

GIFTS: Overcoming Student Resistance to Active Learning: First-Year Educator's Experiences of Transferring Research into Practice

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Negative student response or student resistance to active learning is often discouraging for faculty when implementing active learning in engineering classrooms [1]. Active learning (AL) includes instruction in which students engage in activities during class instead of listening to the instructor’s lecture. Recently, researchers have systematically examined student resistance as a barrier to adoption and continued use of AL in undergraduate classrooms [2]–[5]. This research has identified evidence-based strategies that instructors may use for mitigating student resistance. Cumulatively, the research findings underscore that student resistance can be reduced by strategic design, implementation and facilitation of AL exercises. This paper presents an example of using these strategies in a first-year analytical methods for engineers course with an enrollment of 45 students. The course is intended for academically underprepared students and covers pre-calculus mathematical topics. The AL involved students working on a given problem during class and were encouraged to talk to each other when engaging in problem-solving. The activity presented in this paper was iterated three times to use different strategies [2].

In iteration 1, the instructor used the strategies of clearly explaining the activity and walking around the classroom for assistance. In iteration 2, additionally, the instructor discussed how the problem was related to homework and collected student feedback. Students’ recommended aligning class activity to help them with the exam. In iteration 3, student feedback was incorporated to redesign the activity in which students were given a solved problem and asked to identify errors. Instructor discussed how the errors were representative of common mistakes students commit in the exam. While iterations 1 and 2 received low student engagement; iteration 3 received medium engagement, marking a reduction in student resistance (Table 1).

Table 1. Implementation Summary

Iteration	Instructor Strategies [2]					Engagement*[6]		
	Walked around the room	Explained the activity	Discussed how activity related to learning	Solicited student feedback	(Re)designed activity for participation	1	2	3
1	X	X				X		
2	X	X	X	X		X		
3	X	X	X		X		X	

*1: Low (<50% of students), 2: Medium (>50% & <90% of students), High (>90% of students)

Future Direction

To mitigate student resistance, active learning design and implementation may follow a more iterative approach which is based on student feedback. However, engineering faculty are typically not trained in pedagogy. Thus, faculty development efforts could place more emphasis on assisting faculty in developing active learning exercises in addition to simple dissemination. Considering faculty’s time constraints, future research and dissemination efforts may focus on co-developing content-specific resources with faculty to facilitate adoption. This could include case examples explicating failures, iterations, and successes of different active learning design and implementation approaches which are empirically derived from actual classroom settings.

References

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