Challenges, Compatibility, Creativity

Team-based active learning in a large, tiered lecture theatre
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In January, 2013 I delivered a course in Computing Architecture. I had taught it before but this time, I delivered it as a team-based, active learning course. I was in a traditional classroom.

I split the students into 10 teams, each of 7 students. Each was split over two rows so that students could be face-to-face although students in the front rows had to turn around to face their teammates.

A few minutes into the first team-based activity, I scanned the classroom to see if every student was participating. They were. Every single student had joined in their team’s discussion. I wandered around the class eavesdropping on their conversations. Guess what I heard? Nothing but the course material!

I had never seen this level of engagement in a classroom before. I remember a voice in my head announced to me immediately - *You can never go back. You have seen what a class CAN be!* That realization and my commitment to it has remained as strong and clear to this day, 5 years later. Student outcomes that year were just as good as previous years, and with fewer failures. Some of my activities however really needed improvement. To be honest, some students begged me to return to lecturing that year.
In 2014, I was fortunate enough to move to the largest of the new active-learning classrooms in Ellis Hall. The space was big, and bright, and roomy. The acoustics were so good that team members could easily communicate with their teammates in a normal voice. There were whiteboards around three sides of the room. There were computer monitors at either end of every table where students could plug in two laptops and share their screens with the rest of their team.
From the podium, I could broadcast any team's screen to the rest of the class. I could also broadcast my laptop screen to one or both screens of the team tables.

I used this classroom from 2013 to 2016. Team-based active learning consistently returned higher class averages and reduced (almost eliminated) student failures.
Enrollment in this course continued to rise however, exceeding the capacity of the active learning classrooms in Ellis Hall. In January of this year, I was about to deliver course again, but enrollment had increased from 130 to 205. The class would be held in Stirling Auditorium.
I was a little apprehensive but I knew that the Team Based Learning method that I was following had scaled successfully to classes of 300 or more at other universities. I was expecting the experience to be somewhere between just OK and very, very bad.

The Centre for Teaching and Learning had the students do a survey at the end of my last year in Ellis and again at the end of this last term in Stirling Hall to reveal any differences in student perceptions of the effect of environment on active learning. This term I also held my own survey of student perceptions, rating specific aspects of the environment in Stirling and their importance to student learning. I’ll be presenting some of the results of both surveys here today.
The first team activity in this new environment with the room about 85% filled, made it obvious that the noise level was going to be far too high for team discussions. Thankfully, I had reserved the adjacent lecture theatre for an anticipated overflow. I moved about 70 students to that adjacent room for the entire term.
I Skyped between the two rooms, using my very competent TA to manage the logistics of the other room. In fact, we sometimes had the two rooms work independently which was occasionally more appropriate for asking questions and class discussions.
I was worried that students in the other classroom might feel disadvantaged by me being in just the largest room but survey results indicated that this was not a major issue. The other room did however request that I add video of me speaking along with the content I was displaying so that I was not just a disembodied voice. I was happy to do this.
The next problem, which was anticipated, was the fact that to have teams of 8 face-to-face with each other, the best arrangement was to have 4+4 students in two rows - requiring student in the front row to twist around to communicate with the row behind them. Although this was perceived as the worst aspect of teamwork in a lecture theatre, it was workable.
To compensate for the lack of video monitors for students to share their laptop screen, ignoring the other problem of having no nearby power, I made sure that every team member had a paper copy of the activity they were working on. This material was also available online but students preferred a paper copy supplied to them.
Students thought that this was important and they seemed to be satisfied with this solution.
There was a very important side effect of not having computers, displays, or whiteboards to work on. It forced me to make sure that the activities done in this class were "Big Picture" activities requiring students to reflect on a bigger picture and the place that the current content play in it, rather than low level problem solving activities better suited for individual work done in labs or assignments.

Team activities were best when they were open-ended, a little ambiguous, and require analysis, discussion, creating consensus, and making decisions. I tried to make sure the in-class activities provided a need and opportunity to reflect on the material, articulate their positions on it, and experience alternate views both within their team and within the class.

This has always been my goal for an active-learning class but have found from the start that creating effective in-class activities was always the most difficult part of facilitating student learning and engaging students.
Outcomes
It wasn't a surprise to find that students were NOT really happy with the environment.
In fact, this first slide shows that the results between Stirling Hall and Ellis classes were complete opposites. This was obvious in both surveys that we did. In my survey the environment was perceived as important or very important, but was rated as very negative to slightly positive.
In both Stirling and Ellis, there was a wide variation regarding the value of class-wide discussions of team presentations, and discussion of class-wide questions and resulting answers. I'm not sure anything can be drawn from these results, other than perhaps there is still room for improvement regardless of the environment.
As it turns out, this was one of the highest performing classes I have ever had in terms of class average (a solid B) and number of failures (<2%). This was in spite of being the largest class ever in this course and the negative effects of the environment.
In my 5 years of using active learning in this course, I also found that there has been increasing numbers of students that make a point of privately remarking on the positive aspects of an active-learning and how it has changed them in some way - changing the way that they approach problems, changed their perspective on
learning new things, even seeing how the benefits of using tools such as mind mapping and concept mapping can help them in activities outside of this class, even outside of school.
Conclusion
My final thought is that if you are presented with the prospect of delivering a team-based active learning course and are faced with using a traditional lecture theatre with few technical and ergonomic resources - expect some difficulties but don't worry.
Team-based Learning is scalable to large classes. Problems can be mediated with flexibility and creativity.
Above all, the benefits of active learning transcend the negative effects of the environment in which it is delivered.
Believe in the abilities of your students. They will always adapt, they will persist and they will prevail.
Thank You.

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