



Rapid Response—Project-based Learning

Date	October 14, 2008
Number	00077
Request	How are states across the nation using project-based learning (PBL)? Has PBL been implemented in elementary, middle, and high schools? If so, when was it implemented, and what results have schools and districts experienced?
Summary	In response to this request, the Southeast Comprehensive Center (SECC) queried several state departments of education as well as the REL Southeast at the SERVE Center, the National High School Center, and the National Center for Research on Evaluation, Standards, and Student Testing (CRESST) to obtain information on the use of PBL in schools nationwide. SECC also used various Web search engines to obtain information on this topic. The results are provided below along with resources that may offer additional information.

PURPOSE AND USE OF PROJECT-BASED LEARNING

Upon review of publications and resources from a number of education research and dissemination organizations—the Association for Career and Technical Education (ACTE), the Association for Supervision and Curriculum Development (ASCD), the Buck Institute for Education (BIE), the Northwest Regional Educational Laboratory (NWREL), and the Southern Regional Education Board (SREB), among others—the SECC developed a summary of PBL implementation and research findings. Although various models, instructional methods, and initiatives are discussed below, none are endorsed by the SECC.

According to leading educational organizations, academic rigor and relevance are key issues that must be addressed in order to increase student engagement in course work and improve student achievement. In its mapping framework for high school improvement, the National High School Center lists eight elements, number one of which is rigorous curriculum and instruction. The NHSC stated that, “everyone in the system is responsible for ensuring that all students have access to rigorous content and instruction.” The Center explained that “this content and instruction should be organized around student instructional needs and aligned with instruction in other content areas to support thematic and *project-based learning* [italics added], tiered instruction, etc. (NHSC, 2008, p. 2). In addition, the SREB High Schools That Work (HSTW) model focuses on a rigorous academic core, emphasizes career and technical studies, and encourages students to apply academic content and skills to real-world problems and *projects* [italics added] (SREB, 2005, p. 2).

A review of the literature on project-based learning indicated that there is no widely accepted definition of PBL. However, the following definition encompasses the basic principles of most of the information that was available. The Buck Institute for Education (BIE, n.d.) defines project-based learning as “a systematic teaching method that engages

students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.”

BIE has a comprehensive Web site that contains PBL online resources and information on its PBL model (http://www.bie.org/index.php/site/PBL/pbl_online/). The Institute’s model for project-based learning focuses on teaching students content as well as the 21st century skills that have been identified as essential for college- and workplace-readiness by organizations, such as the Association for Career and Technical Education (ACTE, 2006).

These skills include the following:

- Communication and presentation
- Organization and time management
- Research and inquiry
- Group participation
- Leadership
- Self-reflection and assessment

The BIE Web site also provides information on how PBL is used, implementation strategies, and guidance for project design.

With the continuing focus on improving graduation rates and lowering dropout rates, PBL is seen as “a potentially powerful means” for producing relevant and rigorous learning (Harada, Kirio, & Yamamoto, 2008, p. 14). In a recent article on PBL, these authors stated that PBL “builds on students’ individual strengths and allows them to explore their interests in the structure of a defined curriculum.” The authors also highlighted major features of well-structured PBL projects and suggested two critical ingredients for successful implementation of PBL—start early and develop a plan. They also described a nine-step process for planning a project, which begins with determining student outcomes and content standards to be addressed and ends with identifying and agreeing upon roles and responsibilities for project participants.

A limitation of the resources from BIE and Harada, Kirio, & Yamamoto is that they did not cite research to support their statements about PBL. Consequently, there is insufficient information on which to evaluate the level of evidence in accordance with Institute of Education Sciences (IES) guidelines for distinguishing educational practices that are supported by rigorous evidence (U.S. Department of Education, 2003).

In a NWREL PBL booklet, Railsback (2002) discussed the benefits of PBL and identified the following common defining features of authentic projects:

- Student centered, student directed
- Definite beginning, middle, and end
- Content that is meaningful to students
- Real-world problems
- Opportunity for firsthand investigation
- Sensitivity to local culture and culturally appropriate
- Specific goals tied to curriculum and school, district, and state standards
- Tangible product that can be shared with intended audience
- Connections among academic, life, and work skills
- Opportunity for feedback and assessments from expert sources
- Opportunity for reflective thinking and student self-assessment
- Assessments of work (portfolios, journals, etc.)

Railsback also provided guidance on structuring projects, selecting projects, avoiding pitfalls that may hamper progress, and determining assessment strategies. In addition, the NWREL booklet featured several innovative PBL projects that were implemented in schools throughout the Northwest, which included creation of a roller coaster

(Idaho), development of three-dimensional spirit masks (Alaska), an afterschool Marimba band (Oregon), and creation of an electronic talking book of words spoken by native tribes in Puget Sound (Washington). The NWREL booklet did not provide specific information on the types of research studies that were implemented to show effectiveness, so no determination can be made regarding the level of evidence for the PBL practices.

RESEARCH FINDINGS AND PBL IMPLEMENTATION RESULTS

The SECC reviewed several additional publications that examined the research findings on PBL and project-based instruction as well as the results of implementation in schools and districts. Two of the documents reviewed—Using Real-World Projects (SREB, 2000) and PBL Research Summary (Edutopia, 2001)—did not provide sufficient information on research studies to support statements regarding PBL efficacy or recommendations for use. However, in an ASCD article, David (2008) described the types of research studies that he reviewed and the implications of the findings. Consequently, the PBL interventions detailed by David may be backed by “possible” evidence of effectiveness, as defined in the IES user guide for review of educational practices (U.S. Department of Education, 2003). The studies reviewed by David provided the “best evidence” of effectiveness through experimental and/or quasi-experimental designs using treatment and control group comparisons.

Using Real-World Projects to Help Students Meet High Standards in Education and the Workplace

In this guide, the SREB and Jobs for the Future Inc., examined practical experiences and research on project-based learning (SREB, 2000). The guide also described the following six “A”s of project-based learning that can be applied to all projects: 1) Authenticity, 2) Academic rigor, 3) Applied learning, 4) Active exploration, 5) Adult relationships, and 6) Assessment.

In addition, the SREB guide provided several key observations on PBL use and implementation:

- High-quality projects allow students to learn and apply the material as well as concepts and problem-solving skills that they have gained through course work.
- It is crucial to identify specific learning goals for the project and to plan how these goals connect to the local, state, and national standards for knowledge and skills that students are expected to meet.
- PBL does not replace direct instruction but can add meaning and purpose to course work, motivate students to learn more advanced material, and provide practice in critical skills for lifelong learning.

The guide also provided examples of exemplary PBL projects from schools in several states—California, Louisiana, Oregon, North Carolina, and Washington—some of which are discussed in Table 1, Project-based Learning Implementation and Results, of this summary document.

PBL Research Summary: Studies Validate Project-Based Learning

This 2001 Edutopia article stated that “a growing body of academic research supports the use of project-based learning in schools as a way to engage students, cut absenteeism, boost cooperative learning skills, and improve test scores. Those benefits are enhanced when technology is used in a meaningful way in the projects.” The article provides summaries of a number of studies of PBL approaches that were used for providing mathematics instruction, developing presentations, completing projects using videotaped problems, and completing projects using computers and laptops. Two of these studies are highlighted below.

Challenge 2000. In this 5-year study conducted by SRI International (2000), researchers from the Center for Learning in Technology found that students who used technology in Challenge 2000 Multimedia Project classrooms performed better than non-technology students in communication skills, teamwork, and problem solving.

Researchers analyzed the implementation of PBL using surveys and structured observations of project and non-project-based classrooms. They also created and administered a performance assessment that focused on measuring the students' skill in design and communication. Researchers "compared the performance of students from a random selection of middle-grade Multimedia Project classrooms in other non-media classrooms in the same school."

Co-nect School Reform Design. In its 1999 study, the Center for Research in Education Policy (located at the University of Memphis and the University of Tennessee at Knoxville) found that students using the Co-nect program, which focuses on PBL and technology, increased their test scores in all subject areas during a 2-year period on the Tennessee Value-Added Assessment System. Overall, the Co-nect schools outperformed the control schools by 26 percent.

What Research Says About Project-Based Learning

In this recent ASCD article, David (2008) discussed the core idea of PBL, the lack of common project criteria, and findings of several research studies. David summarized 3-year longitudinal case studies conducted in British schools, in which Boaler (2002) reviewed mathematics achievement in two similar secondary schools, one using a traditional instructional approach and the other project-based instruction. The research found that "after 3 years, students in the PBL-school significantly outperformed the traditional-school students in mathematics skills as well as conceptual and applied knowledge. In fact, in the PBL school, three times as many students passed the national exam."

In a second study reviewed by David, researchers with The Cognition and Technology Group at Vanderbilt University (1992) studied the effects of a series of technology-based programs that the university had developed and which included video-based adventure simulations. The video series allowed students to work together on simulated real-world problems that required the use of mathematical knowledge and reasoning skills. The researchers compared assessment results from ten classes of students at five sites who had received instruction using the Vanderbilt curriculum with ten "control group" classes at the same five sites. The principals at the five sites selected the classes that served as the control groups. When compared with a control group, students taught using the video series scored higher in solving word problems and in planning skills. However, both groups scored the same on tests of basic mathematics concepts.

In addition, David examined a comprehensive review of the limited research on PBL, which was completed by Thomas (2000). Thomas found some evidence that the PBL approach enhances the quality of student learning when compared to other instructional methods. Thomas cited evidence to indicate that PBL is effective for teaching processes such as problem solving and decision-making. However, David stated that a large amount of the research that was reviewed by Thomas did not include comparisons with other models.

David concluded that studies suggest that PBL can have a positive effect on student learning but stressed that the research also showed the difficulty of effectively implementing PBL.

Refer to Table 1 for a summary of project-based learning implementation and results. Sources for the information provided in the table include personal communications, publications, and online materials. The majority of the sources highlighted did not include information on research studies of the PBL interventions that were implemented. However, some of the results provided were based on assessments, pre- and post-test scores, as well as observations of increased levels of student engagement and parental involvement in the educational process.

Table 1. Project-based Learning Implementation and Results

Title	Description
<p>Alice Carlson Applied Learning Center (Texas)</p>	<p>Through real life projects, such as museum-like exhibits, brochures, and newsletters, students at the Alice Carlson Applied Learning Center are learning Texas history. Teams of students are replanting the prairie, studying flora and fauna, and making connections with Native American customs through authentic learning experiences (Page, 2006).</p> <p>Link to resource: http://www.thejournal.com/the/printarticle/?id=18042</p>
<p>Caldwell Parish High School (Louisiana)</p>	<p>To strengthen connections between vocational and academic disciplines, a schoolwide forestry project takes roots at Caldwell Parish High School in Columbia, Louisiana. Forestry is one of the community’s two largest employers. This project-based learning experience exposed students to forestry equipment, uses of timber and timber products, and Forestry-related job opportunities. The school-based enterprise features an integrated approach to creating, developing, and market a product. Students performed above average on projects and related examinations (SREB, 2000).</p>
<p>Clarkson University: Project-based Learning Partnership (New York)</p>	<p>This K-12 project based learning partnership program uses PBL to demonstrate the importance of integrating science, math, technology and engineering (STEM) skills in teaching students a new curricula. This partnership exists among Clarkston University, St. Lawrence University, and the K–12 community. K–12 students learn by doing rather than through traditional strategies of lecture and memorization (Clarkson University, n.d.).</p> <p>Link to resource: http://www.clarkson.ed/highschool/k12/index.html</p>
<p>Crescent Valley High School (Oregon)</p>	<p>An 8-month study on the biological and cultural resources of Bald Hill Park was conducted by an advanced field Biology class at Crescent Valley High School in Corvallis, Oregon. The PBL project combined academic studies and community service opportunities. Through collaborative teamwork, students researched topics such as birds, mammals, insects, geology, cultural history streams, and plants through the assistance of more than 20 mentors from the community. Students wrote a guide to the parks biological, geological, and cultural richness. In addition, students lead field trips and produced videos about Native Americans who once resided in Bald Hill Park (SREB, 2000).</p>
<p>Georgia State Department of Education</p>	<p>Georgia receives a grant from Learn and Serve America to support its implementation of service learning. Service learning applies the knowledge and skills that students acquire in the classroom to service projects. More than 700 elementary, middle, and high school students have received Learn and Serve grants to implement service-learning projects. Each year, a comprehensive evaluation is conducted to determine outcomes regarding student learning, school engagement, and program quality.</p>

Table 1. Project-based Learning Implementation and Results

Title	Description
<p>Georgia State Department of Education (continued)</p>	<p>Results of the last 5 years indicate that</p> <ol style="list-style-type: none"> 1. Students showed significant gains on pre- and post-test scores that are linked to Georgia Performance Standards 2. Teachers observed significant increases in student motivation 3. Students were able to link classroom content to real-world experiences 4. Parents became more involved in their child’s school experience <p>(Personal communication, J. Broome, Georgia Department of Education, August 18, 2008).</p>
<p>Hawaii Department of Education</p>	<p>Beginning in 2010, the Hawaii Department of Education will offer a Board of Education Recognition Diploma, which requires the completion of a senior project. The senior project entails students completing a research paper, a project that is career service or personal interest focused, a project portfolio and a culminating presentation to a review panel (REL Southeast, 2008).</p>
<p>High Tech High School (California)</p>	<p>Immersion into the adult world is the model of performance-based student work and assessment at High Tech High in San Diego, California. High Tech High is designed more like a workplace rather than a traditional high school in that each student has a personalized learning plan (Page, 2006).</p> <p>Link to resource: www.hightechhigh.org</p>
<p>New Technology High School (California)</p>	<p>At New Tech High School in Napa, California, teachers assign periodic projects with different components to students rather than handing out daily assignments. Teachers build their instruction around eight learning outcomes content standards, collaboration, critical thinking, oral communication, written communication, career preparation, citizenship, ethics, and technology literacy. These learning outcomes are embedded in all projects, assessments, and grade reporting (Pearlman, 2006).</p> <p>Link to resource: http://www.newtechhigh.org/Website2007/about-NTHS-PBL.html</p>
<p>Michigan Department of Education</p>	<p>The Michigan Merit Curriculum for Grade 12 English Language Arts incorporates a project entitled “Culminating Senior Project” for all students enrolled in that curriculum. Students are required to show evidence of leadership skills in taking social action on an issue. The project is used to determine the student’s final grade (REL Southeast, 2008).</p> <p>Link to resource: http://www.michigan.gov/documents/inde/ELA_Grade_12_189418_7.p</p>

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Title	Description
<p>Milwaukle High School (Oregon)</p>	<p>In 1995, the Milwaukle High School in Milwaukle, Oregon, launched a schoolwide project known as “Living History Day.” Through integrated learning, this annual project offers all students the opportunity to study the history and people of American conflicts, and the project culminates into a daylong Veterans Day observance (SREB, 2000).</p>
<p>North Carolina Department of Education</p>	<p>The North Carolina Graduation Project is a multifaceted, multidisciplinary performance assessment that provides students the opportunity to connect content knowledge, acquire skills, and relate work habits to real-world situations and issues. This project was launched in the 2006–2007 school year, beginning with the entering freshman class (REL Southeast, 2008).</p> <p>Link to resource: http://www.ncpublicschools.org/graduationproject/overview</p>
<p>Rhode Island Department of Education</p>	<p>Effective with the class of 2008, the state of Rhode Island is requiring all students to complete locally determined proficiency-based measures in addition to Carnegie units. One of the proficiency options that a district may require of all students is the completion of a senior project. However, a senior project is not state mandated (REL Southeast, 2008).</p> <p>Link to resource: http://www.mb2.ecs.org/reports/Report.aspx?id=1548</p>
<p>Sumner High School (Washington)</p>	<p>Sumner High School in Sumner, Washington, has developed an integrated program that incorporates academic, technical, and personal skills. This inquiry-based program requires students to complete projects that take at least 1 year to complete and integrate agri-science, advanced biology, and graphic communications courses. Frequently, the projects evolve into multiyear endeavors (SREB, 2000).</p>
<p>Washington State Department of Education</p>	<p>The state of Washington mandates that all students complete a culminating senior project. Through this project, students will demonstrate both their learning competencies and preparations related to specific state learning goals. Each district must develop a written district policy that includes assessment criteria (REL Southeast, 2008).</p> <p>Link to resource: http://mb2.ecs.org/reports/Report.aspx?id=1548</p>

Note: The PBL initiatives and programs discussed above are those for which information was available. The SECC does not endorse any of the initiatives or programs discussed in this summary document.

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ADDITIONAL RESOURCES

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