

PBL BRIEF #7



WPI

PBL & High-Impact Practices in the Transition to College

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Briefer Brief

- Three high-impact practices (Kuh, 2008) – first year seminars and experiences, learning communities, and writing-intensive courses – are often implemented as part of strategic plans to engage and support students in the transition to college.
- PBL can be used to enhance the implementation of high-impact practices by increasing student choice and offering authentic learning opportunities (Zilvinskis, 2019; Yorio & Ye, 2012; Sommo, Mayer, Rudd, & Cullinan, 2012; Weiss, et al., 2015).
- Some first-year seminars explicitly teach students the skills needed to succeed in PBL and related student-centered, experiential pedagogies (Bakermans & Plotke, 2018). A 2017 national survey found that 22% of colleges and universities teach students project planning, teamwork, or management skills in first-year seminars (Young, 2018).
- Grounding PBL in students' lived realities allows learning communities to foster meaningful connection, rather than serving as merely another mandated requirement for graduation (Ball, 2016).
- There is less empirical exploration of the impact of PBL in writing-intensive courses.

Introduction

This brief outlines and critiques the evidence supporting the use of PBL in three high-impact practices commonly used to support the transition to college: first-year seminars and experiences, learning communities, and writing-intensive courses. Learning communities and writing-intensive courses can and do support students beyond their first year of college; however, they are often intentionally chosen as part of institutional strategic plans to better support first-year students. The transition from high school to college can be a vulnerable time for students; research has demonstrated the importance of supporting students during this time, both within and beyond the classroom.¹

These three high-impact practices have been empirically demonstrated to engage students and amplify learning.² First-year seminars and experiences and learning communities in the first year have been demonstrated to increase student satisfaction³ and to improve retention.⁴ Writing-intensive courses can be particularly impactful for students when offered early in their college careers, as these experiences can shape how students engage in writing to learn in subsequent coursework.⁵ However, it is important to note that the quality of implementation has been found to be critical to the impact of high-impact practices.⁶ PBL can be one strategy used to attend to the quality of learning experiences provided to students in all three of these high-impact practices.

This brief begins by synthesizing the empirical literature supporting the impact of each of these three high-impact practices for the transition to college. Within this synthesis, the trends in research are surfaced and the weaknesses in what we know are described. The brief concludes with recommendations for future scholarship and suggestions for further reading.

First-Year Seminars and Experiences

First-year seminars and experiences serve as a bridge between the expectations, goals, and skills necessary for success in secondary and postsecondary education. They are also a means of promoting peer support groups for students. First-year seminars and experiences are the high-impact practice most explicitly centered on serving first-year students. They are also one of the most prevalent: 74% of 537 institutions of higher education that responded to a survey in 2017 use first-year seminars to support student transitions to college.⁷

According to a national survey, the most frequent objectives of first-year seminars include academic success strategies (80% of responding institutions), academic planning or major exploration (76%), knowledge of institution or campus resources (76%), connection with the institution or campus (75%), and introduction to college-level academic expectations (70%).⁸ First-year seminars have shifted away from the extended orientation model and, increasingly, colleges and universities have adopted academic-rich models that are either uniform across campus or that allow students to choose among a set of thematic topics.⁹

Many studies have been conducted to assess the effectiveness of first-year seminars. In a meta-analysis of 284 independent samples, Permzadian and Credé (2016) found almost no average effect of participating in a first-year seminar on first-year GPA and only a small effect on 1-year retention rate. However, their analyses found significant moderators on both effects, which suggests there is a wide variety of ways that first-year seminars are designed—and those design features matter. First-year seminars were significantly more likely to have a positive impact on first-year GPA when they included some academic content (rather than extended orientation seminars), were taught

by faculty or professional staff (rather than by peers), were taught by instructors with seminar-specific training, and were shorter in duration. First-year seminars had a greater impact on 1-year retention rates when they provided an extended orientation (rather than only including academic content), were taught by faculty or professional staff (rather than peer instructors), and targeted all incoming first-year students (rather than serving only academically underprepared students).

First-year seminars can be taught without PBL, relying on more traditional pedagogies. However, there are many benefits of using student-centered, experiential pedagogies in such courses.¹⁰ PBL increases engagement among first generation college students,¹¹ improves retention,¹² and can assist students in understanding how degrees are related to career pathways.¹³ Embedding PBL within first-year seminars can serve departments and colleges by setting students up for success as they advance through subsequent coursework.¹⁴ Some first-year seminars explicitly teach students the skills needed to succeed in PBL and related student-centered, experiential pedagogies.¹⁵ A 2017 national survey found that 22% of colleges and universities teach students project planning, teamwork, or management skills in first-year seminars.¹⁶

For colleges and universities that encourage PBL and similar pedagogies in more advanced courses, helping students transition from teacher-centered learning in secondary education to student-centered learning can reduce student resistance to accountability that might otherwise seem unfamiliar and unfair.¹⁷ First-year seminars that serve as foundational courses for engineering degrees can also use team-based PBL to meet ABET accreditation benchmarks for student learning outcomes.¹⁸

Table 1. Case Studies of PBL in First Year Seminars

Seminar Type	Focus and Description	Case Studies Using PBL
Extended orientation seminars	Explicitly focused on helping students transition to college by introducing the purpose of higher education and teaching students how to navigate college success. Topics may include learning about campus resources, study skills, academic and career planning, and strategies for health and wellness.	Veach, C. C. (2019). Breaking out to break through: re-imagining first-year orientations. <i>Reference Services Review</i> , 47(4), 556-569. Boss, K., Angell, K., & Tewell, E. (2015). The Amazing Library Race: tracking student engagement and learning comprehension in library orientations. <i>Journal of Information Literacy</i> , 9(1), 4-14.
Academic seminars with uniform content across courses	Focus is on the academic transition from norms in high school to the expectations in college. Topics may include skill-building in writing and critical thinking, often within the context of themes designed to be engaging for first-year students. All first-year students receive the same course content.	Bleicher, E. (2020). Teaching Critical University Studies: A First-Year Seminar to Cultivate Intentional Learners. <i>Honors in Practice – Online Archive</i> , University of Nebraska – Lincoln.
Academic seminars with variable content across courses	Focus is on the academic transition from norms in high school to the expectations in college. Topics may include skill-building in writing and critical thinking, though themes are more likely to be related to a particular discipline or profession. First-year students have a choice over different course topics.	Wobbe, K. K., & Stoddard, E. A. (2019). <i>Project-based learning in the first year: Beyond all expectations</i> . Stylus Publishing.
Pre-professional or discipline-linked seminars	Explicitly focused on preparing students with foundations for particular professions or disciplines. May be required for a degree program even if first-year seminars are not required of all students university-wide.	Sundaram, R. (2016, October). Engage and educate: Engineering laboratory activities for first-year engineering students. In <i>2016 IEEE Frontiers in Education Conference</i> (pp. 1-5). Vernaza, K. M. (2017). Developing team-work skills in a first-year seminar. Paper presented at ASEE Zone II Conference.
Basic study skills seminars	Explicitly focused on college-level skill development. Typically target underprepared students, sometimes as a condition for admission.	Hottell, D. L., Martinez-Aleman, A. M., & Rowan-Kenyon, H. T. (2014). Summer bridge program 2.0: Using social media to develop students' campus capital. <i>Change: The Magazine of Higher Learning</i> , 46(5), 34-38.

Note: Modified from “Helping first-year college students climb the academic ladder: Report of a national survey of freshman seminar programming in American higher education” by B. O. Barefoot (1992), dissertation, College of William and Mary; as used by the National Resource Center for the First-Year Experience and Students in Transition at the University of South Carolina

Learning Communities

Learning communities offer community-building to a cohort of students taking multiple linked classes together, often centered around a theme (e.g., STEM) or a stage of learning (e.g., First Year Experience).¹⁹ In 2018, 15% of students at four-year institutions who responded to the NSSE survey reported participating in a learning community their first year of college.²⁰ Students who participate in learning communities that assign students to live together in thematic communities report studying and holding academic discussions with their peers, high-quality interactions with faculty members, and feelings of social support within their residence halls.²¹ Those who participate in learning communities earn higher GPAs and report greater learning gains than those who do not.²²

Learning communities are a fairly common high-impact practice. Almost half (47%) of the institutions surveyed in the 2017 National Survey on The First-Year Experience indicated that they offer a learning community specifically for first-year students.²³ This was more common at public institutions than private (not-for-profit) colleges and universities. In 2018, 22% of seniors at four-year institutions participating in the NSSE survey reported having participated in a learning community at some point in their college career.²⁴ Most of these experiences occur in the first year, as 15% of first-year students across multiple national surveys reported participating in learning communities.²⁵

Tinto (2019) argued that inquiry-based learning pedagogies, such as PBL, help students in learning communities learn how to balance responsibility for their own learning with responsibility for contributing to their peers' learning. Ball (2016) described using PBL to implement culturally

responsive curriculum within a learning community, drawing on student voice and authentic problems to engage students. As she asserts, these aspects of PBL enable faculty to use learning communities to ask students, "What problems do we need to solve and how might we do that?" (p. 5). Grounding PBL in students' lived realities allows learning communities to foster meaningful connection, rather than serving as merely another mandated requirement for graduation. Projects that connect student interests with broader themes can hook students into learning communities that link multiple courses together across disciplines.²⁶

However, it is important to recognize that not all the research on learning communities finds positive effects on students. For example, learning communities offer mixed results at community colleges. Using random assignment of almost 7,000 developmental education students at six community colleges, MDRC and the National Center for Postsecondary Research found only small effects on credits earned and no impact on student persistence.²⁷ However, longitudinal analyses of Kingsborough Community College found that students from their learning communities earned more credits over six years than those not in learning communities and were more likely to persist to degree. Kingsborough Community College's program was reported to have exceptionally high quality, which researchers posit may account for the differences in impact on students.

Table 2. Case Studies of PBL in Learning Communities

Type of Learning Community	Description	Case Studies Using PBL
Curricular learning communities	Students co-enroll in two or more courses, often from different disciplines and linked by a common theme	<p>Madden, M. E., Baxter, M., Beauchamp, H., Bouchard, K., Habermas, D., Huff, M., Ladd, B., Pearson, J. & Plague, G. (2013). Rethinking STEM education: An interdisciplinary STEAM curriculum. <i>Procedia Computer Science</i>, 20, 541-546.</p> <p>Evans, R., Friedman, J., McGrath, L., Myers, P., & Ruiz, A. (2018). Math Path: Encouraging Female Students in Mathematics Through Project-Based Learning. <i>PRIMUS</i>, 28(4), 287-299.</p>
Classroom learning communities	The classroom serves as a place for community-building through cooperative, team-based teaching and learning	Ball, C. L. (2016). Sparking passion: Engaging student voice through project-based learning in learning communities. <i>Learning Communities Research and Practice</i> , 4(1), 9.
Residential learning communities	Students co-enroll in common courses while also living together in designated on-campus residences; often co-curricular activities are organized.	Gipson, K., Nagel, J., Henriques, J., Barrella, E., McLeod, H., Holland, K., Padgett, S., & Wild, J. (2015). Development and Implementation of a First-year Engineering Experience. Paper presented at the 7th First Year Engineering Experience (FYEE) Conference, August 2-4, Blacksburg, VA.
Learning communities targeted to student groups	Specially designed for targeted student groups who may benefit from supports designed to engage them, such as academically underprepared students and students who are under-represented in STEM.	<p>Academically Underprepared Students: Butler, A., & Christofili, M. (2014). Project-based learning communities in developmental education: A case study of lessons learned. <i>Community College Journal of Research and Practice</i>, 38(7), 638-650.</p> <p>Weiss, M. J., Visher, M. G., & Wathington, H. (2010). Learning Communities for Students in Developmental Reading: An Impact Study at Hillsborough Community College. <i>National Center for Postsecondary Research</i>.</p> <p>Academically Talented/Honors Students: Cooke, T. J., Quimby, B. B., Horvath, N. F., Jardine, H. E., & Levin, D. M. (2016). Integrated Life Sciences (ILS): A new honors living-learning program at the University of Maryland. <i>HONORS in Higher Education (HHE)</i>, 1.</p> <p>Students Underrepresented in STEM: Whitfield, C. A., Freuler, R. J., Allam, Y., & Riter, E. A. (2011, August). An overview of highly successful first-year engineering cornerstone design projects. Paper presented at the International Conference on Engineering Education, August 21-26, Belfast, UK.</p>

Note: Modified from “The powerful potential of learning communities: Improving education for the future” by O. Lenning & L. Ebbers (1999), *ASHE-ERIC Higher Education Report*, 26(6).

Writing-Intensive Courses

Writing-intensive courses require students to produce and revise various forms of writing, with emphasis on the importance of meeting audience needs and discipline norms for communication to be effective.²⁸ A few forms of writing-intensive courses have been widely adopted in higher education. Writing across the curriculum involves courses that use student writing as an instructional tool, rather than relying on writing solely as a means of assessing knowledge acquisition and critical thinking and argumentation skills.²⁹

Writing in the disciplines offers courses that include multiple writing assignments that give students practice with the writing conventions of that particular discipline. For example, science courses might include lab journals and lab reports; business courses might include statements of value propositions and market research findings. The learning objectives of these writing assignments include learning how to communicate with colleagues and other audiences according to the norms of a particular field or potential career.³⁰ Both writing across the curriculum and writing in the disciplines offer a way of distributing the teaching of writing beyond limited composition and other English course offerings.

Promoting active learning is a foundational goal of the writing across the curriculum and writing in the disciplines movements.³¹ The majority of PBL projects include written components,³² which can be used in conjunction with the “writing to learn” imperative of writing across the curriculum and writing in the disciplines. Despite similar foundations in active learning, relatively little has been written about the intersection of writing-intensive courses and those that use PBL. Jacobson (2018) wrote an essay articulating the potential for alignment between PBL and writing-intensive courses, though he does not reference much by way of empirical support. Writing-intensive courses, broadly speaking, have received less empirical attention than their popularity in practice might warrant.

We do know that approximately two thirds of first-year students experience the kinds of writing assignments that are suitable to PBL activities. In 2018 the National Survey of Student Engagement included a set of questions on students’ writing experiences.³³ When asked how often writing assignments asked them to write in the style and

format of a specific field (engineering, history, psychology, etc.), 36% of first-year students reported that they did so for all or most writing assignments; another 29% reported this kind of writing for some writing assignments. Similarly, 33% of first-year students reported that all or most of their writing assignments addressed a real or imagined audience such as their classmates, a politician, or non-experts; another 32% reported this objective in some writing assignments. Using a large national dataset, Anderson and colleagues (2016) found that the quality of writing-intensive learning activities—including how interactive they are—matters more than the volume of writing students are required to do.

Conclusions And Further Reading

As Kuh and colleagues have argued,³⁴ high-impact practices can take multiple forms, depending on the students engaging in them, the faculty delivering them, and institutional priorities. As faculty and educational staff design supports and interventions for first year students, research suggests that considering how to maximize the return on investment in high-impact practices is time well spent. This research brief makes the case that PBL might be one of those design considerations.

Faculty at WPI have written about their use of PBL in the Great Problems Seminar—a series of team-taught interdisciplinary first-year seminars.³⁵ We found the use of PBL in the first year to be a powerful way to create community, develop confidence, and build a variety of academic and professional skills in and with first-year students. This requires the thoughtful and reflective efforts of a collaborative group of faculty sharing what worked and ideating about what might work better. A similar community of practice has much to offer institutions that want to deliver these same benefits to their students in transition.

PBL can also be used to enhance the quality of high-impact practices aimed at other aspects of college students’ development. Two research briefs in this series are organized to address the use of PBL according to postsecondary developmental phases—the next brief covers four high-impact practices that can leverage PBL to engage students in experiential learning; another brief then discusses how PBL can be used in three high-impact practices to structure how students demonstrate mastery.

Notes

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