The Active Learning Classroom Project

Collaborative for Teaching Innovation

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October 30, 2014

The Active Learning Classroom Project: Redesigning classrooms to facilitate engaged and collaborative learning

Introduction

Research demonstrates the importance of active learning pedagogies on student learning. Educational experiences that include activities such as discussion, project-based work, and analysis in groups promote engaged, self-motivated, and higher performing learners. A 2014 meta-analysis (Freeman et al., 2014) of 225 studies of student learning in the STEM areas found that active learning increased student performance by about 6 percent on exam scores and concept inventories. Interestingly, active learning also lowered the failure rate as measured by students withdrawing from the course or receiving a grade of D or F.

Active learning pedagogies are facilitated by classroom spaces which offer flexibility to reconfigure the classroom and move students easily into groups, where students can display their work, and reorient the relationship between students and instructor, and among students themselves (University of Minnesota Active Classroom project). In these types of classrooms, students report a higher level of engagement in the learning process and achieve enhanced learning outcomes.

The Santa Clara pilot of active learning classrooms

Three active learning classrooms were designed in the summer of 2012: Varsi 114, Graham 163 and Graham 164. In 2013, three additional classrooms were redesigned: Alumni Science 220, Engineering 602, and O'Connor 204. Features of these classrooms include moveable desks or tables, smart boards, writeable walls, and multiple projection display screens.

Faculty and students in those classrooms were surveyed during fall or winter quarter (2012-13 and 2013-14) to determine the perceived impact of the classroom on active participation, connections among faculty and students, the promotion of new and transferrable ways of thinking, the types of learning activities taking place in the classroom, the perceived benefits of specific classroom features, and generally, what worked well and what didn't. Many of the survey items were taken from a survey developed at the University of Minnesota, allowing us to compare our findings with this (and other) institutions that have engaged in multi-year research projects that include comparisons between "traditional" and "active" classrooms.

The survey responses demonstrate that students perceived the new classrooms to support the types of learning and engagement typical of active learning environments. These responses parallel those from other institutions with redesigned classrooms.

Percent of students agreeing that the classroom:	2012-13	2013-14
Facilitates multiple types of learning activities	87%	86%
Promotes discussion	85%	83%
Encourages my active participation	73%	73%
Enriches my learning experience	74%	73%
Encourages me to create or generate new ideas, projects or ways of understanding	69%	63%
Helps me develop connections with my classmates	75%	74%
Helps me communicate effectively	73%	80%
Helps me develop connections with my instructor	67%	67%

In their surveys, faculty responded similarly to the students, generally finding the classroom design and affordances promoted more active participation, enhanced student learning, and communication. Many of their teaching practices aligned with their perceptions: In both years, with a frequency of once a week or more, just over two-thirds had students working in small groups or on an in-class learning activity; 55 percent in 2012-13 had an in-class learning activity that required students to explain course ideas or concepts to others and that number rose to 70 percent in 2013-14; and approximately two-thirds percent of faculty consulted with groups of students during an in-class activity.

Students' and faculty's open-ended comments point to the flexibility of the classrooms and the way in which they facilitate interaction. However, they also identify some perceived limitations in the classrooms, either because of design, technology performance, or because of lack of usage of the classrooms' affordances, underscoring the value of the pilot as a learning experience for the university.

The moveable desks in Varsi allow for easier interaction and access to visual displays of information, factors that enable a variety of active learning practices.

[The room works well] when we are discussing in small groups. When we want the screens to project a website, a presentation, a student's work, an assignment, or anything…
(Student in Varsi 114, 2012-13)

I like the flexibility of the tables and chairs. It was easy to shift them around depending on our needs. I also liked the various screens so that students could sit in small groups and see the screens from various locations. I also really liked that the technology was readily available and easy to use. (Faculty in Varsi, 114, 2012-13)

The importance of sufficient space in a classroom, as well as natural light, was frequently noted as a feature of the Graham classrooms.

I loved that it had a lot of natural light-helped to keep me energized and in a generally positive mood. I like how big and open it was and the new equipment accommodated different learning styles.
(Student in Graham 163/164, 2012-13)

Moving from lecture to small group discussions and then to full class discussions was easy with the rolling chairs. The chairs also allowed us to easily make a large circle for discussions.
(Student in Graham 163/164, 2012-13)

The wide space in the room, compared to other cramped classrooms, allows for more mobility and freedom and made me more comfortable with my surroundings.
(Student in Graham 163/164, 2013-14)

In 2013-14, writable wall paint was a new feature used in **all three** of the classrooms. While the implementation had some problems (adequate time to cure, cleaning tools), the greater writing surface areas and the multiple projectors, combined with moveable chairs/desks allowed for active engagement of many students and collaborative work.

We would often break off into our quarter-long groups so the swivel chairs made this very easy to go in and out of whole class discussions and group discussions. Also it was nice to be able to write on all four walls. This helped for presenting group work to the rest of the class.
(Student in O'Connor 204, 2013-14)

Excellent for generating ideas and promoting many other kinds of creative learning opportunities. My students loved it and were very eager to engage in all kinds of writing activities from individual to large group, and were more enthusiastic than in standard classrooms to present and discuss their work with others. They also told me they liked the rolling chairs, which made it easy for them to change group configurations readily. (Faculty, O'Connor 204, 2013-14)
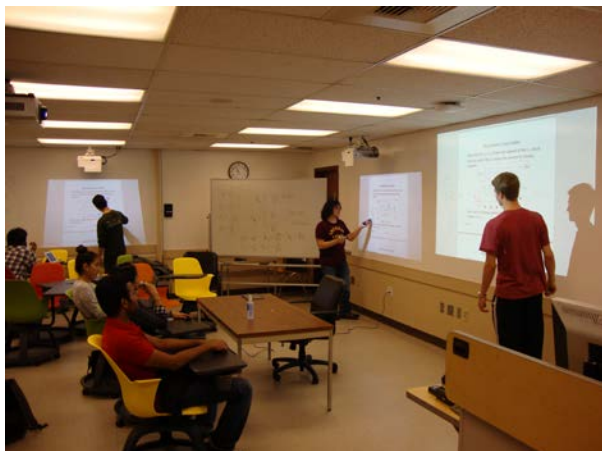
Using the wall paint, we were able to write problems and examples on the walls to more effectively learn the material. (Student in Engineering 602, 2013-14)

As much as the node chairs promoted functionality and ease of transporting and transitioning between individual and group activities, the size of the desks made both classwork and tests very difficult. (Student in Engineering 602, 2013-14)

[The room works well when] using slides and board at the same time ... I use combination of writing on board and projecting different slides ... being able to write on the wall while slides are presented helps me a lot ... I also benefit a lot through writing on slides making it more clear for students. (Faculty, Engineering 602, 2013-14)

Visually stimulating. The bold colors of the chairs, tables, and walls encouraged me to think. (Student in Alumni Science 220, 2013-14)

I like the layout and most of the special features. I like that the chairs are colorful. It adds to the learning environment and makes the room inviting, especially in the early mornings. (Student in Alumni Science 220, 2013-14)

Taken as a whole, student and faculty comments are a clear reminder that not everyone experiences all the features in the classrooms the same way. For some, the desks are "too small." For others, the "chairs are always out of order and are not comfortable." Some failed to see the benefits of certain classroom features for their learning: "The huddle boards were completely useless for our class." Others questioned the "fit" of the classroom for the type of learning experience of the class: "It was an interesting classroom although it may not have been the best choice for the class I was in." Some felt their renovated classroom was not really very different from others at the university and questioned the expense involved in renovation.

Furthermore, in 2013-14, the assessments made for Varsi 114, the Graham classrooms, and O'Connor 204 by faculty and students were more positive than those for Engineering 602 and Alumni Science 220, reminding us of the learning curve in trying something new and the importance of proper implementation. The writeable walls in both of these classrooms were not easily cleaned and their surface provided too much glare when an images or text were projected on them. This was a significant distraction for students and faculty. The furniture in Alumni Science 220 was not easily reconfigurable (partially due to limited maneuvering space), diminishing that benefit of the room. Some additional problems with the A/V facilities and IT

were identified, along with a problem with temperature control in one of the rooms. Despite the limitations identified for these rooms, many faculty and students see potential for the features of these classrooms.

Conclusion

Through our surveys and conversations with faculty, it is clear that the classroom environment can and does contribute positively to the teaching and learning experience.

We have learned that active classrooms:

- ❖ Are energizing for students and faculty
- ❖ Encourage faculty to make changes in their teaching practices
- ❖ Allow students to experience the class material in multiple ways
- ❖ Encourage students to develop and reinforce important competencies like oral communication or teamwork

Going forward, Faculty Development and the Collaborative for Teaching Innovation will continue to support faculty who are interested in developing more collaborative, small-group, and inquiry-based activities. Media Services and the Instructional Technology Resource Specialists and classroom support staff will offer more workshops and one-on-one demonstrations to help the faculty make the most out of the technological affordances of the classrooms. The university will work on effective ways to ensure that there is the right fit between the teaching preferences of faculty and the features of a given classroom, and that there is a timely resolution of IT or facility problems.