through formal exhibitions.

Exemplary project designs demand that students move beyond the role of passive recipient of knowledge. Instead, students are required to actively question, research, explore, analyze, and present. They literally get their hands and feet involved in the work of the project – and in doing so, they are required to use different modes of thinking and learning. Students engaged in active exploration tap into resources and opportunities beyond the walls of the classroom, and are enriched by the experience.

### Examples of projects that feature *active exploration*

<p><b>FINANCE</b></p> <p>Students interview local small business owners to develop case studies for a report on entrepreneurship strategies.</p>	<p><b>INFORMATION TECHNOLOGY</b></p> <p>Student teams develop websites for nonprofit agencies in the community.</p>	<p><b>HOSPITALITY AND TOURISM</b></p> <p>Students work with a local hotel to develop and deliver training workshops for new employees.</p>
<p><b>FINE ARTS</b></p> <p>Students write, rehearse, and perform an original dramatic work.</p>	<p><b>LANGUAGE ARTS</b></p> <p>Students read a variety of technical manuals, then write their own technical article describing how to complete a task on the computer.</p>	<p><b>MATH</b></p> <p>Students survey their classmates on a variety of current issues and produce a thorough and accurate statistical analysis of the data.</p>
<p><b>SCIENCE</b></p> <p>Students use proper scientific sampling techniques as they study the impact of non-native insect species on their local ecosystem.</p>	<p><b>SOCIAL STUDIES</b></p> <p>Student teams conduct original research on a local historical event through interviews and examination of official public records.</p>	<p><b>WORLD LANGUAGES</b></p> <p>Students work with native speakers of the language they are studying to create a dictionary of conversational slang.</p>

## Links

The [What Kids Can Do](http://www.whatkidscando.org/index.asp) site features many student “action research” projects that have impacted the community and has powerful examples of student work (Fires in the Bathroom) and processes (Students as Allies in the Work). (<http://www.whatkidscando.org/index.asp>)

This template for the [Boston Public Schools’ Signature Projects](http://boston.k12.ma.us/stc/signature.htm) shows how all seniors must create a project that includes active exploration as a key component of the work. (<http://boston.k12.ma.us/stc/signature.htm>)

## Applied Learning

The best PBL designs push students to use new learning right away and to practice important skills demanded by the workplace. Projects that feature applied learning:

- Involve learning that takes place in the context of a semi-structured problem, grounded in real-world issues and settings.
- Lead students to acquire and use competencies expected in high-performance work organizations (for example, teamwork, problem solving, and communications).
- Require students to develop organizational and self-management skills.

Exemplary PBL designs develop deep student learning on multiple levels, as suggested by the [simultaneous outcomes](#) model (page 12). The first part of this design challenge is to intentionally and explicitly layer content standards, thinking skills, habits of mind, and lifelong learning aptitudes into the project. The second challenge is to plan experiences that require students to immediately use their newly acquired content and skills to solve a problem or challenge. This applied and “just-in-time” model not only builds in student engagement; it also helps to cement and deepen learning.

### Examples of projects that feature *applied learning*

<p><b>FINANCE</b></p> <p>Students use accounting skills to help set up a financial record-keeping system for the school store.</p>	<p><b>INFORMATION TECHNOLOGY</b></p> <p>Student teams use teamwork techniques and problem-solving protocols to troubleshoot case study network malfunctions.</p>	<p><b>HOSPITALITY AND TOURISM</b></p> <p>Students employ event management and food preparation techniques to host an all-sports banquet for the school.</p>
<p><b>FINE ARTS</b></p> <p>Students use their understanding of all aspects of the industry to operate a student-run production company.</p>	<p><b>LANGUAGE ARTS</b></p> <p>Students use persuasive writing techniques to petition the school board to support district policy changes of interest.</p>	<p><b>MATH</b></p> <p>Students analyze traffic patterns and use problem-solving skills to develop models and solutions to traffic congestion.</p>
<p><b>SCIENCE</b></p> <p>Students use their understanding of the causes and effects of flooding to sponsor a town hall meeting on how to prevent future flood damage in the community.</p>	<p><b>SOCIAL STUDIES</b></p> <p>Students use their understanding of U.S. immigration trends and laws to develop and present potential policy solutions to current immigration debates.</p>	<p><b>WORLD LANGUAGES</b></p> <p>Students use newly acquired second-language skills to interview native speakers about their cultural heritage.</p>

## Links

Learn more about applying essential workplace skills from the [SCANS Report](http://wdr.doleta.gov/SCANS/). (<http://wdr.doleta.gov/SCANS/>)

[New Horizons for Learning](http://www.newhorizons.org/strategies/applied_learning/front_applied.htm) offers definitions and examples of applied learning. ([http://www.newhorizons.org/strategies/applied\\_learning/front\\_applied.htm](http://www.newhorizons.org/strategies/applied_learning/front_applied.htm))

The [Center for Educational Networking](http://www.cenmi.org/LeadingChange/Sp06/article5b.asp) site discusses applied learning skills necessary for twenty-first-century school, career, and citizenship success. (<http://www.cenmi.org/LeadingChange/Sp06/article5b.asp>)

## Assessment Practices

No PBL experience is complete without opportunities for students to receive quality feedback during and after their project work. Projects that feature excellent assessment practices:

- Ask students to regularly reflect on their learning using clear project criteria that they helped to set.
- Involve adults from outside the classroom to evaluate student work and help students develop a sense of real-world standards.
- Provide opportunities for ongoing assessment of student work through a range of methods, including exhibitions and portfolios.

Quality project assessment involves both formative and summative feedback. During the project, students reflect on their own progress, receive formative feedback from peers and teachers, and have opportunities to improve their work and address issues raised by reviewers. At the end of the project, summative evaluations of student products and performances are provided by teachers and other adults who judge student work in relation to predetermined quality indicators as described on project rubrics.

### Examples of projects that feature *assessment practices*

<p><b>FINANCE</b></p> <p>Student team PowerPoint presentations on key economic concepts are rehearsed in front of peer reviewers and graded on a rubric by a panel of employer partners.</p>	<p><b>INFORMATION TECHNOLOGY</b></p> <p>Student teams create a web-based electronic magazine. Articles are reviewed by a language arts teacher, while technical aspects are reviewed by a technology teacher.</p>	<p><b>HOSPITALITY AND TOURISM</b></p> <p>Students participate in mock interviews in front of district personnel staff. Students write up reflections on their performance and debrief the experience with their interviewers.</p>
<p><b>FINE ARTS</b></p> <p>Students work with the teacher to develop rubric criteria and descriptors for a sculpture project, then use the rubric to provide feedback to their peers.</p>	<p><b>LANGUAGE ARTS</b></p> <p>Students complete multiple drafts of a research paper focusing on a current issue of interest. Students receive feedback on each draft from a different source: peers, parents, employer partners, and the teacher.</p>	<p><b>MATH</b></p> <p>Student teams prepare solutions to complex mathematical scenarios, then receive critical feedback from other teams working on different problems. Final presentations include evaluations of the group process.</p>
<p><b>SCIENCE</b></p> <p>Students work with real scientists to develop criteria for assessing experimental methods, then conduct experiments and evaluate their process using those criteria.</p>	<p><b>SOCIAL STUDIES</b></p> <p>Student teams studying twentieth-century social revolutions in the United States write research papers, create video documentaries, and deliver informational teaching sessions. Students receive formative feedback on each product, and final versions are evaluated using rubrics distributed at the outset of the project.</p>	<p><b>WORLD LANGUAGES</b></p> <p>Students prepare and deliver oral presentations in a second language. After the presentation, students view a video recording of their performance and write a formal evaluation of their language and delivery based on a speaking and presentation rubric.</p>

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## Links

The [4Teachers](http://pblchecklist.4teachers.org/checklist.shtml) site offers checklists for teachers to use while designing PBL experiences. (<http://pblchecklist.4teachers.org/checklist.shtml>)

[Northwest Regional Education Laboratory](http://www.nwrel.org/request/2002aug/assessment.html) describes assessment of a project-based learning experience on their site. (<http://www.nwrel.org/request/2002aug/assessment.html>)

[Kathy Schrock's](http://school.discovery.com/schrockguide/assess.html) extensive site for best practices in teaching and learning features an assessment section with authentic tools and prompts for teachers to adapt or adopt. (<http://school.discovery.com/schrockguide/assess.html>)

The [Coalition for Essential Schools](http://www.essentialschools.org/pub/ces_docs/resources/cp/assess/assess.html) has extensive resources for all assessment practices. ([http://www.essentialschools.org/pub/ces\\_docs/resources/cp/assess/assess.html](http://www.essentialschools.org/pub/ces_docs/resources/cp/assess/assess.html))

[Looking at Student Work](http://www.lasw.org/) is dedicated to processes and protocols for examining the work students are creating in the classroom. Is the evidence sufficient to demonstrate learning? How do we know? (<http://www.lasw.org/>)

## Project Delivery

How can teachers ensure that their students will succeed in complex project work? Part of the answer lies in providing students with the supports needed to complete the task. Like real scaffolds that support people who work on buildings high above the ground, “project scaffolding” refers to the time, tools, and training students need in order to succeed during the risky business of project work.

Below are several key scaffolds that teachers must consider when implementing sophisticated classroom projects.

### Types of Project Scaffolding

SCAFFOLD	DESCRIPTION	EXAMPLES
Structure	Critical organizing features of the project that determine <i>who</i> does <i>what</i> and <i>when</i> .	<ul style="list-style-type: none"> <li>• Students split into project teams or groups.</li> <li>• Each team investigates a different health topic, but all create a public service video.</li> </ul>
Content	Any classroom activity that covers the foundational topics, concepts, and standards that students need to know for the project.	<ul style="list-style-type: none"> <li>• Interactive lecture on customer service.</li> <li>• Reading and discussion on how computer networks are structured.</li> </ul>
Training	Explicit skill-building for students in group work and all required production areas.	<ul style="list-style-type: none"> <li>• Modeling of key steps in creating a PowerPoint presentation.</li> <li>• Explicit group communication training.</li> </ul>
Expertise	Professional-level training and consultation provided by outside experts or adults in the community.	<ul style="list-style-type: none"> <li>• Guest artist teaches students how to set up lighting for a video shoot.</li> <li>• Marketing executive helps students improve text phrasing for a website.</li> </ul>
Oversight	Structured times for teachers to meet, motivate, and mentor student teams.	<ul style="list-style-type: none"> <li>• Teacher informally interviews each student team during project workdays.</li> <li>• Project teams give progress report to teacher halfway through project.</li> </ul>
Documents	Handouts to help explain and organize project.	<ul style="list-style-type: none"> <li>• Project descriptors and calendars.</li> <li>• Project rubrics, deadlines, check sheets.</li> </ul>
Tools	The technological resources necessary to produce required products.	<ul style="list-style-type: none"> <li>• Computers, software, video cameras.</li> <li>• Display boards, scissors, glue, paper.</li> </ul>
Time	In-class opportunities for students to meet, research, produce, exhibit, and evaluate.	<ul style="list-style-type: none"> <li>• Thirty minutes of project time each day.</li> <li>• Designated “project days” – extended periods of time for student project work.</li> </ul>

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## Project Implementation Tools

Below are links to tools and templates that can assist teachers in designing and delivering quality projects.

[Project Design Template](http://pearsonfoundation.org/NAF/downloads/SixAsDesignTemplate.pdf) (<http://pearsonfoundation.org/NAF/downloads/SixAsDesignTemplate.pdf>)

This comprehensive template leads teachers through key elements of the project design process.

[Project Rubric Templates](http://www.bie.org/pbl/pblhandbook/BIE_PBLrubrics.pdf) ([http://www.bie.org/pbl/pblhandbook/BIE\\_PBLrubrics.pdf](http://www.bie.org/pbl/pblhandbook/BIE_PBLrubrics.pdf))

This tool from the Buck Institute for Education helps teachers develop rubrics for assessing different aspects of project work.

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## Links

The Coalition of Essential Schools' [guide to scaffolding](http://www.essentialschools.org/cs/resources/view/ces_res/85) can help teachers support project learning. ([http://www.essentialschools.org/cs/resources/view/ces\\_res/85](http://www.essentialschools.org/cs/resources/view/ces_res/85))