

Expanding Accessibility of Learning through Blended Synchronous Instruction of F2F and Remote Students

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Introduction

The COVID-19 pandemic has devastated traditional face-to-face learning experiences. The mass transition from traditional classroom environments to online learning in March of 2020 required STEM educators to design flexible learning experiences and reconceptualize engagement and participation. Using blended synchronous instruction paired with face-to-face instruction, the HyFlex model offers learners the option of participating remotely for short or long-term as needed

Research Questions:

1. How does HyFlex synchronous blended learning impact student learning, sense of community, and engagement as compared to a traditional face-to-face environment?
2. How does student learning, sense of community, and engagement compare between students participating face-to-face and students participating remotely in a HyFlex synchronous blended learning course?

Theoretical Foundation:

Raes et al. (2019) suggested a three-dimensional model that divides engagement into behavioral, affective, and cognitive elements.

Traditional undergraduate students prefer pedagogy that fosters accountability strategies that promote higher engagement (Kusurkar et al., 2011) and to make self-advocated choices rather than those determined by external factors (Sobhan et al., 2014).

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Purpose

This potentially transformative proposal will impact accessibility of undergraduate STEM education in a core Polytechnic Design Thinking course required of 1500 students annually. We propose to expand on our pilot work by studying active learning strategies in blended synchronous instructional environments to further define HyFlex as an educational model, optimize the approach, scale to 1500 students annually, and study the efficacy on student learning and sense of community.

Pedagogical Approach

Context:

Introductory design thinking course that services approximately 1,500 students annually. The course has employed a flipped approach to active learning with small group problem-based learning projects for 10 years. This introductory design thinking course is the second highest enrollment course at Purdue University and the core introductory course for all Polytechnic Institute majors at Purdue University.

Pedagogy:

As of March 2020, the course employed a Hybrid Flexible (HyFlex) model to engage students synchronously remotely and face-to-face using the online video conferencing tool Microsoft TEAMS. Instructors communicate with the students through a wireless headset. Students provide their own headphones to connect to a Microsoft TEAMS meeting to interact with their remote partners and instructor. Students have the option of working remotely whenever they choose, whether due to illness, not waking up for class in time to commute, or for any other reason without missing any in-class course experience.

Research Methods

A Design Based Research (DBR) mixed methods research efforts will guide the design, implementation, and refinement of an optimal HyFlex approach for blending face-to-face and remote learners in a large active learning design thinking course.

In our final project year, the HyFlex approach, influenced through the iterations, interviews, observations, and multiple levels of coding, will be implemented with a quasi-experimental non-equivalent posttest-only comparison group design to test the impacts.



Outcomes: Pilot and Year 1

- Student performance differs between Face-to-Face only and HyFlex classrooms measured by grade distribution (Mentzer under review).
- HyFlex environment significantly improved Basic Psychological Needs compared to a Face to Face only environment (Mentzer under review)
- Students reported accountability, community and flexibility as key strengths of our HyFlex approach.
- Our team is creating a website and harvesting instructor best practices to feature.



Publications and Presentations

- Mentzer, N., Krishna*, B., Kotangle*, A. & Mohandas*, L. (Under review). HyFlex Environment: Addressing Student's Basic Psychological Needs. Learning Environments Research.
- Mentzer, N., Isabell*, T., Cano*, G., Ott*, C. & Mohandas*, L. (Under review). The Impact of Interactive Synchronous HyFlex Model on Student Academic Performance in a Large Active Learning Introductory College Design Course. Journal of Computing in Higher Education.
- Mentzer, N. & Mohandas*, L. (Under review). Student Experiences in an Interactive Synchronous HyFlex Design Thinking Course during COVID-19. Interactive Learning Environments.
- Mohandas*, L. & Mentzer, N. (2021). The Effectiveness of Synchronous vs Asynchronous Modes of Instruction in an Online Flipped Design Thinking Course. Paper presented at the 2021 ASEE Annual Conference & Exposition, Long Beach, California.
- Mentzer, N., Farrington, S. & Koehler, A. (2022). HyFlex as a Pedagogical Approach to Engaging Learners Post Pandemic. Ethical Approaches to Digital Leadership Round Table participant at Ahead by BETT, UK.
- Mentzer, N., Farrington, S. & Mohandas*, L. (2021). Expanding Accessibility of Learning through HyFlex Synchronous Instruction of F2F and Remote Students. Presentation to TU Dublin faculty and instructional excellence team.
- Mentzer, N. (2021). Active Learning and Synchronous HyFlex Participation: Lessons Learned from v4. Presentation at Purdue Center for Instructional Excellence IMPACT program for the Fall 2021 cohort.
- Mentzer, N. (2021). Active Learning and Synchronous HyFlex Participation: Lessons learned from V4. Sloan Equity and Inclusion in STEM Introductory Courses STEM Showcase, held remotely.
- Mentzer, N. 2020. Early Start Faculty Experience: Hyflex in Tech 120. Purdue Provost forum on Teaching and Learning Aug 21. Approx. 100 faculty.
- Mentzer, N. & Farrington, S. 2020. Synchronous Engagement of Students in Group Experiences: Hyflex in Tech 120. Purdue's Active Learning Community of Practice (ALCoP) Oct. 20.