RESEARCH BRIEF

Brought to you by McGill's NEXTschool Research Team

Project Based Learning

PROJECT BASED LEARNING (PjBL)

Stephanie Bell (2010), an experienced teacher makes the point "have you ever heard a child beg to do work? In a project-based learning classroom, it is routine!" (p. 39). But what is project-based learning (PjBL)? What is the role of the teacher? What are the tenets of PjBL? and how can it be successfully implemented in a classroom? This brief is an attempt to synthesize answers to these questions.

PjBL BACKGROUND

PjBL has evolved, at its core, from both experiential learning which is based on Dewey's philosophy of learning by doing, integrating the subject areas[1], and Vygotsky's conception that the most effective learning environment offers learners the opportunity to explore personal interests while negotiating meaning from others.[2]

PjBL, "to allow[s] students to learn by doing and applying ideas ... It is based on the constructivist finding that students gain a deeper understanding of material when they actively construct their understanding by working with and using ideas."[3]

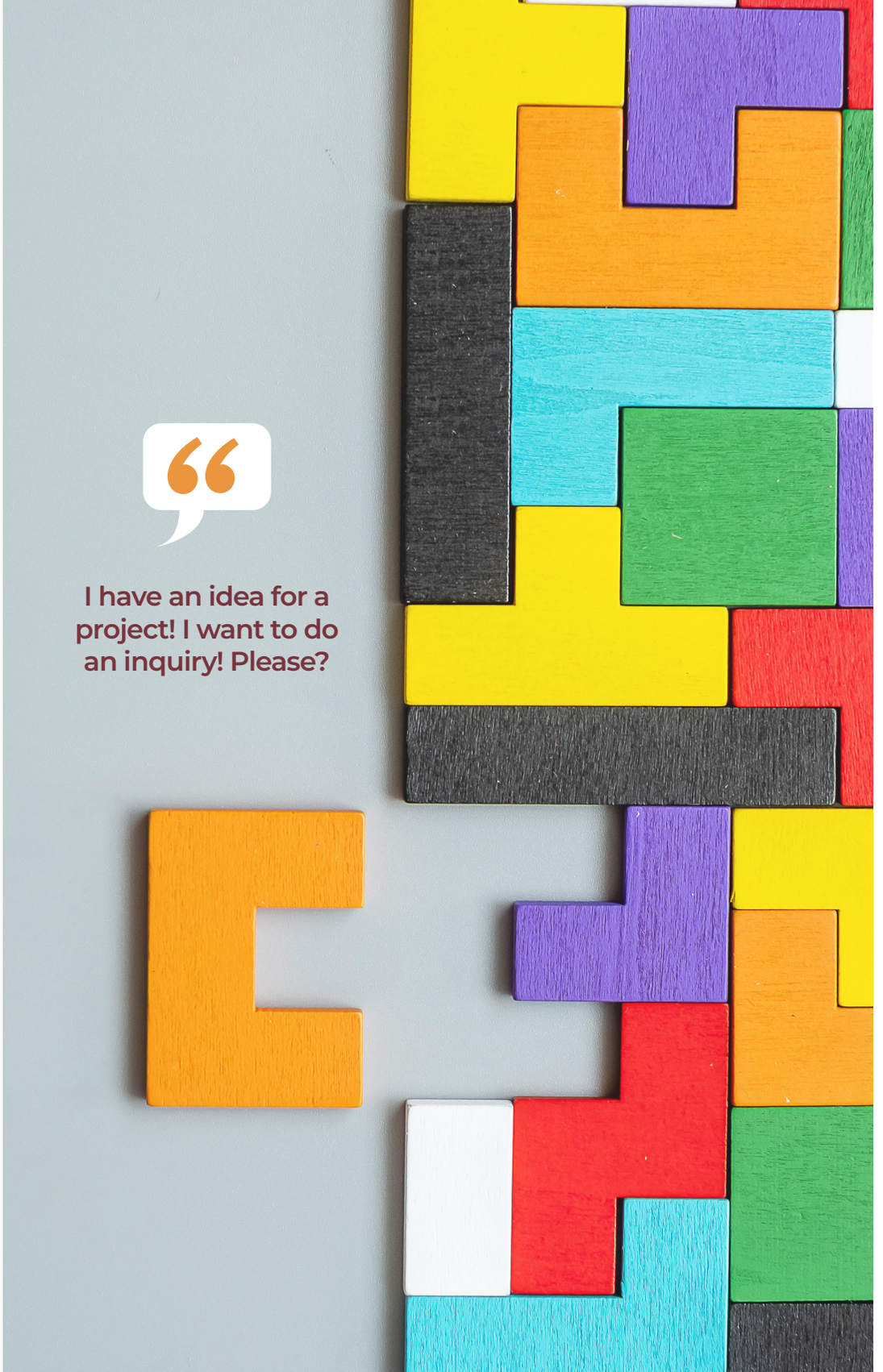
PjBL is a teacher-facilitated approach to learning which is student-driven.[4] The research problem must capture students' interest and be within their cognitive and material resource capability to interrogate and solve. PjBL places "the problem" at the center of the research project and advise that: The heart of the project is a problem to investigate and solve, or a question to explore and answer[5]

PjBL is a form student-centered learning and as such, PjBL shares some connections with other pedagogical approach such as problem-based learning[6]; experiential learning[7]; collaborative learning[8]; project-based science[9]; disciplined inquiry[10]; open-ended learning environments[11]; and student-centered learning environments.[12]

Common to all these pedagogies, and particularly PjBL, are the following tenets promoting and fostering: (1) individual interests; (2) interactions with peers; (3) expert knowledge; (4) resources; and (5) technologies (Grant & Branch, 2005). Where PjBL distinguishes itself from other student-centered approaches is by requiring a culminating activity in the form of a final product, sometimes referred to as an artifact.[13]

The Buck Institute for Education's "Gold Standard of Project-based Learning" model provides seven principles to be followed by teachers and learners: identifying a challenging problem which is real; sustained inquiry into the problem identified; reflection on the authenticity of the problem; student voice and choice during data collection; analyzing and reflecting on the data collected; critiquing and revising research findings; and disseminating the research findings as a final product inside and outside the school.[14]

1 Dewey, 1986
2 Vygotsky, 1978; 2012
3 Krajcik & Blumenfeld, 2010, pp. 317-8
4 Chimbi & Jita, 2021
5 Larmer, Mergendoller, & Boss, 2015
6 Helle, Tynjälä, & Olkinuora, 2006
7 Kokotsaki, Menzies &Wiggins, 2016
8 Kokotsaki, et al., 2016
9 Blumenfeld et al., 1991; Krajcik, Blumenfeld, Marx, & Soloway, 1997
10 Levstik & Barton, 2015
11 Hannafin, Hall, Land, & Hill, 1994; Hannafin, Land, & Oliver, 1999
12 Land & Hannafin, 2000
13 Blumenfeld et al., 1991; Kokotsaky et al., 2006
14 Buck Institute for Education, 2015, p.1



WHAT IS PjBL?

PjBL is central to the curriculum, not peripheral nor is it a supplementary activity for learning[15]

Project-based learning (PjBL) is a student-centered and student-driven mode of exploration where the role of the teacher is to facilitate and support active student initiative. PjBL is a constructivist pedagogy based on three general premises, learning is: context-specific; active; and collaborative.[16] Additionally, PjBL requires students to generate questions based on their own curiosity and interests, and subsequently pursue knowledge to answer their questions. If more than one student has the same interest, or if they intersect in meaningful ways, they may choose to form a team and collaborate on a project or on a portion of the exploration. One pathway to understand and potentially implement PjBL process proceeds as outlined below:

15 Bell, 2010
16 Cocco, 2006; Kokotsaki et al., 2006

PjBL STEP BY STEP

- STEP 1. Guided by curiosity, students are encouraged to ask questions.
- STEP 2. Students develop a guiding question for their inquiry.
- STEP 3. Students generate an organizational blueprint around their inquiry turning it into a project. The blueprint should include a calendar of the project with plans, drafts, timely benchmarks, a target audience, and the type of final product. (This blueprint is typically provided for the student. While it is not fixed, individual educators, departments or schools may have certain requirements, standards and benchmarks that need to be met.)
- STEP 4. Students begin their investigation.
- STEP 5. Students self-monitor their progress through journaling and goal setting, keeping detailed records of daily progress, success and failures, and any adjustments they make to their project blueprint.
- STEP 6. Students share their learning by presenting the final product with the target audience.
- STEP 7. Students complete a self-evaluation.

ROLE OF THE TEACHER

The most key component of PjBL is student autonomy and ownership of their project. As such, the teacher is primarily a facilitator, supporter, and coach. Steps 2-3 require teachers to be more directly involved to ensure the students have a solid and realistic blueprint upon which the rest of their project will be constructed. It is extremely important that teachers have an active role throughout the PjBL process, hosting conferences with students (think check-in check-out interactions), engaging with their students' reflections, probing, and guiding students in their research, and ensuring students are meeting their own benchmarks and deadlines, etc. PjBL's potential is based on the transdisciplinary learning it generates. Teachers' potential is expanded by allowing them to make use of their expertise (not limited to their subject areas). Another role of the teacher is to locate and connect groups of experts from the community to the needs of the students and their projects.

When teachers adopt the PjBL approach, they sometimes face the problem of transitioning from knowledge providers to facilitators of learning[17].

In a case study in the USA teachers complained that PjBL was time wasting, too demanding, and did not allow them to prepare learners for examinations[18].

17 Savery, 2006
18 Culclasure et al., 2019

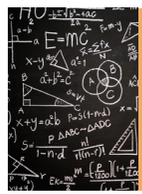
KEY TAKEAWAYS

As a pedagogy, PjBL affords students the opportunity to pursue personal interests; develop agency; practice collaborative skills (with peers, teachers, and experts); and increase technological literacy in a student-centered environment. Thus, offering a strong alternative to teacher-centered instruction[19]. Additionally, PjBL facilitates the development of 21st century skills in students[20]. Several studies have looked at high school students' learning and understanding in PjBL environments. In all cases, the authors caution that many other factors beyond PjBL can be contributing to the results; nonetheless we selected three studies:

19 Grant and Branch, 2005
20 Bell, 2010

Students in an environmental science PjBL classroom showed enhanced environmental knowledge and attitudes towards science (Al-Balushi and Al-Aamri, 2014).

In a multi-media PjBL history classroom, students demonstrated gains in historical thinking skill, knowledge, and positive effects (Hernández-Ramos & De La Paz, 2009).



In a two-year study, students developed conceptual understandings of mathematics rather than procedural, and outperformed peers learning in traditional environments on General Certificate of Secondary Education standard examinations (Boaler, 1998).

IMPLEMENTATION

Here, we synthesized some of the challenges and considerations in successfully implementing a PBL environment:[21]

1. Student support: students with mainly didactic learning experiences might not have developed the skills to engage with the open learning environment of PjBL yet. Teachers must recognize their students lack preparedness and support them in the process.[22]
2. Teacher support: regular network and professional development & support from the school administration.
3. Balancing didactic instruction with an independent inquiry method to develop the fundamental skills required to engage in independent projects.
4. Assessment emphasis on authentic assessments, reflection, self, and peer evaluation: 21st Century skills development through PjBL are not measurable by standardized testing.[23]
5. Model effective group work.
6. Respect student choice and autonomy.

21 Kokotsaki et al. (2006):
22 Hill & Hannafin, 2001
23 Bell, 2010

The outcome of PjBL is greater understanding of a topic, deeper learning, higher-level reading, and increased motivation to learn. PjBL is a key strategy for creating independent thinkers and learners. Children solve real-world problems by designing their own inquiries, planning their learning, organizing their research, and implementing a multitude of learning strategies. Students flourish under this child driven, motivating approach to learning and gain valuable skills that will build a strong foundation for their future in our global econonomy".[24]

24 (Bell, 2010, p. 39

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