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The Interdisciplinary Journal of Problem-based Learning

Recognizing Our Accomplishments, Saying Thank You, and Looking Ahead for *IJPBL* and the Field

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It is bittersweet to end my tenure as editor at *IJPBL*. It has been a distinct pleasure to work with *IJPBL* editors, board members, reviewers, and our publisher over the past twelve years. First, I began as a reviewer. Then, I moved into the co-editor position under the mentorship of Peg Ertmer (Purdue University). This was a tremendous learning opportunity for me. I was able to leverage my experiences in printing and publishing along with my experiences with project-based and problem-based learning. Under Peg's leadership, we worked to establish consistency, vision, health, and growth with *IJPBL*.

In 2010, I moved into the Editor position with Krista Glazewski (Indiana University) as co-editor. During this tenure, we have expanded the journal. Using feedback from an initial application for an impact factor along with our publisher and our editorial boards' guidance, we attempted to publish more content more consistently. During this time, we made a concerted effort to establish firmly the "Voices From the Field" section of *IJPBL* with a specific emphasis on implementations and practitioners. In addition, we have had more consistency with our "Book Reviews" section under the editorships of Suha Tamim (University of South Carolina) and Andrew Tawfik (University of Memphis).

With Krista Glazewski's leadership, *IJPBL* has also experimented with edited texts. We have explored how to transition our special issues within the journal into expanded texts that further the journal's work, mission, and authors' expertise. For example, in 2013, we published a special issue honoring the work and legacy of Howard Barrows, guest edited by Cindy Hmelo-Silver, Andrew Walker, and Heather Leary (see https://docs.lib.purdue.edu/ijpbl/vol7/iss1/). This special issue was successfully adapted into *Essential Readings in Problem-Based Learning: Exploring and Extending the Legacy of Howard S. Barrows.* Again in 2014, we published a special issue on technology-supported problem-based learning in teacher education edited by Thomas Brush and John Saye (see https://docs.lib.purdue.edu/ijpbl/vol8/iss1/). This special issue was also effectively adapted into the *Successfully Implementing Problem-Based Learning in Classrooms: Research in K–12 and Teacher Education* text.

We have stayed true to our mission of providing high quality and rigorous publications with the use of inquiry pedagogies. As an open access journal, we continue to boast high downloads around 80,000 per year. We also report downloads and use from around the world with heavy use outside the United States in Asia and Europe. Most recently, we have applied again to Clarivate Analytics (previously Thomson ISI) for inclusion in their index with the calculation of an impact factor. As an international publication, we recognize that impact factor is an important metric, particularly for emerging and established scholars in Europe.

We have accomplished much together with a competitive acceptance rate, significant yearly downloads, and high-quality articles. *IJPBL*'s numbers of articles in each issue have blossomed; our editorial board consistently represents noted international scholars; our special issues are consistent and poignant; we have begun a stream of revenue through book projects; and we have built partnerships with international organizations, such as the AERA PBE SIG, the PBL conference in Zurich, and the recent PanPBL conference in Santa Clara, CA. I continue to hear that *IJPBL* is a stand-out for online journals and a model for "how to do it."

Looking Ahead

As I complete my tenure at *IJPBL*, I would like to offer some direction to the field. As Glazewski and I wrote (Grant & Glazewski, 2017), three specific areas of PBL and inquiry research are needed to further investigate and explore in order to strengthen the body of PBL and inquiry research and fill voids in both reporting implementations and research findings. We suggested the field needed (1) stronger depictions of problem-based learning (PBL), project-based learning (PjBL), and inquiry implementations; (2) to offer more attention to the purposes of scaffolds and how they are implemented and faded; and (3) fewer implementations of PBL and

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inquiry in isolation and more reports of longitudinal benefits. While we addressed these within K–12 and teacher education, they are not necessarily exclusive to these contexts.

To further these recommendations, I would like to consider in more depth two topics that focus on stronger depictions of PBL, PjBL, and inquiry implementations. First, reports of research (and often the manuscripts submitted to *IJPBL*) do not provide enough detail to identify the active ingredients (Clark, 1983; Herrington, Reeves, & Oliver, 2010) that are part of the implementation or learning environment. Again, Glazewski and I (Grant & Glazewski, 2017) proposed a number of components researchers should consider and describe as part of an implementation. In Figure 1, we presented 12 continua on which variations of implementations can occur and may impact the active ingredients as part of the inquiry-based learning environment. While this list is not intended to be exhaustive, it is meant to provide a structure for which researchers and authors should consider when describing their implementations. These variations should help identify the unique and specific characteristics of the learning environment and provide stronger depictions.

A second topic that is needed for stronger depictions of PBL, PjBL, and inquiry implementations is full descriptions of the learning cycle and the goal/outcome of the process. Though similar in the investigative process, PBL and PjBL often differ in the product. PBL focuses on finding solution(s) to a problem while PjBL goes further toward the construction of shareable artifacts. Again, the variations in implementations with PBL, PjBL, and inquiry need full descriptions in order for readers and researchers to determine their utility and transferability.

PBL

Barrows (as cited in Hmelo-Silver & Barrows, 2006) defined PBL as "an active learning method based on the use of ill-structured problems as stimulus for learning" (p. 24). In PBL, the learning cycle is indeed cyclical. It has been labeled as a problem-solving cycle (Gijselaers, 1996), a learning cycle (Hmelo-Silver, 2004), or more recently, a tutorial cycle (Lu, Bridges, & Hmelo-Silver, 2014). The tutorial cycle specifies eight steps for students to accomplish: (1) get presented with a problem scenario; (2) identify relevant facts; (3) generate a hypothesis; (4) identify knowledge gaps, also referred to as learning issues, representing what they know and what they need to know in order to solve the problem; (5) engage in self-directed learning; (6) apply new knowledge to the problem until they resolve it; (7) evaluate solutions; (8) reflect on the knowledge gained and the solutions presented (Hmelo-Silver, 2004; Hung, Jonassen, & Liu, 2008; Lu et al., 2014).

In reports of PBL research, full descriptions of the learning cycle are needed. In addition to the learner's steps, additional information is needed about (a) the ill-structured problem, including authenticity, multiple domains integrated, and scope of solutions; (b) how scaffolding, coaching, and/or modeling is conducted with resources (e.g., learning grid), teacher/faculty, facilitator, or tutors; and (c) the extent to which collaborations occurred (if any), such as through self-directed teams and team sharing (Barrows, 2006; Hmelo-Silver & Barrows, 2006; Hung et al., 2008; Lu et al., 2014).

PjBL

In PjBL, there is not a specified cycle of learning that is iterative. Instead, there is a process where embedded components lead to the production of a public, shareable learning artifact (Blumenfeld et al., 1991). Different models of PjBL identify procedures of scientific practice (Blumenfeld et al., 1991; Krajcik & Blumenfeld, 2006; Krajcik & Shin, 2014), sustained inquiry (Larmer, Mergendoller, & Boss, 2015; Larmer, Ross, & Mergendoller, 2009), or investigation (Grant, 2002, 2011) as the process to produce the learning artifact. During this process, the embedded components include (a) a driving question, (b) learning goals, (c) collaborations, (d) reflections (Grant, 2011; Krajcik & Shin, 2014; Larmer et al., 2015), (e) resources, (f) scaffolding (Grant, 2011), (g) learner choices, (h) authenticity (Larmer et al., 2015), and (i) technology tools (Krajcik & Shin, 2014).

While the PjBL process may not be iterative, the learning process cycle should be described in detail. The process for the investigation needs a full description along with the various components that were implemented within the PjBL project. In particular, (a) the role of the teacher, scaffolding, and fading, (i.e., hard and soft scaffolds; Saye & Brush, 2017), or transfer of responsibility (Belland, 2011); (b) collaborations, peer reviews, or debriefs (Grant, 2002, 2011); and (c) learner choices and autonomy (Grant, 2011; Larmer et al., 2015) should be described.

Inquiry

Inquiry appears to be the broadest as a pedagogy; there is no agreed upon definition for inquiry across the education literature. Definitions are contextual, based upon discipline (e.g., science education) and contexts (e.g., higher education, K–12). However, like PBL and PjBL, inquiry is generally considered a student-centered approach that affords the learner some choice in the content, path of learning, or process of an investigation (Saunders-Stewart, Gyles, & Shore, 2012). In K–12 education, science education researchers define the largest body of knowledge and recommendations for inquiry. In particular, science educators ascribe inquiry to reflect the work of scientists and scientific investigations.

Banchi and Bell (2008) define four types of inquiry that span the continuum of teacher-centered to student-

Figure 1. Components of variations in PBL, PjBL, and inquiry implementations. Reprinted with permission of the authors.

centered pedagogies. The first two levels, confirmation inquiry and structured inquiry, are teacher directed. In both levels, the teacher determines both topic or question and method for investigation. The second two levels, guided inquiry and open inquiry, most closely reflect the characteristics of pedagogies similar to PBL and PjBL. In guided inquiry, the teacher may choose or limit the topic while the learner must determine the path of investigation (Banchi & Bell, 2008; Martin-Hansen, 2002). In open, or full, inquiry the learner is allowed to choose the topic or driving question and the path or process of investigation.

Again, full descriptions of inquiry should address at what level the inquiry was conducted with how much learner choice involved. Also, the roles of the learner and the roles of the teacher should be described with regard to coaching, modeling, scaffolding, fading, and managing individuals and groups (Grant & Hill, 2006).

Conclusion

By encouraging deeper descriptions of implementations in *IJPBL*, I hope we can adequately identify the essential elements that are part of the implementation or learning environment. This would then lead to a more robust body of research to support these pedagogies. Proponents of PBL and its associated pedagogies must provide the corpus of support through rigorous research and implementations. The value, effectiveness, and efficiency of PBL and other learner-centered pedagogies have been questioned (Kirschner, Sweller, & Clark, 2006). With deeper description of the active ingredients (Clark, 1983; Herrington, Reeves, & Oliver, 2010) in our learning environments, we can provide the evidence to support these strategies beyond one-off, isolated implementations.

Thank you for allowing me to lead a small part of this charge.