



# Evaluating Methods to Improve Teaching in Engineering

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## Research Question

■ What is the comparative value of four specific methods to improve teaching in the middle of the term?

- No intervention (control)
- Report on student ratings of teaching
- Student feedback session and follow up consultation
- Videotaped class sessions and follow up consultation

## Experimental Design

	Middle of term				End of term
	Student ratings survey	Report on student ratings	Student feedback session + consult	Videotape class session + consult	Student ratings survey
Cohort 0: Control	✓				✓
Cohort 1: Ratings Only	✓	✓			✓
Cohort 2: Feedback + Consult	✓		✓		✓
Cohort 3: Videotape + Consult	✓			✓	✓

### Student Ratings of Teaching

- Scantron survey with 17 research-based items
  - *Seven Principles of Good Practice in Undergraduate Education* (Chickering and Gamson, 1987)
  - Classroom behaviors related to college teaching effectiveness (Murray, 1985)
- Thirteen traits that could potentially be changed over short period (plus four standard questions)
- Administered at mid-term and end of term

### Participants and Courses

- 28 participants representative of CoE faculty
  - All faculty ranks
  - Ten separate departments
  - Four women
- 28 distinct courses representative of undergraduate lectures courses
  - All class levels (3 100-level, 5 200-level, 9 300-level, 11 400-level)
  - Range of credits (1 2-credit, 8 3-credit, 19 4-credit)
  - Broad class size (average =  $52.6 \pm 37.3$  students)

## Results

Average increase from midterm to end-of-term for each question.  
Ratings scale: 1=strongly disagree, 2=agree, 3=neutral, 4=agree, 5=strongly agree. Increases that are significantly different from 0 are highlighted ( $p < 0.05$ ).

	Cohort 0: Control	Cohort 1: Ratings Only	Cohort 2: Feedback + Consult	Cohort 3: Videotape + Consult
1. Overall this was an excellent course.	-0.02 ± 0.16	-0.05 ± 0.07	0.09 ± 0.10	0.04 ± 0.21
2. Overall, the instructor was an excellent teacher.	0.06 ± 0.19	-0.10 ± 0.12	0.19 ± 0.17	0.01 ± 0.29
3. I learned a great deal in this course.	-0.13 ± 0.24	0.05 ± 0.05	0.17 ± 0.12	0.08 ± 0.13
4. I had a strong desire to take this course.	0.09 ± 0.34	-0.09 ± 0.17	0.00 ± 0.27	0.09 ± 0.03
5. The instructor gave clear explanations.	0.03 ± 0.11	-0.07 ± 0.21	0.12 ± 0.39	0.06 ± 0.14
6. The instructor acknowledged all questions insofar as possible.	0.07 ± 0.18	0.05 ± 0.16	0.05 ± 0.27	-0.09 ± 0.07
7. The instructor used class time well.	-0.14 ± 0.18	-0.07 ± 0.10	-0.02 ± 0.31	-0.11 ± 0.15
8. The instructor seemed well prepared for each class.	-0.12 ± 0.19	-0.03 ± 0.12	0.18 ± 0.28	-0.13 ± 0.14
9. Work requirements and grading system were clear from the beginning.	-0.01 ± 0.30	-0.11 ± 0.27	0.08 ± 0.20	-0.01 ± 0.16
10. The amount of work required was appropriate for the credit received.	-0.16 ± 0.25	-0.13 ± 0.12	0.03 ± 0.24	0.08 ± 0.14
11. The instructor used techniques that fostered class participation.	-0.05 ± 0.22	0.08 ± 0.23	0.41 ± 0.22	0.20 ± 0.29
12. The instructor treated students with respect.	0.06 ± 0.20	-0.04 ± 0.14	0.18 ± 0.12	-0.04 ± 0.08
13. The instructor taught in a way that served students' needs.	0.00 ± 0.18	-0.17 ± 0.20	0.10 ± 0.14	-0.09 ± 0.25
14. The instructor was willing to meet and help students outside of class.	-0.02 ± 0.23	0.07 ± 0.12	0.13 ± 0.39	-0.06 ± 0.26
15. The instructor was enthusiastic.	-0.01 ± 0.17	0.09 ± 0.12	0.23 ± 0.17	0.09 ± 0.14
16. The instructor kept students informed of their progress.	0.03 ± 0.34	0.11 ± 0.45	0.39 ± 0.50	0.31 ± 0.33
17. The instructor set high standards for students.	-0.02 ± 0.11	0.09 ± 0.36	0.22 ± 0.15	0.08 ± 0.20
# of questions with an average increase.	6	7	15	10

Questions for which the average increase of one cohort differs from that of a second cohort ( $p < 0.05$ )	Cohort 0: Control	Cohort 1: Ratings Only	Cohort 2: Feedback + Consult
Cohort 3: Videotape + Consult	No differences	4, 6, 10	8, 12
Cohort 2: Feedback + Consult	3, 8, 11, 15, 17	1, 2, 3, 11, 12, 13	
Cohort 1: Ratings Only	No differences		

## Preliminary Conclusions

- The methods to improve teaching studied here do result in changes in student ratings of teaching
- Student feedback and follow-up consultation may have the greatest impact, but each approach has benefits
- Further analysis (including a second iteration of data collection) is underway