

PBL in K-12: A survey of researchers and an emerging shared online resource

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Abstract

Recent growth in use of project based learning in K-12 raises questions that warrant expanded research efforts. This paper shares results of a survey conducted to assess how researchers are keeping up with PBL use in schools, what topics are being addressed, and to identify opportunities for collaborative investigation. Results are based on unique features of PBL identified by participants, as well as common features and concerns. This paper also discusses efforts to create an interactive Google Site designed to serve as a shared resource that enables people to update or contribute to this work in the future.

Objectives or purposes

The purpose of our survey was to assess how researchers are keeping up with PBL use in K-12, what topics are being addressed, and to identify opportunities for collaboration or synergy among K-12 PBL researchers. Project based learning (PBL) has become a prevalent instructional innovation within the progressive K-12 reform movement, particularly among reform networks and smaller high school initiatives (American Institutes for Research & SRI International, 2004, p. 65). In recent years, schools, districts, and even states have been experimenting with substantial PBL initiatives (West Virginia Department of Education, 2013; Williamson, 2008). In Indiana, over 1000 teachers have received professional development (Gillenwaters, 2009; Staff Reports, 2011; University of Indianapolis, 2010; Indiana University School of Education-Indianapolis, 2010; 2012). Moreover, the UTEACH program, a nationally prominent pre-service STEM program has a full course about project-based instruction (Petrosino, 2012) and there is also significant interest in PBL outside the US (Problem Based Education SIG, 2012; Republic Polytechnic, 2007). The growth in PBL raises questions that warrant expanded research efforts. Educators, policymakers, and school community members may benefit from studies that provide information about such topics as effective classroom practices, leadership and school culture that supports PBL, professional development, as well as student achievement and engagement.

PBL research efforts could be bolstered by a cohesive research agenda and a collaborative approach to overcoming methodological dilemmas. As an initial step toward connecting PBL researchers to this end, we developed and deployed an online survey to identify who is conducting PBL research, what their research interests are, and how they might wish to proceed in a joint research effort. We are currently seeking funding to convene interested parties in an opportunity to review and discuss the survey results as well as the final paper. Additionally, we have developed a Google Site to share the results of this survey and to enable people to update or contribute their own work and perspectives. There is a shared discussion board and spreadsheet of participants and resources, as well as shared documents that can be used virtually or to enhance face-to-face meetings.

Perspective(s) or theoretical framework

A major emphasis of PBL research has been problem-based learning as applied in medical, industry and higher education settings, but there is growing awareness of use in K-12 settings (Walker & Leary, 2009). To some extent research on PBL in K-12 may be hampered by lack of investment compared to what is often available for research in higher education and industry. What limited funding is available often goes into development and delivery of resources, not research per se. It is important to increase awareness of valuable research on PBL in K-12, and how research can better inform practices and policies. Providing scaffolds for collaboration and bringing researchers together, in person and online, may help to promote knowledge and models for advancing practices and

policies, adding value and helping the field to avoid implementation and research pitfalls.

PBL in K-12 settings can vary by grade, subject and teacher, but it is understood to be learner-centered, constructivist-based instructional approach that is designed to support deeper, more engaged learning. This approach uses “projects” as vehicles to encourage student motivation contextualize content and concepts, and to provide a means for exhibiting and explaining what students have learned. Although there are subtle differences, PBL has much in common with problem-based or inquiry-based instruction (Barron & Darling-Hammond, 2008; Savery, 2006). All of these approaches attempt to promote academic rigor while promoting “soft skills” such as critical thinking, communication and collaboration (e.g., Trilling & Hood, 1999). They often encourage students to be responsible and resourceful for their own learning, to solve open-ended problems, and usually to create and present artifacts (e.g., as analyzed by Mitchell, et al., 2005) as demonstrations of their learning.

Methods, techniques, or modes of inquiry

In the spring of 2012 the authors wrote and distributed the PBL in K-12 Research Survey (Ravitz & English, 2012) via SurveyMonkey. This method allowed us to gather information from distant individuals with minimal disruption and to follow-up when needed. We searched Google Scholar (scholar.google.com), Google (google.com) and our personal files and communications for researchers known to be working on various aspects of PBL. This included people who had published about PBL related to leadership, whole school reform, performance assessment, technology integration, collaborative learning and teacher professional development. We included academics, research-oriented school leaders, evaluation consultants, and informal learning researchers (e.g., Kanter, 2012), as well as a small group of international scholars. We started with a list of 35 known researchers and asked them to complete a survey in which they would confirm their interest in PBL in K-12, provide information about their work, and recommend others. This eventually led to 81 people in total who were asked to complete the survey.

Data sources

We were able to obtain 58 responses (a 72% response rate) from across 19 states and 5 countries outside the US. Of these, 48 confirmed they are conducting PBL-related research and are interested in participating in or contributing to a collaborative effort in some way Respondents expressed interest in working on topics across a wide range of subjects and grade levels--7 in all subjects and grades (including pre-service); 7 in secondary all subjects; 5 in math in all grades, 12 focused on science in various grades, 6 on secondary social studies; 3 STEM across grades, and 2 elementary, self-contained. A majority of these were at university institutions, but some worked for non-profits, charter management organizations, or museums. Although we were disappointed with some who did not respond, this sample was considered fairly representative of the PBL in K-12 research community. Appendix A provides a list of potentially interested participants who answered the survey or were recommended by others.

Results

Interest in specific issues

Researchers were asked to indicate their level of interest (on a 4-point scale) in 10 specific PBL issues, which included: pre-service and in-service professional development, designing, classroom management, teacher and student perceptions, accountability and other outcomes and technology integration. The average level of interest for all 10 issues was 3.2, indicating a high level of interest in all of these issues. Other interests identified by participants using open-ended responses included the design and use of PBL in informal environments, online professional teacher networks, cross-context research on PBL as a pedagogical culture, and the relationship between PBL and self-regulated learning. The study methods reported by participants included experimental, survey, qualitative and mixed methods.

Figure 1. Wordle of Unique Qualities of PBL



The above “Wordle” (Figure 1) is based on responses to an open-ended survey question asking participants to identify any unique qualities of PBL or terms that define PBL for them and distinguish it from approaches that may be used by others. These represent potentially important variations in PBL use that might be explored further.

Common features of PBL or concerns

Another open-ended question that proved to be fruitful asked respondents to describe common features of or concerns about PBL that might help unite research efforts. We analyzed these responses in order to identify major threads of interest. The specific threads identified include barriers to PBL use, clarifying what PBL is and how it works, identifying best practices to enable quality experiences, ensuring fidelity of implementation, student skills and benefits, and research concerns.

The thread with the greatest number of responses (27) was identifying PBL best practices. Some of the practices noted included:

- Generating of quality problems and projects
- Promoting meta-cognition, self-regulation and self-direction
- Creating authentic learning environments
- Improving outcomes for diverse learners
- Creating effective rubrics

The thread with the second highest number of responses (13) was centered on barriers to PBL use. Some of the barriers identified included:

- Addressing a standardized curriculum with PBL
- Developing teacher skills for implementing PBL
- Answering teacher concerns (classroom time, planning time, ability of students to self-regulate)
- Integrating PBL within a culture of high-stakes testing and accountability
- Identifying school conditions that support learner-centered approaches

The third most commonly cited thread (11) was clarifying what PBL is and how it works. Example issues in this category included:

- Developing a common definition or definitions of PBL
- Describing how to develop driving questions to envelop curriculum standards
- Developing models that enable us to represent teaching and learning processes
- Dispelling the myth that PBL is “fluff”

The fourth greatest number of responses (6) related to student skills and benefits. Sample concerns included:

- Measuring student efficacy and habits of mind developed through PBL
- Clarifying the relationship between PBL and self-regulated learning or self-directed learning
- Identifying ways students can benefit from real-world connections and collaboration
- Demonstrating that there can be transfer of problem-solving skills

- Leveraging intrinsic interest and real-world contexts
- Determining whether (or how) PBL can work equally well for all students

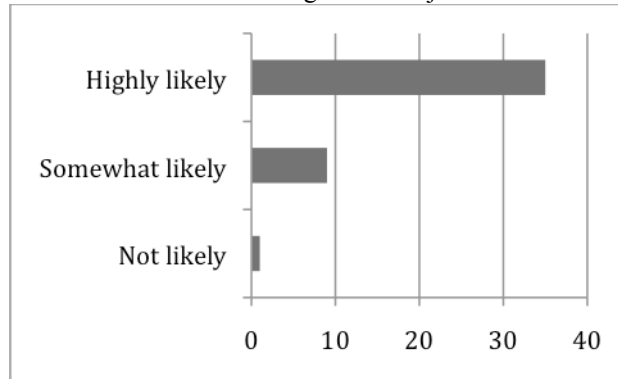
Other threads related to measurement concerns, such as measuring student outcomes beyond test scores, measuring the quality of implementation and measuring fidelity to the intended curriculum were also noted.

Interest in collaborating

The survey asked participants to indicate their level of interest (on a 4-point scale) in seven types of interactions -- including joint research projects, seeing work of others, sharing work, posting work in online forum, ongoing dialogue, live chats, and publishing opportunities. The average level of interest for all types of participation was 3.2, indicating a high level of interest in all types of participation.

There was enthusiasm for sharing knowledge and finding opportunities to share knowledge and collaborate. A substantial proportion (40%) said it was “highly likely” local colleagues would benefit from a regional convening on PBL, while (47%) said it was somewhat likely and very few (12%) said it was not likely. Concerning a one-day national meeting (Figure 2), a substantial majority (67%) said it was “highly likely” they would attend such a conference on PBL in K-12, if funding was available to cover costs and it was linked to a national conference they were already attending.

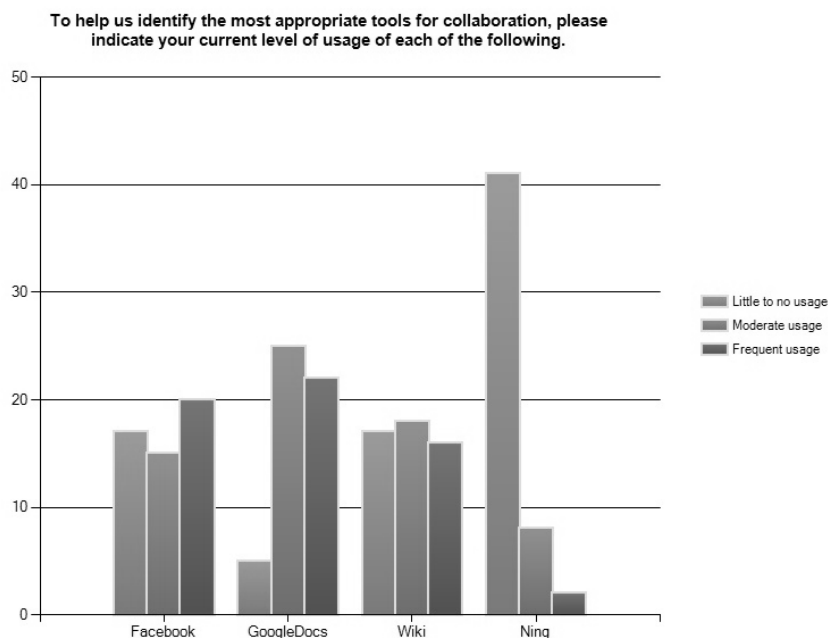
Figure 2. Participation likelihood for all day meeting, if funded and coinciding with a major conference



Tools for collaboration

We asked about online collaborative environments that might be used to support collaboration among PBL in K-12 researchers. As shown in Figure 3, of the four options we offered in the survey GoogleDocs had an apparent edge in number of users, while Ning was at a decided disadvantage. Facebook appeared to have a slight edge in use on Wiki. There were also a large number of alternative technologies listed as an open-ended response by participants. These included EdModo, Skype, DropBox, Moodle, and others.

Figure 3. Use of collaboration tools



As a result of these data, we created a Google Site (Ravitz & English, 2013). This is linked to a group discussion board (PBLinK12research), and the group email address is used to share files or links, so that anyone with a Gmail account who is added to the group is automatically able to access shared documents and spreadsheets of participants and resources. We have not yet determined the best way to provide access to those without Gmail.

As of now, access to the Google Site is limited to current participants. We are working on guidelines for participation and for adding new members. The plan is to add new researchers in waves, as we work to clarify our policies, especially how much of the information and discussion should be made public. To nominate yourself or a colleague for inclusion in the future, please contact the authors, or a colleague who identifies themselves to you as a participant.

Scientific or scholarly significance of the study or work

One significant result is that best practices emerged as the most frequent topic of discussion. Another of the four major threads that emerged was defining PBL. This may indicate that, in some cases, creation of the PBL model is still a primary concern, rather than what it takes to implement that model or its impact on students. We anticipate there can be productive discussion of best practices regarding specific components of PBL that are worthy of discussion (e.g., creating rubrics to assess specific outcomes), even while people may disagree or be agnostic about whether these or other specific components are critical to the definition of PBL.

Two other major issues that emerged were barriers to implementation and impacts on students. These may represent a natural evolution of questions being asked, perhaps mirroring stages of concern research (Hall, 1979) for individuals. That is, until one has defined PBL and its practices it may be difficult or premature to conduct studies focused on implementation concerns (e.g., Ertmer & Simons, 2006; Pedersen & Liu, 2003) or student impacts (e.g., Grant, 2011; Peck, Peck, Sentz & Zasa, 1998; Vega, 2012; Vlereborne, 2010). On the other hand, it may be impossible to ignore questions about implementation and impacts even while one is defining and designing what one hopes will be effective and useable practices.

In conclusion, the breadth and depth of perspectives offered in the survey responses we received provide opportunities to investigate theoretical and scholarly issues related to the above discussion and within each of the identified topic areas. In the future we hope to use the results of the survey and the Google Site to promote conversations among researchers who share interests on the above topics, or topics like teacher preparation, school leadership, use of technology, assessment and international implementation of PBL. As we work to build out the online web site we hope that we can begin to collect examples of research and recommendations for research in each of the above areas.

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Appendix A: Geographic list of PBL in K-12 researchers

State/Region	#	Institutional Counts (* indicates interest in hosting local meetings)
Indiana	30	Purdue (10) * University of Indianapolis-CELL (12) * Indiana University-Bloomington (4) * Indiana University-Purdue University Indianapolis (4) Indiana University-Purdue-Columbus (1)
Israel	10	Weizmann Institute of Science (3) * Technion (2) Institute for Democratic Education (2) Tel Aviv University (2) Bar Ilan University (1)
California	7	New Tech Network (2) Independent Consultant (1) Mills College (1) San Jose State University (1) SRI International (1) Buck Institute for Education (1) *
Other International	5	Scotland - University of Edinburgh (2) Germany - Ruhr University Bochum (1) Cyprus - CARDET - University of Nicosia (1) Canada - University of Toronto/OISE (1)
Minnesota	2	Hamline University (1) Minnesota State University-Mankato (1)
New Hampshire	2	University of New Hampshire (2)
North Carolina	2	North Carolina State University (2)
New York	2	New York Hall of Science Teachers College-Columbia University
Texas	2	New Tech Network (1) University of Texas at Austin (1)
Virginia	2	George Mason University (2)
Alabama	1	Auburn University
Colorado	1	University of Colorado-Boulder
Iowa	1	Iowa State University
Michigan	1	University of Michigan
New Jersey	1	Rutgers University
New Mexico	1	University of New Mexico
New York	2	New York Hall of Science Teachers College-Columbia University
North Dakota	1	University of North Dakota
Tennessee	1	University of Memphis
Utah	1	Utah State University
Washington	1	University of Washington

Note. List represents survey respondents and people they said they could identify at the time of the survey