

# Instructor Perceptions of Teaching in a New Active Learning Building

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This study analyzes instructor attitudes toward 26 collaborative spaces at a large, R1 university in the United States. The authors conducted 151 interviews with instructors, identifying elements of classroom spaces that helped or hindered teaching and student learning. Approximately 44% of the instructors (n=67) had participated in a professional development program designed to encourage and enhance student collaboration and active learning in courses. A comparison between that group and all other instructors in this study (n=84) showed instructors who had participated in the development program stated fewer hindrances to their teaching.

It has been fifteen years since Michael Prince declared “broad but uneven support for the core elements of active, collaborative, cooperative and problem-based learning” (Prince, 2004) and five years since scholars offered a more authoritative call for “abandoning traditional lecture in favor of active learning” (Freeman et al, 2014). While active learning is a loosely defined term, Freeman and colleagues’ description remains the most commonly cited: “Active learning engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work” (2014, p. 8410). In response to the increase in active learning, universities and colleges have redesigned hundreds, if not thousands of classrooms to reflect the change in pedagogical priorities. This trend is more likely to continue than abate, (Alexander et al, 2019) representing millions of dollars in new capital spending, all with presumptive improvement in student learning (Beichner et al, 2007; Baepler et al, 2016; Deslauriers et al 2019). While these classrooms may contain similar features, like the de-prioritization of a single lecturer as the focal point, the final form of active learning spaces vary considerably. Furthermore, the scope of the fiscal commitment carries an assumption that faculty will teach in these new spaces, (Birdwell & Uttamchandani, 2019) even without regular allocation of resources to help them implement effective active learning strategies. These factors

underlie the central question of the effectiveness of these new active learning rooms.

The pace of classroom construction has not been accompanied by a representative increase in research on instructional comfort or effectiveness in the new active learning spaces. Researchers have conducted quasi-experimental studies about the effect of these spaces on instructor comfort, student learning, as well as the use and frequency of active learning techniques (Benoit, 2017; Whiteside et al, 2012; Van Horne et al, 2012). However, most studies are unable to control for self-selection when examining the use of active learning spaces, as instructors who teach in active learning spaces usually choose these spaces and are more likely to value and use active learning approaches (see Andrews et al, 2011; Baepler et al, 2016).

Studies examining the effectiveness of active learning spaces are also generally focused on a specific course that is usually taught by one or two instructors during the same semester. Discipline-based research has driven much of the construction and assessment of collaborative and active learning spaces, especially in physical and life sciences. From the original conception of the SCALE-UP layout (Beichner et al, 2007), physics education has spurred many studies of active learning environments (Gatch, 2010; DeBeck & Deamree, 2012; Meltzer & Thornton, 2012). Life sciences (Cotner et al, 2013; Langley & Guzey, 2014) and chemistry (Weaver & Sturtevant, 2015) have similarly explored the effectiveness of collaborative techniques outside of the traditional lecture hall. Findings from these studies were mixed, though generally slight improvements in student performance on exams were found when comparing instructors teaching in the active learning spaces to the same instructors teaching in other classrooms. However, research in statistics education found no difference in student

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performance based on room type (Gundlach et al, 2015). Given the difficulty of measuring the benefit of student knowledge gains and the resources required for assessing the type and frequency of active learning, it is difficult to make broader generalizations of how instructors are using active learning spaces.

Though most studies on active learning spaces tend to focus on student outcomes, select studies have examined instructor perceptions or confidence using active learning spaces, including the potential benefit of academic development programs. The University of Minnesota produced multiple analyses covering the use of its collaborative rooms (Brooks, 2012; Langley & Guzey, 2014). These studies indicate that collaborative classrooms can encourage instructors to shift from passive lecture to student-centered techniques, but instructor attitude and willingness to foster a student-centered environment are the most likely predictors as to whether that shift will occur. The University of Iowa's TILE program has been dedicated to providing development resources to instructors for use in active learning spaces (Van Horne et al, 2012; Florman, 2014). Detailed interviews and focused observations allowed these authors to explore implementation of active learning practices, instructor and student comfort with specific collaborative learning techniques, and use of room technology.

Repeatedly, studies have shown that active learning spaces themselves are not panaceas for student learning (Lasry et al, 2014). Efforts to replicate improved student learning in many of these studies highlight the need to include pedagogical principles in tandem with classroom design. In particular, lack of self-efficacy in active learning spaces leads to instructor discomfort and often results in lower student academic performance (McArthur, 2015). The most robust study to examine the spaces (McDavid et al, 2018) includes a subset of teachers who reported low self-efficacy. The authors found that instructor self-efficacy was the variable most likely to predict student-centered use of the space.

## The Current Study

The creation of a large active learning center presented the authors with a unique opportunity to investigate the impact of bringing active learning classrooms (ALCs) to scale. Institutions of higher education generally build few ALCs per year because that is what renovation budgets allow. This slow cadence of construction and distribution of ALCs across an institution's campus constrains the study of ALCs to individual rooms with instructors who generally want to teach in them.

In 2017 at the center of our campus, the University opened one of the first dedicated active learning buildings (ALB) in

the nation. The ALB is comprised of 27 classrooms across 8 different configurations (including 1 large lecture hall) within 4 stories of informal learning and study space for students. The ALB hosts over 300 instructors every semester with over 5,000 students a day studying, attending classes, or walking through to other campus destinations.

The ALB created new challenges as an active learning building with a range of classroom configurations and sizes. The most significant challenge was scheduling courses and instructors in the new classroom learning spaces. The initial wave of scheduling gave priority to instructors who had participated in the university's course redesign and faculty development program. The schedule of the building's classrooms was subsequently filled by matching class size with rooms of the approximate capacities, with no accounting for pedagogical approach. In an effort to maximize the building's capacity, the final wave of scheduling matched any course to an open room as long as the class size was less than the room capacity.

The current study aimed to take advantage of the unique opportunity of 26 active learning classrooms becoming available to a large number of instructors from a variety of disciplines and with varying experience in active learning pedagogy. The building's 26 classrooms comprised 7 different active learning configurations across a wide range of classroom sizes. As there were a variety of active learning classroom types, one focus of this study was to attempt to identify specific characteristics of the rooms that were beneficial or challenging.

Another aim of the study was to examine instructor perceptions of how the rooms were used and whether the rooms influenced student learning. Finally, the last goal of this study was to evaluate the effect of prior experience and knowledge of active learning on instructor perceptions of teaching in an active learning classroom. In order to examine the wide breadth of instructor experiences, we chose to conduct short, qualitative interviews with a large percentage of instructors teaching in these active learning spaces during the first year that the building was open. Through these interviews, we sought to answer the following research questions:

- 1) What aspects of the rooms did instructors find to be beneficial?
- 2) What aspects of the rooms did instructors find to be a hindrance?
- 3) Did instructors perceive the rooms to improve student learning?
- 4) How much active learning did instructors use in their teaching?
- 5) Did participation in a development program influence how faculty perceived the spaces?

## Method

### Participants

Data were collected during the final weeks of the Spring 2018 semester at a large, research-intensive university in the Midwest. This was the second semester that the building had been open and available for teaching. All instructors teaching in collaborative classrooms in a large, brand-new active learning center were eligible to participate in the study. Instructors were recruited via email; participation was completely voluntary. A total of 276 instructors met our criteria for inclusion in the study and 151 instructors completed an interview (55% response rate). These instructors discussed 147 different courses; some instructors taught multiple courses and some courses were team-taught creating a total of 176 instructor/course pairings. Of these 176 instructor/course pairings, 16 were removed because the instructor did not provide information on a specific course, 6 were removed because the coders could not reach agreement on coding, and 3 were removed because the instructors had a connection to the faculty development program. These factors led to a final total of 151 coded interviews. Of these coded interviews, 67 instructor/course pairings had been through a faculty development course transformation program. See Table 1 for information on the courses taught by the interviewed instructors.

### Interviews

In order to address the research questions of this study, structured interviews were completed. Instructors were asked what aspects of the collaborative classrooms helped and/or hindered their teaching. They were also asked to describe how the room affected more indirect constructs, such as student learning and the rigor of the class. To identify how instructors were using the rooms, they were asked to describe the types of activities the students were engaged in during the course, as well as an approximation of the percentage of time students spent collaborating. See Appendix 1 for a full list of the interview questions. The number of interview questions was kept low in order to facilitate a greater number of instructor interviews. Each interview lasted between 3 and 40 minutes, with an average of 12 minutes.

### Data Analysis Strategy

Interviews were audio recorded and transcribed. Three coders examined the initial questions concerning which elements of the room helped/hindered teaching. In order to determine the initial codes, the three coders read 20 interviews and identified categories that would be used to code the rest of the interviews. The remaining interviews

were coded by two of the three coders. Coders then compared codes and resolved disagreements. The initial agreement was 66% which improved to 96% after discussion.

**Table 1.** Number of Courses by Colleges, Academic Level and Class Size based on participation in a faculty learning community (FLC).

Colleges	FLC Instructors	Non-FLC Instructors
Agriculture	9	6
Education	1	4
Engineering	8	9
Health and Human Sciences	15	7
Liberal Arts	4	17
Pharmacy	1	9
School of Management	1	2
Science	8	7
Technology	18	13
Other	2	10
Course Level	FLC Instructors	Non-FLC Instructors
100	17	9
200	18	19
300	24	22
400	7	15
500+	1	19
Class Size	FLC Instructors	Non-FLC Instructors
≤ 25 students	7	34
26-50 students	12	17
51-75 students	25	13
76-100 students	12	6
>100 students	11	14
<b>Total</b>	<b>67</b>	<b>84</b>

## Findings

### Helpful Room Elements

Overall, instructors provided an average of 2.10 elements of the room that were helpful for their teaching ( $SD = 1.04$ , range: 0-5). There was not a significant difference between instructors who had completed the course redesign program ( $M = 2.02$ ,  $SD = 0.96$ ) and instructors who had not completed the program ( $M = 2.17$ ,  $SD = 1.10$ ;  $p = .38$ ). Coders identified

12 categories to describe the helpful elements of the active learning spaces provided by the instructors (see Table 2 for the codes of all helpful elements).

**Table 2.** Codes for elements that helped instructors' teaching based on participation in a faculty learning community.

	FLC Instructors (N=67)	Non-FLC Instructors (N=84)	All Instructors (N=151)
Seating Configuration	50	63	113
Tech Configuration	36	59	95
Instructor Access to Students	15	14	29
Pedagogical Alignment	11	13	24
Room Size	5	14	19
Natural Light	8	8	16
Room Configuration	4	1	5
Building Ambiance	2	2	4
Building Location	1	2	3
Student Ownership	0	2	2
Room Noise	1	1	2
Building Culture	0	1	1

**Seating Configuration**

The most popular category was seating configuration; 75% of all instructors mentioned some element of the seating as helping their teaching. This category included different aspects of the seating configuration including the types of desks, tables, and chairs available in the room as well as how these seating options were arranged.

For instance, one instructor said:

I invited the students to arrange the tables however they thought was comfortable for them. So, by the end of the semester we had a kind of honeycomb shaped

configuration and it really did lend itself to better discussion, more space, more comfort overall.

Another instructor discussed how the seating configuration influenced group work:

I think a circle kind of makes peers feel more equal to each other like somebody is not the head of the table so to speak...so there's sort of a nice dynamic that can be created there if you foster it. And so that's sort of the way that I get to use that room...to try to get kids to work together in groups consistently over the course of the semester."

One other instructor talked about how they were able to use the flexible seating to tailor their teaching to their specific class:

I found this class to be particularly stoic and hard to shake and that's not normally the case. And so when I realized after about four weeks that I wasn't going to be able to do my normal tricks with them, I just kind of blew up my plan and started making them get into small groups and by having the tables and the ability to force them into each other, that allowed me to do that.

**Technology Configuration**

The technological configuration of the room was also widely reported; 63% of all instructors listed at least one technological element that was helpful for their teaching. Significantly more instructors who had not completed the course redesign program (70%) mentioned technology than instructors who had completed the course redesign program (54%;  $\chi^2(151) = 4.35, p = .04$ ). The category of technology configuration encompassed all technology provided in the room, including everything from the Wi-Fi to the projectors and screens to the physical whiteboards.

One instructor illustrated how the technology allowed them to easily facilitate student presentations:

We used to struggle when the eight teams were giving presentations. They would come up to the podium and then they would begin to try to get into their email to download something and somebody would forget something, and it was just a laborious situation. Today, it's instantaneous. They've already got their presentation ready on either a laptop or a smartphone. They simply load it into Solstice and they're ready to go. And so, it just cuts the time down to almost zero. And that has given us more class time.

Another instructor described how the technology configuration in the classroom helped their teaching:

The things about the room that helped my teaching. I would say one is all of the media options that are in there. The fact that there are front screens that I can see, you know, whatever it is that I have up on the screens or up on the doc-cam. I don't have to continuously turn around and look at the slides.

One instructor shared how utilizing the whiteboards around the walls of the classroom facilitated shifts between the ways in which students discussed and conceived of course themes:

The white boards on the wall allows them to then take sort of what they put into there it's sort of presented in a bigger picture so that if we had had several discussion points they can see there's a lot of sort of synthesis that can come from it. They can redraw it and then we have sort of a public record that we can take pictures of and bring up later so that the students can communicate.

Another instructor shared that the whiteboards around the classroom helped them foster student engagement and discussion:

I like the whiteboards around so I can get them to list things that they've discussed and then they feel, I think, a little less shy to say what they've come up with because it's all there so I can ask them something that they wrote on there.

**Instructor Access**

The ability of the instructor to have physical proximity to the students was another important theme that emerged from the data; 19% of the instructors cited a helpful element in this category. One instructor described how this access allowed them to connect more to the students: "I still have 150 kids but there's an intimacy that I've not had before [with] the students because I can go through the rows you know and talk to people."

Another instructor compared their access to students in the active learning space to rooms in which they had previously taught:

I mean this is my 46th year of teaching, right, and for 45 of those years, I was in classrooms in which everything was screwed to the floor. There were no aisles and all display materials were in the front. So very obvious things are right there. One is with flexible tables, group work, being able to move around through the audience casually, you know look students in the eye, you know come right up to them and have a personal one on one conversation that the

whole group can hear just like we're doing now, is a delight.

**Table 3.** Codes for elements that hindered instructors' teaching based on participation in a FLC.

	FLC Instructors (N=67)	Non-FLC Instructors (N=84)	All Instructors (N=151)
<b>Tech Configuration</b>	22	31	53
<b>Seating Configuration</b>	21	22	43
<b>Tech Malfunction</b>	12	14	26
<b>Room Configuration</b>	8	16	24
<b>Room Supplies</b>	3	12	15
<b>Room Size</b>	4	10	14
<b>Building Culture</b>	2	9	11
<b>Room Noise</b>	3	5	8
<b>Instructor Access to Students</b>	5	2	7
<b>Outside Noise</b>	0	3	3
<b>Pedagogical Alignment</b>	0	2	2
<b>Natural Light</b>	0	2	2
<b>Building Ambiance</b>	0	2	2
<b>Building Location</b>	0	1	1

**Pedagogical Alignment**

Some instructors expressly identified how a room matched their pedagogical approach; 16% mentioned how the room allowed them to use their preferred instructional strategies. One example of this is an instructor who declared, "When I saw that room, I'm like oh my God! I can finally do it the way I want to do it!"

Another instructor described how the seating in the room aligned with group work which was a vital part of the course:

My highest priority for that particular class is to have a room that has round tables. I use small groups consistently in the class, the same small groups the whole semester. ... Having essentially round tables and chairs that students can group around them is fundamental to the course design.

### *Hindering Room Elements*

Overall, instructors provided an average of 1.41 elements of the room that hindered their teaching ( $SD = 1.07$ , range: 0-5), significantly fewer than the number of elements that helped their teaching ( $t(147) = 5.24$ ,  $p < .01$ ). However, instructors who had completed the course redesign program reported significantly fewer hindrances ( $M = 1.20$ ,  $SD = 0.85$ ) than instructors who had not completed the program ( $M = 1.57$ ,  $SD = 1.20$ ;  $t(146) = -2.08$ ,  $p = .04$ ). Coders identified 14 categories to describe the elements of the room that hindered instructors' teaching (see Table 3). The most popular categories for elements that hindered were identical to those that helped instructors' teaching: technology configuration and seating configuration. However, overall, there was less consensus in the hindering elements than the helping elements.

### **Technology Configuration**

The most consistent complaint about the active learning rooms was the configuration of technology; 35% of all instructors mentioned at least one element of the technology that hindered their teaching. As with the helpful elements, this category encompassed all the technology provided in the room, though we created a separate category for technology malfunctions.

One instructor highlighted the lack of a wireless microphone in the room:

I know this is probably [an institutional] policy, but I was a little surprised that for an active learning classroom or at least in the active learning center the only mic that supplied by [the institution] is a wired mic which I tried to use for the first two or three class periods and choked myself a couple times. So then I went through discretionary funds bought my own wireless mic which is great.

Another instructor judged several technological elements as deficient:

The layout of the whiteboards and the projection, the screens, is awkward. The screens are too small and the front of the room, the way the room is set up, so that when I'm trying to lay stuff out on the board, I have to

awkwardly transcribe things on the side whiteboards on either side of the projector, the screens.

### **Seating Configuration**

The second most common hindrance discussed was the seating; 29% of all instructors reported some element of the seating as problematic.

One instructor who was teaching in a room with individual rolling desks found the seating difficult to manage:

These damn chairs. This is just awful. It's just a completely chaotic environment. If I'm not moving [classrooms] I will do something else. But we're going to be in a different room in that has fixed tables which I would much, much rather prefer. It's interesting for me. It just makes the whole thing shambolic. If that's a word. It just makes me disorganized I think it doesn't help the students in any way. I detest it.

Another instructor talked about how the collaborative seating was not conducive to lecturing:

The tables were great when I'm doing group work. They are horrible for lecturing. So, the moment I taught I start talking and I have a slide presentation, it either has to be an infomercial or it's just horribly entertaining or I can't get them to even look at it. And so especially with the little half walls so I don't know if you've looked at those walls, those walls cover the table and I get it. Architecturally I don't want to see the clutter but what it also means is I can't see what they're doing at the table which means they feel very comfortable watching their phones looking at their computers and things like this. So, the downside to that table format is that they're never facing forward where at least half the students would pay attention anyway. They're always facing across from me so I'm not getting both ears.

### **Technology Malfunction**

In addition to criticism about what technology was provided, instructors also had issues with technology that did not function properly; 17% of instructors raised technology malfunctions that hindered their ability to teach.

One instructor criticized unreliable Internet connectivity:

So, I mean it's not necessarily room specific, but the Internet connectivity has been super spotty, the Wi-Fi specifically, and that has been a huge problem. So, the students use technology in every class. And I'll say like hey go to the CDC website and identify these things and then talk about them. Well, if they can't get to the CDC



website that's not really going to be, it's hard to move forward.

**Room Supplies**

This category was the only hindrance that showed a difference between faculty who participated in the course redesign program (5%) and faculty who did not participate in the program (14%). Ten percent of total respondents reported room supplies to be an issue. This theme was coded to include any materials provided in the room that did not include technology.

The most common complaint was the lack of whiteboard markers and erasers:

So, it's kind of stupid, but it's the lack of markers and erasers. Because if I happen to run in and I've cleaned out my bag or I don't have time to run downstairs to the lockers because I'm running late I end up having to either leave or I end up having to get rid of the white board completely which I mean we have chalk this is weird because we have chalk in all of the rooms with chalkboards. And I know that the pens are a little bit more expensive, but they can't possibly be so expensive that we can't have them. For that particular room that would probably be the biggest thing.

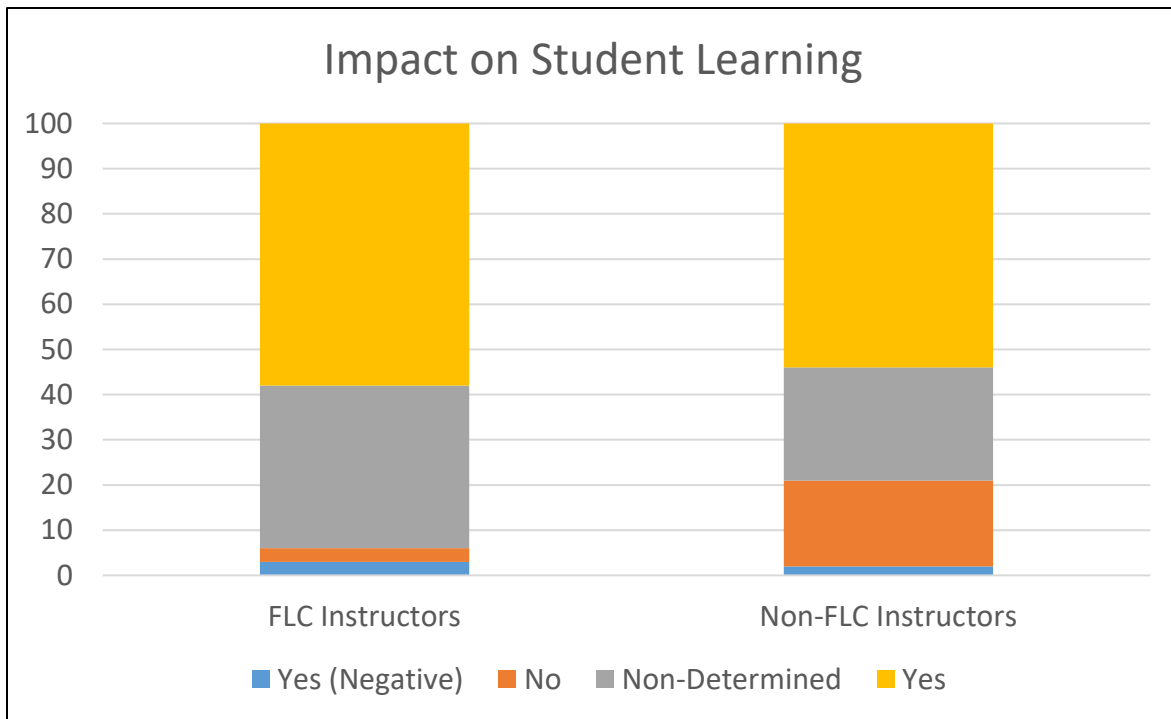
*Student Learning*

Overall, the majority of instructors (56%) reported that the active learning rooms positively affected their students' learning. Another 28% were unsure of the effect of the rooms on student learning while the rest said there was no effect (12%) or a negative effect (3%). There was also a significant difference in how instructors who participated in the course redesign program answered the student learning question compared to instructors who did not participate (see Figure 1).

When asked if they saw an impact on student learning, an instructor who had participated in the course redesign program said:

Absolutely. The grade level has gone up anywhere from half to three quarters a grade level. I made the course tougher. We never did this huge whiteboard equalizer problem before, that kind of stuff, but actually before I even did that I actually, they were doing so well I had to keep increasing the complexity of the problems, which is great cause I think they know more about it.

While another instructor, who had not participated in the course redesign program, responded about seeing an impact on student learning:



**Figure 1.** Instructor responses to whether teaching in an ALC impacted student learning based on participation in a FLC.

Oh, not really. I think for the kind of use that we're currently using it for, as a pure lecture, it really doesn't have [improved student learning]. Well, I suppose if we had more, I guess, in-class exercises where the students like work together in teams doing things it could work quite well but for just pure lecture it's not really ideal, as far as I can tell.

Although many instructors felt that the active learning spaces improved student learning, there were a number who were uncertain: "How would I know?" Many of the instructors who were unsure talked about how they hoped the rooms were affecting student learning but were not sure how to measure these changes. For instance, one instructor said:

No idea. Absolutely no idea. I'd like to think there would be. It's supposed to be more active learning activities and whether it's changed anything I have no idea. It made me a lot more uncomfortable. Listen. I wake up Friday morning and go "Oh shit" I'm out of my comfort zone. I got to do something different. For me this is this is challenging. And I think it's a good challenge. But it makes me as uncomfortable as hell.

Instructors who did report improvements in student learning were asked a follow-up question about what evidence they had to show increases in student learning. There were a variety of different types of themes that this question elicited but the most common answers were related to student engagement with the instructor or peers (42%).

One instructor clarified:

Well, I changed a lot in the class this year because I had that space. So, I made some fairly significant modifications in the class. And I can tell you ... the creativity is light years different than it was before. You know can I attribute that directly to the room? I don't know but I can tell you that being in that space where I have a spot where I can offer pieces of that class on a regular basis throughout the semester to say 'ok, now it's group time for the next hour' it's a group time I'm in here when you have questions ask me. I feel like the students have gotten a lot more, they've had a lot more interaction.

Another instructor elaborated:

It's more of a sort of qualitative feel to the way that the classes go, and I think it is very positive. The way that I set up the classes is intentionally very active and sort of collaborative. And the students, I think, they really--in the

way they utilize this space--it's obvious that they appreciate the ability to move around and rearrange desks you know and to go up to the whiteboards and just sort of work dynamically.

### *Student Collaboration*

The amount of student collaboration that instructors facilitated in their courses ranged from 0 to 100% of the class time with an average of 44% ( $SD = 25.51$ ). There was no difference in the percentage of class time used for student collaboration between instructors who participated in the course redesign program ( $M = 43.49$ ,  $SD = 21.47$ ) and instructors who did not participate ( $M = 43.59$ ,  $SD = 28.51$ ;  $p = .98$ ).

## Discussion

Overall, instructors seemed to have a positive experience teaching in the active learning spaces; instructors reported more elements of the active learning spaces that helped their instruction than elements that hindered their instruction. The most commonly reported helpful elements of the rooms included the seating configurations, the technology configurations, instructor access to students, and whether the room aligned with the instructors' pedagogy. The most frequently named hindering elements of the rooms included technology configurations, seating configurations, and technology malfunctions.

Interestingly, some of the same elements of the room were both helpful and hindering depending on the context, including the room seating and the room technology. One explanation for this may simply be the variety of seating and technology configurations that were available in the different room types. Although all of the rooms in the building were considered to be active learning spaces, the seating arrangements differed greatly: some contained rectangular tables bolted to the floor, others contained moveable hexagonal tables, and others had individual desks on wheels (these rooms were affectionately named the bumper car rooms). Therefore, it is possible that some room types were simply preferred over others or that different instructors had different preferences in seating arrangements. Similarly, the arrangement of the technology, including projectors, monitors, whiteboards etc., varied across the different rooms leading to differences in individual preferences.

However, another reason why there were such discrepancies in the viewpoints on seating arrangements may relate to the theme of pedagogical alignment. One instructor talked about how the seating would have been useful if he were doing groupwork but was not conducive for lecturing, which made up most of his class. This suggests that it may not be the specific elements of the room which



make the most difference, but whether they align with the strategies and practices preferred by the instructor.

While aligning instructor practices with specific rooms may be simple when there are just a few active learning spaces on campus, this endeavor becomes more challenging with an entire building dedicated to collaborative classrooms. To ensure that the building was fully utilized, instructors were assigned to teach in the new space because their departmental classrooms were being renovated. Many of these instructors predominately taught using lectures and now found themselves in classrooms configured for collaborative learning. While some instructors were able to easily adapt, others struggled to make the rooms work for their preferred teaching techniques. Ideally, a scheduling system could be created to match instructors with pedagogically appropriate room types.

Additionally, faculty development programs have been seen as a potential solution for helping more faculty include active learning in their courses, allowing for more instructors who are comfortable teaching in active learning spaces. As a significant portion of the instructors teaching in the active learning spaces had participated in a faculty development session, we were able to compare instructors who had participated to instructors who had not participated in the program. For the most part, the two groups of instructors were largely the same. However, instructors who had participated in the program did produce significantly fewer hindrances to their teaching and were more likely to say that the room improved student learning. Since the instructors were not randomly assigned to participate in the program, there may be other differences between the two sets of instructors, however, it is possible that an intensive program in which instructors focus and reflect on their teaching may positively influence how they perceive teaching in active learning spaces.

### Limitations & Future Directions

While sizeable in scope and sample size, our findings and conclusions are limited by the type of sampling, the relative brevity of our interview process, and the possible bias of self-selection. When soliciting instructor interviews, a truly random sample is difficult to achieve, so this study used a convenience sampling. Instructors who chose to participate might have been those with stronger opinions (positive or negative) regarding teaching in the active learning spaces. Additionally, given the breadth of subjects, our interview process required a restricted time frame allowing only for seven specific questions, without follow-up. Finally, as previously mentioned, since participation in the faculty development program was also voluntary, instructors who had gone through the program might have had more

positive views on active learning to start with, regardless of their experience in the program.

The current study focused on instructors' initial experiences teaching in the new active learning spaces. An interesting follow-up could examine how instructor perceptions have changed after teaching in the active learning spaces for several years. It is possible that teaching in the room might persuade initially reluctant instructors to move towards a more active learning teaching approach or might shift their perception of the space as less of a hindrance. Additionally, a future study could compare instructor perceptions of teaching in the active learning spaces to student perceptions of learning in the active learning spaces. Better alignment between the classroom and instructor pedagogy might be reflected in improved learning outcomes for students.

Although many universities are creating active learning spaces, it is important that they realize that the spaces themselves will not increase student learning. Rather, aligning instructor pedagogy with classroom type and providing opportunities for faculty to thoughtfully incorporate more active learning strategies into their teaching will be vital for improving student outcomes. Our study suggests that universities should allocate resources not just for creating spaces, but also for building appropriate scheduling systems and providing opportunities for faculty development focused on using active learning spaces in intentional ways.

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## Appendix 1

### Interview questions

What about the room helped your teaching?

What about the room hindered your teaching?

Can you see an impact on student? If so, how/what?

What activities are you doing in the class?

What percentage of time do students spend collaborating?

Could you do this in another classroom?

Did the rigor of the class change?