

Development of a Survey Instrument to Measure Students' Resistance to Active Learning

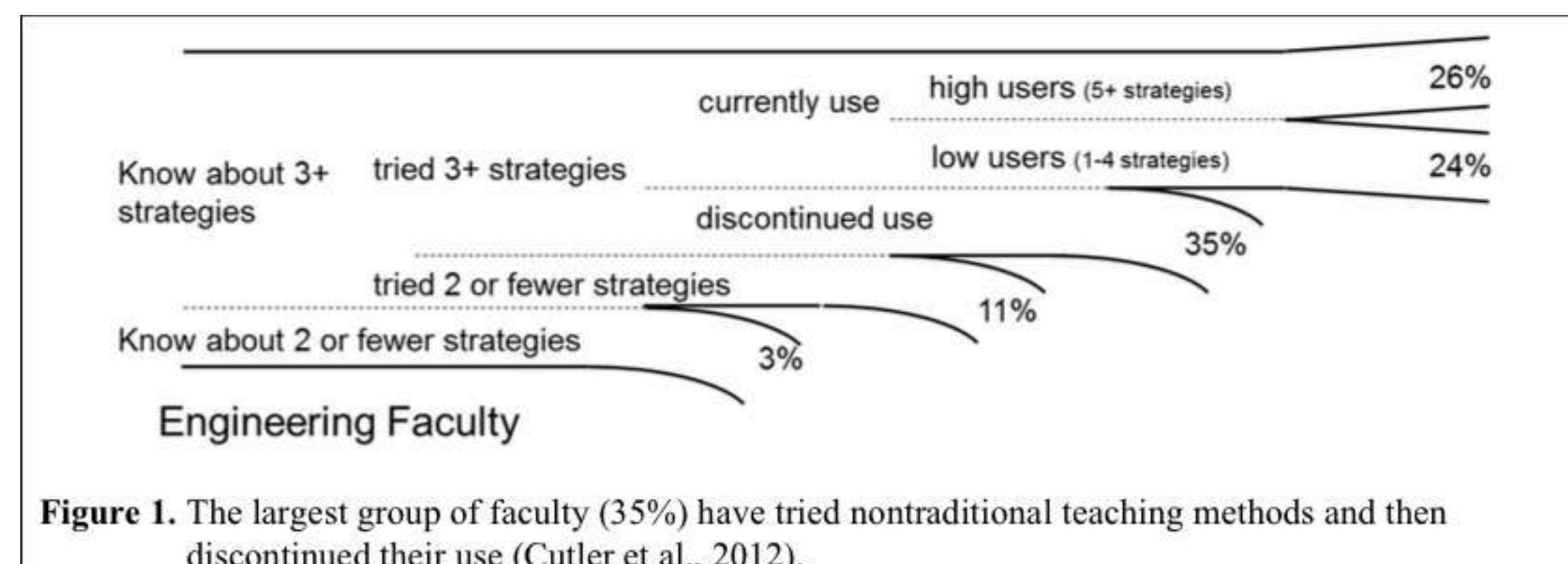


Matt DeMonbrun¹, Dr. Cynthia Finelli¹, Dr. Maura Borrego², and Prateek Shekhar²
¹ University of Michigan ² University of Texas at Austin

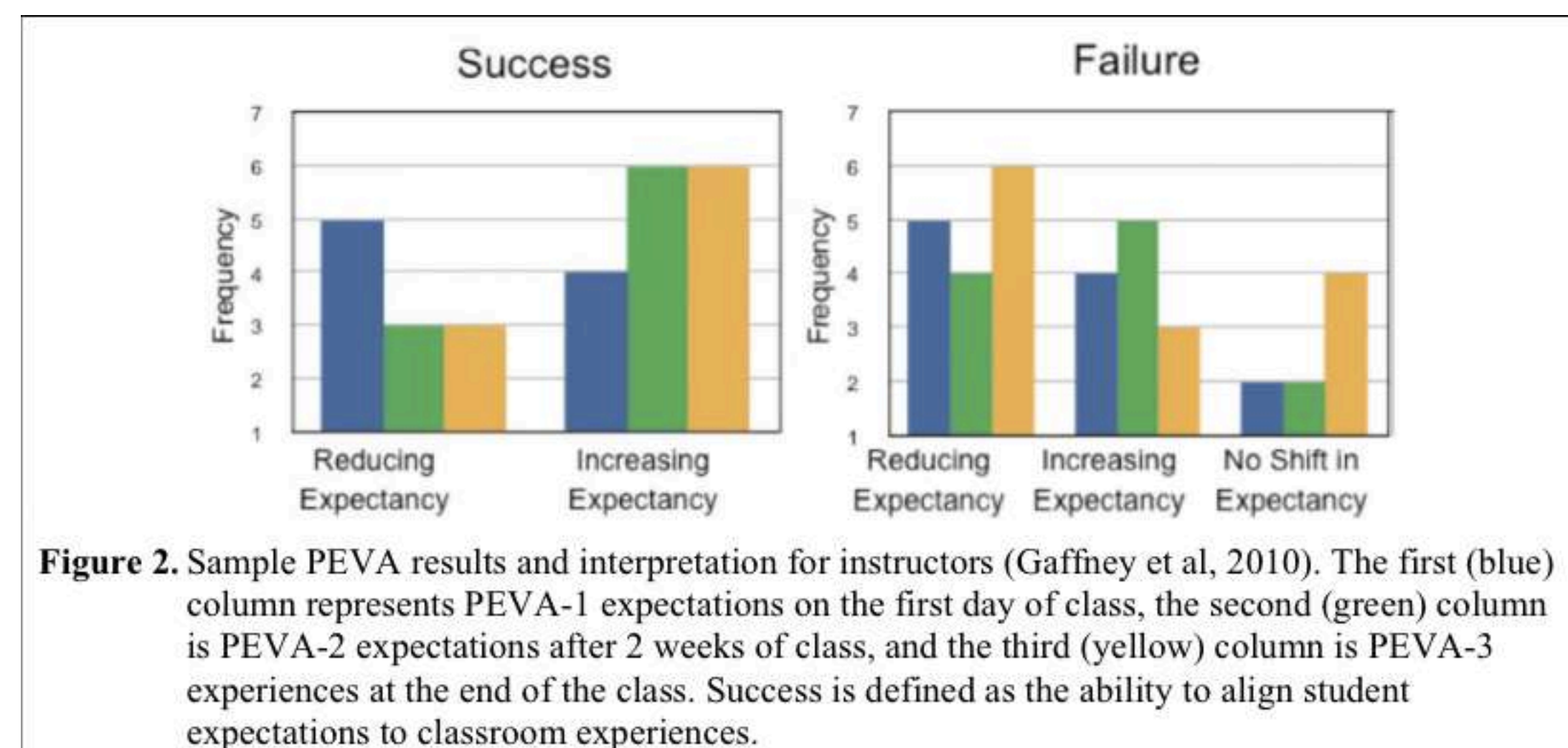


Introduction

- Adoption of active learning has been slow
- Student resistance can be a major barrier to adoption (Cutler & Borrego, 2014)



- Expectation Violation Theory suggests link between student resistance and a mismatch of students' expectations (Gaffney et al., 2010)



Elements of Our Protocol

Section 1

- Construct of productive engagement (Chasteen, 2014)
 - Participation – Active engagement vs. student resistance (alpha=0.71) (Weimer, 2013)
 - Value of investment (alpha=0.74)
 - Emotional engagement (alpha=0.84)

Section 2

- Approaches to reducing student resistance (alpha=0.76) (Bacon et al., 1999; Van Barneveld & Strobel, 2011; Yadav et al., 2011)
- Global course/instructor satisfaction (alpha=0.85)

Section 3

- Pedagogical Expectancy Violation Assessment (PEVA) - Students' expectancies about course experiences (Gaffney et al., 2010)
- Interactive or dialoguing, Constructive or generating, Active or selecting, and Passive or receiving (ICAP) Model Framework (Chi, 2009)
- Measures both actual and ideal course experiences (alphas>0.71)

Your Project ID number (last four digits of phone #, birth month, birth day): _____

PEVA End-of-Term Student Survey

1. In this course, when the instructor asked you to do an in-class activity (e.g., solve problems in a group during class or discuss concepts with classmates), **how often did you react in the following ways?**

	1. Almost never (< 10% of the time)	2. Seldom (< 30% of the time)	3. Sometimes (< 50% of the time)	4. Often (< 70% of the time)	5. Very Often (> 90% of the time)
a. I disliked the activity and voiced my objections.	1	2	3	4	5
b. I focused on doing specifically what the instructor asked, rather than on mastering the concepts.	1	2	3	4	5
c. I rushed through the activity, giving minimal effort.	1	2	3	4	5
d. I felt positively towards the instructor/class.	1	2	3	4	5
e. I tried my hardest to do a good job.	1	2	3	4	5
f. I distracted my peers during the activity.	1	2	3	4	5
g. I pretended but did not actually participate.	1	2	3	4	5
h. I felt the effort it took to do the activity was worthwhile.	1	2	3	4	5
i. I participated actively (or attempted to).	1	2	3	4	5
j. I talked with classmates about other topics besides the activity.	1	2	3	4	5
k. I felt the instructor had my best interests in mind.	1	2	3	4	5
l. I saw the value in the activity.	1	2	3	4	5
m. I felt the time used for the activity was beneficial.	1	2	3	4	5
n. I enjoyed the activity.	1	2	3	4	5
o. I surfed the internet, checked social media, or did something else instead of doing the activity.	1	2	3	4	5

2. In this course, when the instructor asked you to do an in-class activity (e.g., solve problems in a group during class or discuss concepts with classmates), **how often did the instructor do the following things?**

	1. Almost never (< 10% of the time)	2. Seldom (< 30% of the time)	3. Sometimes (< 50% of the time)	4. Often (< 70% of the time)	5. Very Often (> 90% of the time)
a. Clearly explained what I was expected to do for the activity.	1	2	3	4	5
b. Clearly explained the purpose of the activity.	1	2	3	4	5
c. Discussed how this activity related to my learning.	1	2	3	4	5
d. Solicited my feedback or that of other students about the activity.	1	2	3	4	5
e. Used activities that were the right difficulty level (not too easy, not too difficult).	1	2	3	4	5
f. Walked around the room to assist me or my group with the activity, if needed.	1	2	3	4	5
g. Encouraged students to engage with the activity through his/her demeanor.	1	2	3	4	5
h. Gave me an appropriate amount of time to engage with the activity.	1	2	3	4	5

3. Please rate your level of agreement with the following items.

	1. Strongly disagree	2. Disagree	3. Neutral	4. Agree	5. Strongly agree
a. Overall, this was an excellent course.	1	2	3	4	5
b. Overall, the instructor was an excellent teacher.	1	2	3	4	5

4. What final grade do you expect to receive in this course? F D- D D+ C- C C+ B- B B+ A- A A+

5. For each of the following things, please indicate how often you did each thing in this course and how often you would like to do each in your ideal course.

	In this course, how often did you... (1-5)					In your ideal course, how often would you like to... (1-5)				
a. Listen to the instructor lecture during class.	1	2	3	4	5	1	2	3	4	5
b. Brainstorm different possible solutions to a given problem.	1	2	3	4	5	1	2	3	4	5
c. Find additional information not provided by the instructor to complete assignments.	1	2	3	4	5	1	2	3	4	5
d. Work in assigned groups to complete homework or other projects.	1	2	3	4	5	1	2	3	4	5
e. Make individual presentations to the class.	1	2	3	4	5	1	2	3	4	5
f. Be graded on my class participation.	1	2	3	4	5	1	2	3	4	5
g. Study course content with classmates outside of class.	1	2	3	4	5	1	2	3	4	5
h. Assume responsibility for learning material on my own.	1	2	3	4	5	1	2	3	4	5
i. Discuss concepts with classmates during class.	1	2	3	4	5	1	2	3	4	5
j. Make and justify assumptions when not enough information is provided.	1	2	3	4	5	1	2	3	4	5
k. Get most of the information needed to solve the homework directly from the instructor.	1	2	3	4	5	1	2	3	4	5
l. Be graded based on the performance of my group.	1	2	3	4	5	1	2	3	4	5
m. Preview concepts before class by reading, watching videos, etc.	1	2	3	4	5	1	2	3	4	5
n. Solve problems in a group during class.	1	2	3	4	5	1	2	3	4	5
o. Solve problems individually during class.	1	2	3	4	5	1	2	3	4	5
p. Answer questions posed by the instructor during class.	1	2	3	4	5	1	2	3	4	5
q. Ask the instructor questions during class.	1	2	3	4	5	1	2	3	4	5
r. Take initiative for identifying what I need to know.	1	2	3	4	5	1	2	3	4	5
s. Watch the instructor demonstrate how to solve problems.	1	2	3	4	5	1	2	3	4	5
t. Solve problems that have more than one correct answer.	1	2	3	4	5	1	2	3	4	5
u. Do hands-on group activities during class.	1	2	3	4	5	1	2	3	4	5

Thank you for completing this survey.
PEVA 3, 12/16/14

Validation of Protocol

- Reliability and Validity
 - Cognitive interviewing with approximately 15 students at 4 institutions
 - Piloted protocol with over 200 students at 3 institutions
 - Additional validation through expert review and confirmatory factor analysis

Initial Results

- Initial results from students' responses to our four piloted courses
 - Two active learning and two traditional (lecture-based) courses

Table 2: Mean Scores of Constructs by Instructional Style

	Active Learning	Traditional Instruction	Significance
Passive Resistance	2.300	2.218	
Partial Compliance	2.585	2.857	**
Open Resistance	1.538	1.667	
Active Participation	3.930	3.813	
Value Construct	3.809	3.476	**
Emotional Construct	3.008	2.635	***
Global Course Satisfaction	4.156	3.518	***

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

- Students in active learning courses reported significantly higher satisfaction levels.
- Students in active learning courses reported significantly higher values on emotional construct than students in traditional courses.

Future Directions

- Five courses in our research study for the current term
- National, 20-course study, supplemented by faculty surveys and faculty interviews.

References

Bacon, D., Stewart, K., & Silver, W. (1999). Lessons from the best and worst student team experiences: How a teacher can make the difference. *Journal of Management Education*, 23(5), 467-488.

Chasteen, S. (2014, November 4). Measuring and improving students' engagement [blog post]. Retrieved February 25, 2015 from <http://blog.sciencegeekgirl.com/2014/11/02/measuring-and-improving-students-engagement/>

Chi, M. T. (2009). Active-Constructive-Interactive: A Conceptual Framework for Differentiating Learning Activities. *Topics in Cognitive Science*, 73-105.

Cutler, S., & Borrego, M. (2013). *An analysis of the Fidelity of Implementation of Research-Based Instructional Strategies in the statics classroom*. Paper presented at the ASEE Annual Conference & Exposition.

Cutler, S., Borrego, M., Henderson, C., Prince, M., & Froyd, J. (2012). *A Comparison of Electrical, Computer, and Chemical Engineering Faculty's Progression through the Innovation-Decision Process*. Paper presented at the Frontiers in Education Conference, Seattle WA.

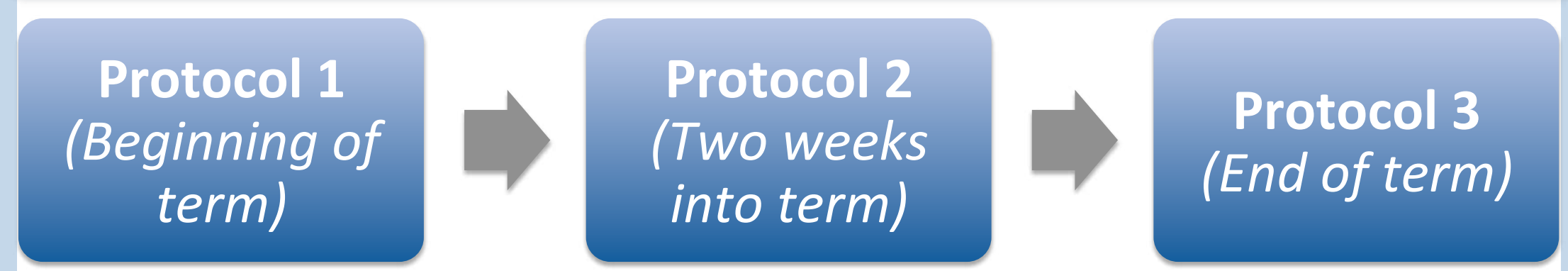
Gaffney, J.D.H., Gaffney, A.L.H., & Beichner, R.J. (2010). Do they see it coming? Using expectancy violation to gauge the success of pedagogical reforms. *Physical Review Special Topics – Physics Education Research*, 6(1), 010102. doi: 10.1103/PhysRevSTPER.6.010102

Van Barneveld, A., & Strobel, J. (2011). *Reports from teaching practice: experiences and management of tensions encountered with PBL implementations in the early years of undergraduate engineering education*. Paper presented at the Research in Engineering Education Symposium, Madrid, Spain.

Weimer, M. (2013). *Learner-Centered Teaching: Five Key Changes to Practice*. San Francisco: Jossey-Bass.

Yadav, A., Lundeberg, M., Subedi, S., & Bunting, C. (2011). Problem-based learning in an undergraduate electrical engineering course. *Journal of Engineering Education*, 100(2), 253-280.

Implementation Timeline



This material is based upon work supported by the National Science Foundation under DUE Awards #1347417, 1347482, 1347580, and 1347718. Any opinions, findings, and conclusions or recommendations expressed are those of the authors and do not necessarily reflect the views of the NSF.