# IMPACT OF PRIOR EXPERIENCES ON FUTURE PARTICIPATION IN ACTIVE LEARNING

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# PURPOSE

- Researchers have emphasized the need to improve the quality of undergraduate teaching through the use of evidence-based instructional practices for STEM fields

- Despite research supporting the benefits of EBIP in the engineering field, the conversion from research into practice has been slow

- There are a number of barriers to the adoption of these practices, including concerns about student resistance to active learning

- This paper examines students' responses to different types of instruction in the engineering classroom and how their responses may differ across courses between semesters

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# METHODOLOGY

- Five engineering specialties at a large public university in the Midwest, including:
  - electrical engineering, computer science engineering, chemical engineering, mechanical engineering, and biomedical engineering
- One course section was randomly selected from each of the engineering disciplines
  - Sophomore-level courses (i.e., 200-level courses)
  - Minimum enrollments of at least 50 students
  - No laboratory or discussion sections

# SURVEY INSTRUMENT

- Two student surveys, based on the Student Response to Instructional Practices instrument (DeMonbrun et al., 2017)
- Survey 1 administered between the 5th and 7th weeks of the semester
  - Asked about the frequency of the types of instruction used in their current class and response to four of the most-used types of instruction in a prior course
- Survey 2 was administered between the 13th and 15th weeks in the course
  - Asked about their response to same four types of instruction in the current course and their overall evaluation of the course/instructor

# MOST FREQUENTLY USED TYPES OF INSTRUCTION

1. "Listening to the instructor lecture during class,"

2. "Answering questions posed by the instructor during class,"

3. "Brainstorming different possible solutions to a given problem," and

4. "Discussing course concepts with classmates during class."

# CLASSROOM RESPONSE

- Value – the degree to which students see the activity as worthwhile

- Positivity - how positive or negative students feel about the activity

- Participation - the extent to which students do or do not participate or demonstrate resistance

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# LISTENING TO LECTURE

| Student Response | Prior | Current | |
|---|---|---|---|
| Value | 3.78 | 3.25 | *** |
| Positivity | 2.83 | 3.02 | ** |
| Participation | 3.20 | 3.05 | * |

* $p < 0.05$; **$p < 0.01$; ***$p < 0.001$

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# ANSWERING QUESTIONS POSED

| Student Response | Prior | Current | |
|---|---|---|---|
| Value | 3.73 | 3.16 | *** |
| Positivity | 2.66 | 3.20 | *** |
| Participation | 3.08 | 3.23 | ** |

 * p<0.05; **p<0.01; ***p<0.001

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# BRAINSTORMING DIFFERENT SOLUTIONS

| Student Response | Prior | Current | |
|---|---|---|---|
| Value | 3.82 | 3.13 | *** |
| Positivity | 2.78 | 3.02 | *** |
| Participation | 3.10 | 3.24 | ** |

 * p<0.05; **p<0.01; ***p<0.001

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# DISCUSSING CONCEPTS

| Student Response | Prior | Current | |
|---|---|---|---|
| Value | 2.01 | 2.17 | * |
| Positivity | 2.73 | 3.17 | *** |
| Participation | 3.23 | 3.20 | |

* $p < 0.05$; **$p < 0.01$; ***$p < 0.001$

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# DISCUSSION

1. Student participation in EBIP is context dependent, and it varies by the type of instruction used in the classroom

2. Despite significant differences, most of the mean response scores for each of the four types of instruction remained between 2.5 and 3.5, suggesting that these differences are often small

   - One exception is the value response score for "discussing concepts with classmates during class," which was an entire point lower that each of the other three types of instruction

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# DISCUSSION

3. Finally, contrary to beliefs that students' opinions about EBIP are immutable, these results suggest that student response can significantly change throughout the course of the semester.

   ▪ This is important for faculty concerns that poor prior execution of these practices might impact how a student responds to future occurrences of the same practice

# THANK YOU!

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