



# Engage! PBL Research Summary

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## Summary of Research on Project-Based Learning

*Center of Excellence in Leadership for Learning at University of Indianapolis*

A summary of research on PBL by Center for Excellence in Leadership for Learning at University of Indianapolis indicates that PBL: (a) has a positive effect on student content knowledge and the development of skills such as collaboration, critical thinking, and problem solving; (b) benefits students by increasing their motivation and engagement; and (c) is challenging for teachers to implement, leading to the conclusion that teachers need support in order to plan and enact PBL effectively while students need support including help setting up and directing initial inquiry, organizing their time to complete tasks, and integrating technology into projects in meaningful ways (Brush & Saye, 2008; Krajcik, et al., 1998). This summary utilizes Thomas's (2000) five criteria to define PBL: (a) "Projects are central, not peripheral to the curriculum"; (b) "projects are focused on questions or problems that 'drive' students to encounter (and struggle with) the central concepts and principals of the discipline"; (c) "projects involve students in a constructive investigation"; (d) "projects are student-driven to some significant degree"; and (e) "projects are realistic, not school-like" (p. 3-4). Collaboration is also included as a sixth criterion of PBL.

## A Review of Research on Project-Based Learning

*John W. Thomas, Ph. D - review of best practices research on PBL commissioned by Bob Pearlman, former President of Autodesk Foundation*

The research reported includes a variety of investigations and several important findings. Chief among the findings that might be of interest to practitioners are those reported by Boaler (1997) on the effects of PBL on the quality of students' subject matter knowledge, by University of Michigan researchers and others (e.g., Marx et al., 1997) on the challenges faced by teachers and students during PBL implementation, and by the Cognitive and Technology Group of Vanderbilt and others (e.g., Barron et al., 1998) on the effects of "procedural facilitation" interventions on students' skill acquisition in PBL.

- There is some evidence that students have difficulties benefiting from self-directed situations, especially in complex projects. Chief among these difficulties are those associated with initiating inquiry, directing investigations, managing time, and using technology productively. The effectiveness of PBL as an instructional method may depend, to a greater extent than we recognize, on the incorporation of a range of supports to help students learn how to learn.
- There is direct and indirect evidence, both from students and teachers, that PBL is a more popular method of instruction than traditional methods. Additionally, students and teachers both believe that PBL is beneficial and effective as an instructional method.
- Some studies of PBL report unintended and seemingly beneficial consequences associated with PBL experiences. Among these consequences are enhanced professionalism and collaboration on the part of teachers and increased attendance, self-reliance, and improved attitudes towards learning on the part of students.
- PBL seems to be equivalent or slightly better than other models of instruction for producing gains in general academic achievement and for developing lower-level cognitive skills in traditional subject matter areas.

- More important, there is some evidence that PBL, in comparison to other instructional methods, has value for enhancing the quality of students' learning in subject matter areas, leading to the tentative claim that learning higher-level cognitive skills via PBL is associated with increased capability on the part of students for applying those learnings in novel, problem-solving contexts.
- There is ample evidence that PBL is an effective method for teaching students complex processes and procedures such as planning, communicating, problem solving, and decision making, although the studies that demonstrate these findings do not include comparison groups taught by competing methods.
- Finally, there is some evidence, albeit indirect, that the effectiveness of PBL is enhanced when it is incorporated into whole-school change efforts.

### [When is PBL More Effective? A Meta-synthesis of Meta-analyses Comparing PBL to Conventional](#)

Johannes Strobel and van Angela Barneveld, *Interdisciplinary Journal of Problem-based Learning*: Vol. 3: Iss. 1, Article 4 (2009)

This study from Purdue University used a qualitative meta-synthesis approach to compare and contrast the assumptions and findings of the meta-analytical research on the effectiveness of problem-based learning (PBL). Findings indicated that PBL was superior when it comes to long-term retention, skill development and satisfaction of students and teachers, while traditional approaches were slightly more effective for short-term retention.

### [Stop Talking...Start DOING!](#)

*Tony Gurr, All Things Learning Blog*

Project-based learning (PBL) and traditional "full frontal" lecturing as Tony Gurr refers to it, have very similar results in short-term retention as measured on multiple-choice exams. PBL has significantly better results in long-term retention and soft skills acquisition. This article offers PBL summaries regarding some key research showing the long-term retention benefits of PBL vs. traditional models of learning.

### [Learning From Teaching: Exploring the Relationship Between Reform Curriculum and Equity](#)

*Jo Boaler, Journal for Research in Mathematics Education, Vol. 33, No. 4, (Jul., 2002), pp. 239- 258 Published by: National Council of Teachers of Mathematics Stable*

Research conducted in this Stanford University study shows evidence that achievement gaps in math are lessened with process and problem-based curriculum and instruction. Data from two studies showed that middle school and high school teachers using PBL mathematics curriculum and instruction achieved a reduction in linguistic, ethnic, and class inequalities in their schools. The teaching and learning practices that teachers employed were central to the attainment of equality which indicates that efforts to close achievement gaps must go beyond curriculum and include teachers and their teaching practices.