

Students as Partners: Transforming Large Introductory Physics Through Collaborative Course Design

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Abstract

Partnership learning communities are grounded in collaborative, student-centered approaches that position students as active contributors rather than passive recipients of education. This project applied that philosophy to redesign an introductory physics course for approximately 1,000 engineering students by integrating perspectives from undergraduate and graduate students, faculty, educational developers, and instructors.

Guided by research on student-centered learning and inclusive teaching, the team examined how course structure, teaching practices, and assessment design could better support student learning and engagement. Students played an active role throughout the project, contributing to course design, data collection, analysis, and the development of learning resources. Their lived experiences helped align instructional practices with student needs and fostered a stronger sense of ownership and inclusion.

The project focused particularly on persistent challenges in introductory electromagnetism, including conceptual difficulty, low engagement, and inequitable student outcomes. Multiple forms of evidence were collected, including the Brief Electricity and Magnetism Assessment (BEMA), student surveys, and focus groups.

Findings showed improvements in conceptual understanding, participation, and student engagement. Beyond measurable outcomes, the partnership model also transformed relationships between students and instructors by promoting mutual respect, shared responsibility, and more inclusive classroom practices. The project demonstrates how collaborative course design can support both student success and a more supportive learning environment in large introductory STEM courses.

Keywords: Student–faculty Partnerships; Curriculum Development; Student Engagement; Physics Education Research; Large-enrollment Courses.