Project Based Learning and Student Engagement

PBL builds up students' sense of being able to accomplish things and allows them to develop ownership of their work. If we can develop that in kids, we're going to see them become amazing citizens and do amazing things as they go on in the rest of their lives.

Deborah Peek-Brown
Michigan State University

A major concern in many schools is student engagement and reengagement. Project based learning (PBL) has long been advocated not only as a process for enhancing engagement, but as facilitating development of a range of knowledge, skills, and attitudes. For example, through well designed and implemented projects, students are seen as learning to analyze and synthesize problems and situations and as developing critical and higher-order thinking. Project based learning also is viewed as enhancing discipline, goal setting, planning, and organization. And, by working in teams, students can strengthen collaborative, social, and communication skills.

What is Project Based Learning (PBL)?

There are many definitions for PBL. Our synthesis delinates that it is a

> dynamic, active, inquiry-based, and student-centered classroom teaching method that facilitates motivated student learning by engaging them in exploring/investigating serious, authentic real-world and personally meaningful questions, problems, and challenges related to the designated curricula.

Discussions of PBL stress that the intent is to build students' creative capacity for dealing with complex matters and facilitate deep, transferable, and often interdisciplinary learning. Also emphasized is PBL's potential for enhancing collaborative behavior, critical thinking, intrinsic motivation and curiosity, perseverance, and appreciation of self and others. Assessment of acquired knowledge, skills, and attitudes is done during and at the end of the project through process and product analyses, with an emphasis on self and peer evaluation. In stressing mastery of learning, students are encouraged to maintain their focus on what they are learning rather than on grades.

The process involves students working in small teams often for several weeks. (However, simple projects can be accomplished more quickly.) Team members collaborate in deciding how to work on the project. They design, develop, and construct hands-on solutions. There is emphasis on accessing a variety of sources. Technological tools enable gathering, synthesizing, and analyzing knowledge and facilitate communication and collaboration beyond the classroom. The teacher's role is to guide, support, and ensure that individual differences, vulnerabilities, and disabilities are accounted for. Student work is refined using feedback from experts, instructors, and/or peers. When the project yields products that warrant widespread sharing, the internet often is used.

It has taken many years, even decades, to develop an evidence base that focuses on the building blocks of effective PBL, largely because PBL itself has been difficult to define with precision. Kristin De Vivo

---

*The material in this document builds on work done by Alison Wunderland Marie as a participant with the national Center for MH in Schools & Student/Learning Supports at UCLA in 2022.

The center is co-directed by Howard Adelman and Linda Taylor and operates under the auspices of the School Mental Health Project, Dept. of Psychology, UCLA.Website: http://smhp.psych.ucla.edu

Examples of Project Based Learning

Project based learning opportunities can be developed virtually for every school subject, as well as for service-oriented projects focused on helping others, enhancing personal wellness, improving schools and neighborhoods, environmental concerns such as dealing with pollution and climate change, what the future will look like, etc.

> Karen Capraro (2017) offers a concise look at a PBL she conducted. She notes that in mathematics we learn measures of weight and time and units, but she asks, at what point do children learn about money? Coins have different values based on their shapes and displayed content, and there is little to no indication of value on any of our coins. Initiating a PBL approach and using the information contained on coins, she was able to facilitate learning not only to count, but also about the names of states, information about some presidents and about decades and centuries, and more. In facilitating the process, she incorporated simple statistics and graphs (e.g., applying data counts from non-state and state quarters and putting the information into a pie graph). Additional data were provided to color in states on a map.

For a range of ideas, see *Project-Based Learning: 50 Smart Ideas*

And here are a few videos on PBL with examples:

> *Projects and Project-Based Learning: What's The Difference?*
>
> *Student's Learning Journey in Project-Based Learning*
>
> *10 Super Examples of Project Based Learning for Kids*
>
> *Water Quality Project*

More resources are provided on the end of the document.

Research

While many studies have had significant methodological limitations, a series of recent work has used randomized controls. Taken as a whole, PBL research has reported positive effects for student engagement, achievement, and aspects of social and emotional learning across grade levels and racial and socio-economic groups.

For example, Culclasure et al (2019) reported findings that students using project based learning performed better than those who did not on inventories of social-emotional skills. A study of primary school pupils by Kaldi and Govaris (2011) reported moderate positive changes in self-efficacy, motivation toward tasks, and attitudes towards peers from a different ethnic background. Almulla's (2020) findings suggest that PBL improves student engagement by enabling knowledge and information sharing and discussion.

In their 2017 review, Barbara Condliffe and her colleagues, conclude:

> "PBL is grounded in cross-cutting 'design principles' often related to what is taught, how it is taught, and how students should be evaluated in a PBL classroom. PBL design principles emphasize the importance of the project as the central vehicle of instruction and of students as active participants in the construction of knowledge. There is little consensus among developers of PBL design principles, however, about how PBL fits in with other instructional methods, how long a PBL unit should last, the roles of student choice and collaborative learning, and how learning should be assessed. The lack of a uniform vision complicates efforts to determine whether PBL is being implemented with fidelity and to evaluate its effects."

Clearly, many questions remain to be explored – including the challenges of implementation. At the same time, a recent series of randomized control studies funded by Lucas Education Research reports that well-designed and rigorous implementation of PBL significantly improves learning (see www.lucasedresearch.org/research/research-briefs). This body of work also reports that the PBL programs studied improved aspects of social and emotional learning, with consistent effects across racial and socio-economic groups.

Kristin De Vivo (2022) summarizes the findings of the Lucas Education Research funded studies as follows:

- *Embedding project-based learning in Advanced Placement courses increased the probability of students earning a passing score on AP tests by about 8 percentage points in the first year and 10 percentage points after teachers had two years of experience with the project-based curriculum (Saavedra, Liu, et al., 2021).*
- *Middle school students in California who learned science with a project-based curriculum outperformed their peers by 11 percentage points on a science assessment and also did better on the state's end-of-year math and English language arts assessments (Deutscher et al., 2021).*
- *Third-grade students in Michigan who used an interdisciplinary project-based science curriculum performed 8 percentage points better than peers in traditional classes on a key science assessment (Krajcik et al., 2021).*
- *Second-grade students in Michigan who used a project-based social studies and literacy curriculum demonstrated five to six more months of learning in social studies and two to three more months in informational reading than a comparison group (Duke et al., 2020).*

It should be noted that critics of PBL suggest that an overemphasis on group work can result in some students laying back with resultant negative effects for themselves and others. In addition, the move from traditional teaching is seen by some as too demanding on teachers and students, especially given the added challenges that have arisen from the COVID-19 pandemic. Still others worry that a move from traditional approaches will have a negative impact on struggling learners and will exacerbate the achievement and opportunity gaps. These are matters for future study, but available research suggests that the concerns are not major problems when PBL is appropriately implemented and teachers are effectively supported.

Concluding Comments

After exploring the topic of PBL to provide the Center with material for this resource, Alison Marie concluded that learning involves more than just rushing through an assignment to get it done. It is a process of discovery and creation. "It's feeling the wind in your hair and being immersed in the journey and not being preoccupied with the destination."

Engaging and maintaining student engagement and reengaging disconnected students are major concerns for teachers. Well-implemented PBL holds promise for helping address these motivational matters, as well as enhancing knowledge, skills, and attitudes.

PBL fits well into efforts to personalize learning and teaching. The emphasis on student engagement is essential to in establishing a good match for learning in the classroom and enhancing equity of opportunity for success at school and beyond.

We do recognize that increasing use of PBL in classrooms adds another capacity building demand on schools that already have many increased challenges arising from the COVID-19

pandemic. At the same time, we know that many teaching practices are in place that are close to PBL and, with only a few minor tweaks, can be built upon. As always, the challenge for schools is to ensure that teachers are effectively supported every day and especially when they are learning new practices.

A Few Resources

PBL Works website

Project Based Learning: Explained. – video

Project-Based Learning (PBL) Series of Edutopia articles

Project-Based Learning: a Primer

Seven Essentials for Project-Based Learning

Project-Based Learning (PBL) Benefits, Examples & 10 Ideas for Classroom Implementation

A Project-Based Approach to Teaching Elementary Science (Edutopia)

Reinventing AP Courses With Rigorous Project-Based Learning (Edutopia)

Tools for Project-Based Learning

A Guide to Using Project-Based Learning in the Classroom

Project-Based Learning: Teaching Guide

A Planning Guide For Project-Based Learning In The Elementary Classroom

Grossman, P., Hermann, Z., Schneider Kavanagh, S., & Pupik Dean, C.G., (2021). *Core practices for project-based learning: A guide for teachers and leaders.* Harvard Education Press.

References Used in Developing this Information Resource

Adelman, H.S. & Taylor, L. (2018). *Improving School Improvement*. Los Angeles: Center for MH in Schools & Student/Learning Supports at UCLA.

Almulla, M.A. (2020). The effectiveness of the project-based learning (PBL) approach as a way to engage students in learning**.** *SAGE Open* 1–15

Blumenfeld, P.C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating Project-Based Learning: Sustaining the Doing, Supporting the Learning. *Educational Psychologist, 26*, 369–398.

Bouta H., Retalis S. (2013). Enhancing primary school children collaborative learning experiences in maths via a 3D virtual environment. *Education and Information Technologies, 18*, 571–596

Capraro, K. (2017). Making "change" in second grade: Exploring money through project-based learning. *Young Children , 72,* 30-37

Condliffe, B., Quint, J., Visher, M., Bangser, M., Drohojowska, S., Saco, L., & Nelson, E. (2017). Project-based learning: A literature review. *MDRC.*

Culclasure, B. T. , Longest, K. C. , & Terry, T. M. (2019). Project-based learning (Pjbl) in three southeastern public schools: academic, behavioral, and social-emotional outcomes. *Interdisciplinary Journal of Problem-Based Learning, 13*(2).

De Vivo, K. (2022). A new research base for rigorous project-based learning. *Kappan, 103*, 36-41.

Deutscher, R.R., Holthuis, N.C., Maldonado, S.I., Pecheone, R.L., Schultz, S.E., Wei, R.C., & Lucas Education Research. (2021). *Project-based learning leads to gains in science and other subjects in middle school and benefits all learners*. Lucas Education Research.

Dole, S. , Bloom, L. , & Doss, K.K. (2017). Engaged Learning: Impact of PBL and PjBL with Elementary and Middle Grade Students. *Interdisciplinary Journal of Problem-Based Learning, 11(2).*

Duke, N.K., Halvorsen, A-L., Strachan, S.L., Kim, J., & Konstantopoulos, S. (2021). Putting PjBL to the test: The impact of project-based learning on second graders' social studies and literacy learning and motivation in low-SES school settings. *American Educational Research Journal, 58,* 160–200.

Grossman P., Dean C. G. P., Kavanagh S. S., Herrmann Z. (2019). Preparing teachers for project-based teaching. *Phi Delta Kappan, 100,* 43-48.

Kaldi, S., Filippatou, D., & Govaris, C. (2011). Project-based learning in primary schools: effects on pupils' learning and attitudes. *International Journal of Primary, Elementary and Early Years Education , 39,* 35–47.

Karaçalli, S., & Korur, F. (2014).The effects of project-based learning on students' academic achievement, attitude, and retention of knowledge: The subject of "Electricity in Our Lives," *School Science and Mathematics, 114*, 224-235.

Kokotsaki, Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools, 19*, 267–277.

Krajcik, J., Schneider, B., Miller, E., Chen, I.C., Bradford, L., Bartz, K., . . . & Lucas Education Research. (2021). *Project-based learning increases science achievement in elementary schools and improves social and emotional learning*. Lucas Education Research.

Larmer J., & Mergendoller J.R. (2015). *Gold standard PBL: Essential project design elements*. Buck Institute for Education.

Loyens S.M., Jones S.H., Mikkers J., & van Gog T. (2015). Problem-based learning as a facilitator of conceptual change. *Learning and Instruction, 38*, 34–42.

Odell, M.R. , Kennedy, T.J. , & Stocks, E. (2019). The Impact of PBL as a STEM School Reform Model. *Interdisciplinary Journal of Problem-Based Learning, 13*(2).

Prachagool. (2021). Literature and project-based learning and learning outcomes of young children. *International Education Studies, 14*, 93.

Savery, J.R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, *1*, 9–20.

Saavedra, A.R., Liu Y., Haderlein, S.K., Rapaport, A., Garland, M., Hoepfner, D., . . . & Lucas Education Research. (2021). *Project-based learning boosts student achievement in AP courses.* Lucas Education Research.

Saavedra, A.R., Rapaport, A., Lock Morgan, K., Garland, M., Liu, Y., Hu, A., . . . & Haderlein, S.K. (2021). *Knowledge in action efficacy study over two years*. Center for Economic and Social Research.

Virtue, E.E., & Hinnant-Crawford, B.N. (2019). "We're doing things that are meaningful": Student Perspectives of Project-based Learning Across the Disciplines. *Interdisciplinary Journal of Problem-Based Learning, 13*(2).