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Constructive or Disruptive? How Active Learning Environments Shape Instructional Decision-Making

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This study examined instructional shifts associated with teaching in environments optimized for active learning, including how faculty made decisions about teaching and their perceptions of how students responded to those changes. The interviews and subsequent analysis reveal a broad range of course changes, from small modifications of existing activities to large shifts towards collaborative learning, many of which emerged during the term rather than being planned in advance. The faculty discuss several factors that influenced their decisions, including prior experience, professional identity, student engagement, as well as perceived and realized affordances of the environments.

Background and Purpose

Active learning encompasses a broad range of teaching strategies that encourage students to engage more intentionally and effectively with the course subject-matter, their instructor, and their peers. Although the foundations for active learning and other student-centered teaching practices span several decades (Bonwell & Eison, 1991; Chickering & Gamson, 1987; Kuh, 2008), more recent studies and commentary have helped bring greater attention to the efficacy of these practices and have added urgency to expanding their use in higher education (Freeman et al., 2014; Wieman, 2014). As the scholarship of active learning continues to advance, administrators and instructional development professionals are grappling with how best to transform instruction on their campuses from experimenting with these practices in small pockets to more consistent and widespread adoption.

Efforts to increase the implementation of active learning pedagogies range from one-time workshops to more intensive and integrated approaches that aim to address multiple structural and cultural factors associated with reforming education (Borrego & Henderson, 2014; Corbo et al., 2016; Foote et al., 2016; Henderson et al., 2011; Kezar, 2013). Reform strategies have included increasing awareness and knowledge of student-centered teaching practices among faculty, redesigning learning spaces, modifying tenure and promotion practices to better evaluate and reward effective teaching, and forming assessment teams to systematically study and address local gaps in student outcomes. Though these strategies aim to approach the problem from different perspectives—an indication of the complexity of the challenge—they share a common goal to positively influence and support decisions instructors make about their teaching. The purpose of this study is to examine the impact of one of these institutional levers on instructional decision-making: providing broad access to environments optimized for active learning.

Early active learning classrooms (ALCs), such as those associated with the SCALE-UP (Beichner et al., 2007) and TEAL projects (Breslow, 2010), were designed to support faculty and researchers who were already using or planning to implement specific pedagogical models. These ALC designs placed the instructor in the center of the room, surrounded by circular student tables and multiple displays to ensure visibility of instructional materials. Research associated with these projects focused on assessing the combined impact of the pedagogy and modified spaces on student affect, engagement, and learning (Beichner et al., 2007; Dori & Belcher, 2005). Findings generally pointed to a positive effect, though it was difficult to isolate the individual contributions of the physical and pedagogical components.

Subsequent designs of ALCs have retained the principle of supporting group interaction, but have taken different approaches, such as using different groups sizes, more flexible furniture, and more cost-effective technologies. There has also been a growing diversity of methodological approaches to studying ALCs. For example, using quasi-experiments to compare different types of classrooms, technologies, and teaching strategies (Brooks, 2011; Cotner et al., 2013; Nicol et al., 2018; Soneral & Wyse, 2017; Stoltzfus & Libarkin, 2016; Vercellotti, 2018). Though some of these

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studies found a direct positive effect of ALCs on student learning (Brooks, 2011; Cotner et al., 2013), others found that the room design and technologies did not directly impact student grades or exam performance when similar active learning practices were used (Nicol et al., 2018; Soneral & Wyse, 2017; Stoltzfus & Libarkin, 2016; Vercellotti, 2018). On the other hand, affective measures in these studies suggest students and instructors in ALCs did have a more positive experience with active learning. There is also emerging evidence that the design of the classroom may help shift instructors toward more student-centered teaching practices, though others have found this shift may not occur without other supports (Baepler et al., 2016; Lasry et al., 2014; McDavid et al., 2018).

Our study seeks to build on this research by providing a closer examination of the decisions instructors make when teaching in an ALC and the extent to which the learning environment helps shape those decisions in comparison to other factors. Adopting a wider lens that accounts for areas of influence beyond the environment provides a more complete interpretation of factors that may help or hinder use of active learning in ALCs. Better understanding these nuances can provide insight into the value of ALCs as a lever of instructional change and how institutions can use them effectively for that purpose. Guiding our study are the following research questions:

1. How did instructors change their courses when teaching in an active learning environment for the first time?
2. What factors influenced these decisions?
3. What do the instructors perceive to be the impact of the space and course changes on student engagement?

The literature related to instructional decision-making offers a starting point for answering these questions and has informed the design of our study. Though not specifically conducted from the perspective of active learning, the work of Hora (2014, 2016) provides a comprehensive examination of instructional decision-making that has relevance to our study. His research reinforces the role of faculty knowledge and beliefs about learning in framing how instructors approach decisions about teaching, but also emphasizes the influences exerted by more concrete and context-specific aspects of the course and institution. Notably, he stresses the role of existing course artifacts (e.g. syllabi and lecture notes) in shaping changes, suggesting that instructional decisions are often constructed around maintaining and updating these artifacts within the context of related curricular and workload constraints, such as class size and research priorities. Large shifts in course designs and teaching practices, he suggests, are unlikely when these factors are perceived as barriers. These points are especially salient to our study as we seek to discern between the influences of more global abstract beliefs about learning and faculty perceptions and actions related to context-specific cues and affordances, such as the design of the learning environment.

Scholars who more specifically examined faculty use of research-based teaching strategies found similar influences, though they vary in their degree of impact. Dancy et al. (2016), who examined faculty use of peer instruction, found that higher use of these practices was associated with their dissemination through informal discussions with colleagues, though faculty did not always implement them as intended. Finelli et al. (2013) identified similar patterns in their study of faculty adoption of effective teaching practices in engineering, which examined instructional decisions from the perspective of motivation using expectancy value theory (Eccles & Wigfield, 2002). In focus groups, faculty considered access to information about effective teaching practices and a personal disposition toward teaching to be supportive. Classroom layouts with flexible furniture were also mentioned as supportive, though not as frequently as the latter factors. In contrast, faculty frequently cited time as a barrier to trying new practices, as well as concerns about student evaluations. The authors' framing of these decisions in terms of judgements about value and expectations for success provides a helpful lens for considering why instructors may decide to make changes to their teaching, while the constructs articulated by Hora (2014, 2016) help elicit the factors and processes that shape those decisions.

We incorporated these concepts and empirical findings into the conceptual framework for our study, presented in Figure 1, which informed our research design. As suggested by the literature, we delineate between idiosyncratic factors that may be unique to each instructor and those that are associated with the specific course and broader environment. The framework also includes relevant concepts drawn from the broader literature on educational reform and organizational change, such as the role of instructor identity as well as departmental and institutional cultures (Borrego & Henderson, 2014; Corbo et al., 2016; Foote et al., 2016; Henderson et al., 2011; Kezar, 2013). Some of these factors are considered global and relatively stable, such as beliefs about learning and institutional values and cultures. Others may shift more readily with time and context, such as perceived affordances of the learning environment and judgements about the value and cost of specific instructional changes. Decision-making is conceptualized as a dynamic, ongoing process involving these factors that results in specific instructional practices and/or behaviors. These can range from deliberate, planned changes made to a course prior to the term to more reactive, adaptive, and even unconscious decisions made during the course. Some of the reactive decisions are likely to emerge from an instructor's perceptions and measurements of

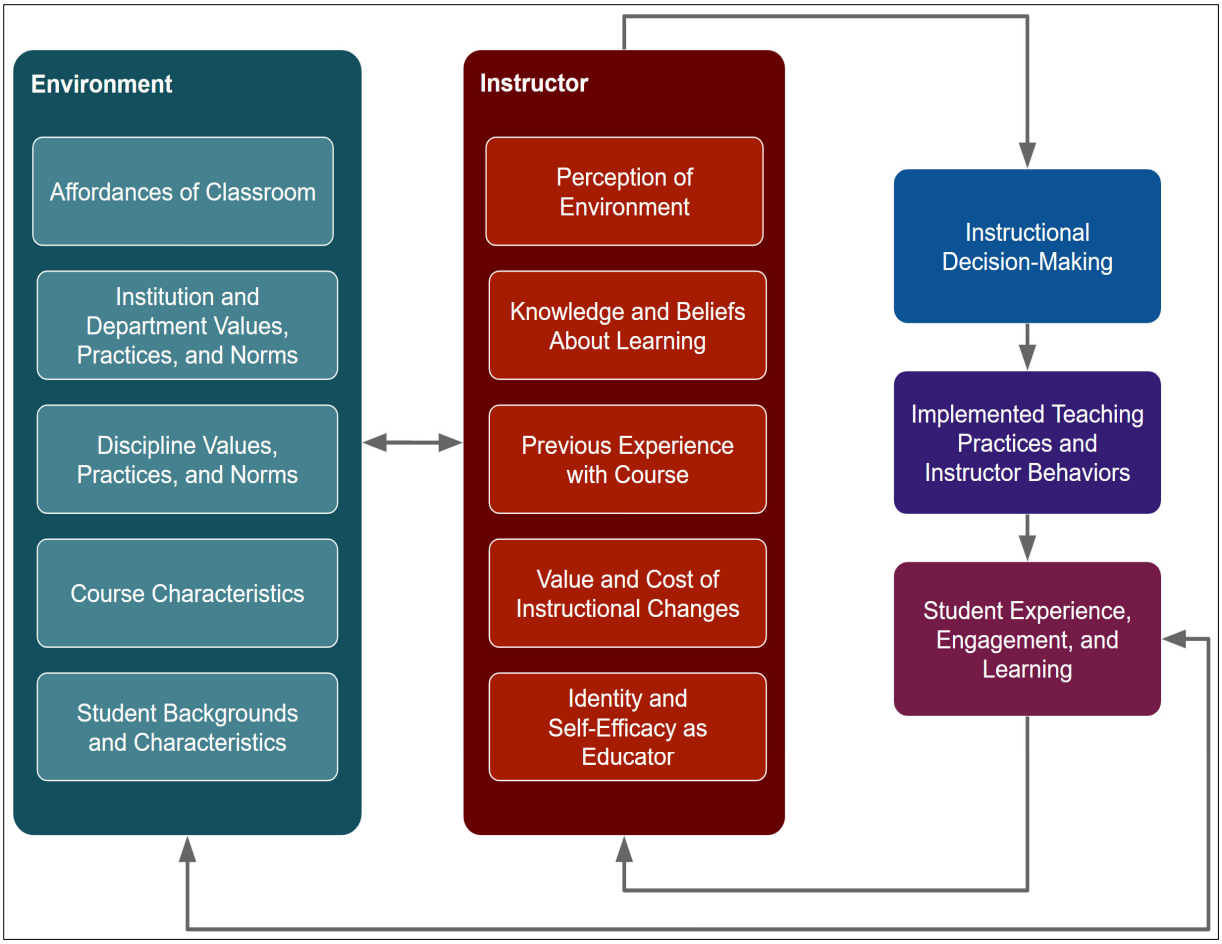

Figure 1. Conceptual Framework

student engagement and learning, which feed back into other factors, such as beliefs about learning or the cost of making changes. As our focus is on instructors, we limited our consideration of factors that could shape student engagement and learning, but it is important to recognize that this is a similarly complex process with a multitude of influences beyond the instructor's control.

Methodology

The conceptual framework and our research questions guided the design of our study and interpretation of the results. To achieve an in-depth understanding of how instructors made decisions and their perceptions of student engagement, we chose a qualitative case study approach using semi-structured interviews. The rich data gathered through interviews afford greater insight into the individual experiences and nuanced views of instructors that would be difficult to ascertain through other methods (Maxwell, 2013; Merriam & Tisdell, 2016).

Study Site and Participants

The site selected for our study is a public research university in the western United States. At the time of data collection, the institution was in the first year of implementation of a campus-wide initiative to increase the effective use of active learning strategies. The main components of this initiative included: (1) new classrooms and lecture halls optimized for active learning, and (2) an instructional development program to support instructors transitioning toward or expanding their use of active learning. The classroom design consisted of central projectors and a seating layout that placed students in small groups, each with access to a shared computer display. The lecture halls consisted of fixed tables and chairs placed in rows with additional spacing and rotating seats that enabled more convenient formation of groups. For this paper, we will use the term active learning environments (ALEs) when referring to both types of spaces together. The second component of the initiative, the instructional development

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Table 1. *Participant Background Characteristics*

Name (Pseudonym)	Title/Rank	Discipline	Type of Active Room	Program Participation
Paige	Professor	Physical Sciences	Lecture Hall	No, but known to use active learning
Kate	Assistant Professor of Teaching	Social Sciences	Classroom and Lecture Hall	No, but known to use active learning
Chris	Professor	Physical Sciences	Classroom	No
Emily	Professor	Biological Sciences	Classroom	Yes
Paul	Assistant Professor of Teaching	Engineering	Classroom	Yes
Neil	Professor	Computer Science	Lecture Hall	No

program, consisted of multiple sessions in which participants engaged with literature and peer activities focused on course design, student motivation, and related tools and technologies. Several cohorts of faculty participated in the program, which provided them with priority access to the new classrooms, but it was not a requirement to teach in these spaces.

When selecting participants for the study, we aimed for a broad representation of instructors who had taught in the new ALEs across the following characteristics: type of appointment and rank, academic discipline, type of room(s) used, and participation in the instructional development program. As detailed in Table 1, we recruited six faculty, two of whom held appointments in the Professor of Teaching series. These are a ladder-rank, tenure-track positions that emphasize both the practice and scholarship of teaching. Of the six instructors, four were known to have prior experience with active learning, with two of those instructors having participated in the instructional development program.

Measures and Data Collection

Our interviews were guided by a semi-structured interview protocol that contained 11 questions. These questions asked about the instructors teaching background, their prior experience with the course taught in the new space, how they approached preparing for and teaching their course in the new space, what influenced their decisions, and their perception of how their teaching strategies and the space impacted student engagement and learning. Follow-up questions and inquiries based on the conceptual framework of the study were also drafted for the interviewer to use at their discretion.

The interviews were conducted in 2019 and ranged in duration from 25 minutes to 55 minutes. The 11 questions were asked of all six instructors with the semi-structured format allowing for deviations from the exact order of questions as the conversations unfolded. The interviewer used follow-up questions to ensure that relevant concepts were fully explored during each interview while also allowing for participant-driven topics to emerge (Merriam & Tisdell, 2016; Patton, 2002). All interviews were recorded for subsequent transcription and analysis.

Data Analysis

We began our analysis during the data gathering stage, with the interviewer noting initial reactions to the interviews shortly after they were held. After all interviews were complete and transcribed, we began the first cycle of coding independently, using a common set of a priori codes derived from the conceptual framework, as well as empirical codes that emerged from the data (Corbin & Strauss, 2008; Merriam & Tisdell, 2016). After coding the first interview, we compared areas of agreement and disagreement, refined the codebook, recoded the first interview and then coded the remaining five interviews. Through this calibration process, we increased our inter-rater reliability from a kappa coefficient of 0.37 to an average kappa of 0.67 for all interviews, as calculated by QSR International's NVivo coding comparison tool.

The first cycle of coding yielded a consistent application of concrete, descriptive codes to the interview data. We

followed this with a second cycle, focused on identifying patterns within and across cases (Corbin & Strauss, 2008; Merriam & Tisdell, 2016). Concentrating on one research question at a time, we grouped together common sentiments shared by the participants, while also noting areas of contrast. We examined these associations within the context of the instructor characteristics and the conceptual framework to develop several themes and initial propositions that addressed the research questions. We refined these further by testing them against the interviews, verifying areas of agreement and noting exceptions. The outcome of this iterative analysis is presented in the following Findings section.

Limitations

As a qualitative study, it is important to note that while the findings of this study can help inform research and practice, they are not intended to be directly generalizable. Case studies provide insight into the experiences and perspectives of the participants involved that may or may not be transferable to other contexts (Maxwell, 2013; Merriam & Tisdell, 2016). By providing rich descriptions of the data and our interpretations, our aim is to provide sufficient detail and transparency that scholars and practitioners may determine for themselves the transferability of these findings to their own settings.

Findings

Question 1: Course Changes

In our interviews, we asked instructors several questions about how the course they were currently teaching differed from previous sessions. All instructors indicated that they changed at least one aspect of their course, typically toward greater use of active learning. However, there was significant variation in the extent of the changes and whether they were made before the term started or emerged while teaching the course.

The instructors who planned changes prior to the term were primarily those teaching in the classrooms. In discussing these changes, they indicated their intention was to increase "interactivity" and reduce the amount of time spent lecturing to better support existing course goals. For example, Paul, who taught an engineering course in the classroom, stated the following when asked about changes to his course goals:

> Probably the same goal, but I think maybe I knew that I was going to be able to achieve a bit more with some certain goals than I would've otherwise…I want them to be able to connect the concepts and the equations, that's always been the goal, but I think I just went about it a different way.

Kate, who taught social science courses in both types of spaces, planned new activities in her classroom-based course that leveraged the additional technology. Like Paul, she did not change the course goals but did feel more optimistic about being able to achieve them, stating:

> I don't think my goals changed for the [class] because that's what I had in mind all along. I did change my expectations surrounding whether I could successfully meet those goals. That's what changed.

In contrast, both Paige and Neil, who taught in the lecture halls, said that they did not plan any significant changes prior to the term as they had already incorporated interactive elements in the form of in-class questions and polling in previous sessions of the course.

Chris, who taught a physical sciences course in one of the classrooms, also did not plan significant changes prior to the term. He began the course with the intent of lecturing and writing on the whiteboard, as he had in previous terms. However, he quickly encountered challenges with this approach in the new classroom as the seating layout faced students towards their group members instead of the front of the room. In response, as the term progressed, he shifted to using the digital displays for content and began incorporating in-class activities around that content, as he discusses here:

> I talk and write on the board. That's how I did it last time, and this time that did not materialize because the room is not made for that. It's not a lecture room. It's not a lecture room at all. Really. It's an activity room...More and more as we were…getting through the [term]. I began inviting the students to answer questions during the class. So, I became more and more interactive.

While Chris' course is the most prominent example of unplanned shifts toward more active learning, all the instructors described making changes during the term that involved adding or expanding in-class activities, including Paige and Neil who did not expect to make changes. Notably, even instructors who planned changes ahead of the term also made shifts, characterizing the process as more emergent and adaptive than prescribed. Paul, for example, described his approach to his engineering class as "pretty ad hoc." Kate mentioned that she shifted from staying near the front of the room for most of the class to walking over and "launching a conversation or discussion" with students. When talking about using small group activities in the large

lecture hall, Kate also shared: "I decided after the first one was successful to spend more time doing that and I think I added another one."

Question 2: Factors Influencing Instructional Decisions

We asked participants a series of questions about what factors they considered when planning and facilitating their course. The instructors' responses ranged from broad statements about why they felt compelled to make a change in their teaching to very specific descriptions of how a given factor impacted a component of their course. We grouped these into three categories: learning environment, personal factors, and course and organizational factors.

Learning Environment

When asked about the impact of specific features of the active learning classrooms or lecture halls on their decisions, the instructors' responses indicate a clear differentiation between the two environments. The lecture hall design appears to have exerted less influence on instructional decisions. Neil and Paige recognized the affordances of the new lecture hall seating as beneficial to small group activities and did make changes to their courses but did not directly associate their decision to make those changes with the new environment. Kate, on the other hand, did report modifying her course in response to the new lecture halls, stating:

> Part of my rationale was when I saw those swivel chairs…I thought, "Okay, they don't have to get up and walk down an aisle. And they don't have to break out to the sides of the room. They can turn and be in mini groups that easily and maybe they would make an effort."

Following positive experiences with the seating layout, Kate added more discussion-based activities to her course.

In contrast to the mixed response to the lecture halls, the instructors who taught in the new classrooms consistently cited the learning environment as influential to their decision-making. Chris, described the impact this way:

> The room is really made for doing interactive exercises with the students…it is optimized for that purpose and then in an amazing way, frankly, because the room invites that kind of model…it really almost forces you to do that.

Emily also recounted lecturing less and feeling more comfortable calling on students as a result of the physical layout, noting that "it doesn't feel like you're really picking on a student so much, it's just a different environment." The additional technology provided in the room also played a role. Kate decided to add computer-based activities to her course, sharing that "that was something I'd never done or could have done in the other classrooms."

Beyond the specific features and affordances of the ALEs, the nature of them being new and somewhat exclusive also appears to have had an impact—not on any one decision, but on the broader decision to initiate changes and persist in implementing them. Paul framed this in terms of retaining access to the classroom, stating:

> If I want to stay in here, I better use it. I better do a good job. Because I know I'm going to be able to grow and I don't want to miss out.

This sentiment was shared by Kate and Chris, who mentioned that now that they changed their courses, teaching the course in a traditional room would not be feasible.

Personal Factors

All the instructors discussed at least one form of personal experience, belief, or knowledge as being influential in their instructional decisions. The most prominent of these are their sense of identity as an educator, recognition of the shortcomings of traditional lecture methods, and a belief that active learning can help address these issues.

For the two Professors of Teaching, their professional identity seems to have strongly contributed to their initial decision to modify their course. As Paul put it, "you're the teaching professor, you're supposed to be doing the new stuff." Kate also mentioned her appointment type, saying that, with respect to teaching, she was "hired for that purpose." The other four participants, who have appointments in the traditional research faculty series, did not discuss their appointment type, but did indicate that they considered themselves among the more teaching-focused faculty within their departments. Neil, for example, stated that he did not consider himself to be "a normal instructor" in how he teaches within his discipline. Chris indicated that he had previously held an administrative position focused on undergraduate education and that, for many years, has had an interest in "teaching…curriculum building…and what is the best way to learn."

The participants' prior teaching experience also weighed heavily in their decision-making. In several cases, participants expressed negative perceptions of traditional lecture methods, indicating that students in these conditions tend to focus on memorization of facts and processes rather than deeper conceptual understanding. Their decision to incorporate more active approaches to teaching was often a response to these challenges, anchored in the belief that

making a class "more interactive" would better engage students in the learning process. Neil, for example, expressed that if he does not prompt students with questions during class, "then they spend the whole time just writing and not thinking" and that he wants them to "learn how to grapple with the problem not just to soak in information." Paul, similarly, felt that after years of exposure to traditional lecture approaches, students expect to be told how to solve the problem. As he put it, the message being conveyed to students is: "here's the problem, here's how you solve it, this is the progression, this is your training as a calculator." In response to this, he dedicated class time to activities that required students to practice solving problems without much initial guidance. Emily similarly expressed that adding more interaction to her course would require that students "be thinking about their answers to questions…even if they didn't feel like volunteering them."

The participants' responses highlight the important role of identity and personal experience in making decisions about their teaching. It is clear from the examples they provided, that these have been influential throughout their careers and certainly contributed to decisions made about the courses being examined in this study. These stable personal factors are likely interacting with more context-specific factors such as the course and learning environment.

Course and Organizational Factors

The participants cited factors related to the course and organization (i.e., department, institution, or discipline) that influenced their decisions about teaching. These seemed to vary by instructor with the most consistent factor being the instructors' expectations for how students would respond to their teaching strategies. Paige, for example, expressed concerns about differences between student characteristics, with some not engaging in discussion because they are shy and others because they prefer to "just learn by themselves." Chris raised this issue as well, stating:

> I think there's an intrinsic… maybe human resistance, to be forced to participate in something that you did not necessarily sign up for or you don't really feel like doing. And I think that element may always remain, because sometimes you're just not up for it, you just want to be left alone.

Neil held a similar concern about engagement but attributed it more to the large enrollment size. In response, he started calling on students randomly to answer in class question instead of relying on volunteers.

Notably, what could have been perceived as curriculum-related constraints did not appear to have a significant impact on the participants' instructional decisions. Paige shared that her course served an important preparatory function for subsequent courses and had a common syllabus, but she still felt she had some latitude in how she chose to teach it. Emily's course also had a common syllabus, but she indicates she did not "really feel those constraints at all" and was able to add things that she wanted. Also noteworthy is that the participants did not bring up the issue of time or workload as a barrier to making changes, though a few did mention time and research priorities as a challenge for their colleagues.

On the other hand, four of the participants mentioned formal and informal instructional development as influential, both in terms of generating interest in making changes and shaping those changes. Emily, who participated in the instructional development program designed for the ALEs, shared how it impacted her:

> Participation in the [program] made me a lot braver about cutting back on lecture, but that wasn't specific to the room. The [program] really helped, but I think there was a synergistic combination of participating in the [program] and having a room that one could walk around in.

Chris, who did not participate in the central program, did recognize the importance of support stating that faculty have to be "convinced it's a good thing" and institutions "need to have a support structure for that." He also shared that he had participated in department-based programs and found value in discussing active learning in less formal settings with colleagues.

The prevalence of all three groups of factors—learning environment, personal, and course and organization—among the instructors in our study are detailed further in Table 2. Most of these topics were discussed by all instructors. However, only those that were associated with a specific instructional decision were counted as influential, as noted by a "Y" in the table.

Question 3: Perceived Impacts on Student Engagement

We asked the participating instructors to describe any changes they noticed in how students approached their learning in the new conditions. Although participants qualified their responses as anecdotal, all six instructors indicated there was a positive impact on student learning, particularly on engagement with in-class activities. They differed, though, in their assessment of the degree to which the new spaces contributed to these differences compared to the teaching methods.

When asked about shifts in student approaches to learning, instructors primarily commented on behavioral of

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Table 2. *Summary of Factors Cited as Influential to Instructional Decisions*

Factor	Paige (LH)	Neil (LH)	Kate (LH/CL)	Chris (CL)	Emily (CL)	Paul (CL)
Learning environment seating design			Y (LH and CL)	Y	Y	Y
Learning environment technology			Y (CL)	Y	Y	Y
Gaining/retaining access to new learning environments	Y		Y		Y	Y
Instructor's appointment type			Y			Y
Identity as an innovative/unique instructor	Y	Y	Y	Y	Y	Y
Dissatisfaction with traditional lecture methods	Y	Y	Y	Y	Y	Y
Belief that increasing "interaction" will increase student engagement/learning	Y	Y	Y	Y	Y	Y
Concerns about student preferences for teaching practices	Y	Y		Y	Y	
Class size		Y	Y (LH)	Y		
Participation in professional development				Y	Y	Y
Discussions with colleagues about teaching			Y	Y	Y	Y
Institutional support for teaching			Y	Y	Y	

aspects of the student learning experience, such as appearing more attentive, staying on task, and interacting more with their peers. The instructors teaching in the classrooms attributed these changes to a combination of the affordances of the space and their use of specific teaching strategies. Paul, for example, summarized the impact this way:

> The main thing I saw different in the [new classroom] was they still want to hear and see me solve something…but once I started saying: "You do a group problem." I think they then realized "Okay, I need to practice." They knew I was going to do it every class. That was their practice time…it sort of flipped a bit towards them, as a responsibility to work out the problem and practice, but they also still relied on me to say "Here's the problem you need to do."

He also commented that the ability to walk around and reach each group "engaged people who wouldn't otherwise" and there was "a big uptake in accountability." Chris similarly commented on the seating layout, saying that it "makes for a much more interactive grouping" when using this model of teaching.

Among the instructors who taught in the lecture halls, Neil noted positive changes in student engagement adding that "it's not directly because of the room, it's because it enables those [practices] in a class that big." Kate also mentioned improvements to student engagement but went further in directly associating the changes to the new environment. Comparing her course to a previous term she taught in a traditional, theater-style lecture hall, she highlighted the following:

> What was helpful was literally the structure of the seating…they did not have to get up and move around. And it seemed to me they were more willing to engage with the activity because, I don't know, I think they almost thought it was fun.

Kate also discussed the broader impact of the new learning environments, stating that the institution's investment signals that "engaged learning and engaged instruction…is important" and that students' "skills and interests and what they're taking away and getting out of their degree matters."

While the instructors indicate that the physical space and teaching methods largely improved student engagement, they did cite a few challenges. Among the persistent challenges, the instructors most frequently cited large class size and students holding unrelated side conversations as areas that were still a factor in student engagement in the new spaces, although to a lesser degree. The classrooms, specifically, also introduced a new challenge mentioned by two instructors: administering exams in the group layouts, where students have no choice but to face each other.

Discussion and Conclusion

Previous research has revealed instructional decision making to be complex, idiosyncratic, and situational (Dancy et al., 2016; Finelli et al., 2013; Hora, 2014, 2016). The decisions discussed by the faculty in our study can be characterized similarly. Though individual factors played a role in how and when faculty made decisions about teaching, some distinct patterns did emerge. Notably, the faculty made many key decisions during the term rather than before those decisions were often in the direction of increased use of active learning strategies. These mid-course decisions tended to be associated with the perceived and realized affordances of the learning environment and judgements about student engagement. In contrast, personal factors such as the participants' beliefs about learning and prior experience with the courses were mostly associated with decisions made prior to the start of the term. The design of the learning environment contributed to the degree to which instructors shifted to more complex active learning strategies, with those teaching in the classroom tending to adopt more collaborative and project-based strategies compared to brief student response questions in the lecture halls.

More closely examining the starting point for these decisions helps provide context for interpreting these instructional shifts. Most of the instructors held the view that traditional lecture approaches were not as effective, although they offered differing explanations for why. Though participants expressed some skepticism about certain active learning practices, they generally viewed the idea of increasing interaction as a promising approach to reduce ineffective note-taking and rote memorization, increase engagement in class, and encourage higher order thinking. They also shared an aspiration to improve teaching, with all participants expressing that their identity as an educator had in some way helped drive their exploration of active learning. The finding that Professors of Teaching expressed that their position created an internal expectation to utilize the active learning environments is perhaps unexpected, as our prior work has highlighted that these faculty are typically trained within their particular discipline, not in an education or discipline-based education research field (Harlow et al., 2020). So, while we identified prior experience as a driving factor of the decision-making process, identity as an educator may be a unique contributor.

Prior research suggests that, barring a catalyzing event or intervention, it is common for faculty to take an incremental approach to modifying their courses, if they modify them at all (Dancy et al., 2016; Finelli et al., 2013; Hora, 2014, 2016; Lasry et al., 2014). As Hora notes, much of course planning and design revolves around maintaining existing course artifacts (e.g., syllabi, lecture notes, and exams) rather than a wholesale redesign. Though the faculty in our study were primed with some experience with active learning and an inclination toward continuing the use of those practices, teaching in an ALE does appear to have catalyzed some course changes beyond what would have been expected otherwise. The most prominent example of this was Chris, who shifted from whiteboard-based lectures to developing multiple in-class activities, but nearly all participants indicate that they added or expanded activities as the term progressed. These findings reinforce the concept of a feedback loop in the decision-making process, not just in the form of a summative reflection at the end of the term, but throughout the term. As faculty experienced teaching in the new environments they could better understand how to leverage them. Similarly, as they implemented certain strategies, they could examine students' responses and adapt accordingly.

Our findings suggest that providing broader access to ALEs can be an effective strategy for encouraging and shaping the use of active learning pedagogies among faculty with a wide range of initial interest and experience—though a degree of buy-in upfront is likely necessary. The affordances of the learning environment, particularly those that depart significantly from traditional environments, can accelerate instructional change through both disruptive and constructive processes. They disrupt the normal cycle of maintaining course artifacts and help shape the subsequent instructional decisions. Part of this phenomenon appears to be due to the novelty associated with gaining access to these spaces, but the features of the environment also promote certain behaviors and practices (e.g., collaborative learning) while impeding others (e.g., lecturing). As suggested in our initial conceptual framework and substantiated in our findings, the exact impact may be subject to mediation and moderation by idiosyncratic factors, such as professional

identity and beliefs about learning, as well as features of the broader organizational environment, such as the value placed on teaching and learning, class enrollment sizes, and availability of supportive professional development. Though not a significant finding in our study, it is worth noting that more radical classroom designs could be a deterrent for some faculty or lead to negative experiences with active learning if not utilized as designed. To mitigate these potential issues, we recommend institutions avoid overly prescriptive or forced approaches, which—in addition to reducing agency and motivation—could hinder the adaptive and constructive processes identified in our study. As noted by our participants, experiencing teaching in the spaces and assessing student reactions provided insights that they could not generate on their own before the experience. While support prior to the term is still encouraged, instructional developers might also focus on encouraging reflection during the course and provide strategies for assessing the effectiveness of changes.

Our study adds to the literature on instructional decision-making and active learning by detailing the disruptive and constructive processes experienced by faculty teaching in environments optimized for active learning and how institutions might leverage ALEs as part of a broader strategy to encourage student-centered practices. A key finding of our study that should be further explored is the role of instructor identity and self-efficacy in their decisions to start and persist in instructional changes. Future qualitative studies that use multiple interviews, observations, and/or reflective journaling during the term could provide more nuanced insight into the role of identity as well as finer detail on the influences of the environment on instructional decisions. Qualitative studies could also be extended to students in order to better understand how they experience instructional practices in active learning environments, how that shapes decisions they make about how to engage in the class, and the degree to which that aligns with instructors' interpretations of how the environment and instructional practices affect students. To better account for the diversity of faculty, students, and institutions, broader survey-based studies should also be considered to expand the study population, test for relationships and influences identified in our study, and potentially identify new patterns among faculty who may not already be engaged with active learning. While the merits of active learning are broadly recognized, additional research in these areas will further our understanding of how to increase the use, fidelity, and effectiveness of these practices across different contexts.

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