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Active Learning Training and Classroom Renovation: Exploring Student and Faculty Perceptions in Health and Human Performance Disciplines

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Active learning spaces form an important part of university learning environments and have the potential to enhance student learning, yet studies on student and faculty perceptions of collaborative learning pedagogies indicate that many remain resistant. To overcome this resistance, an academic department developed and implemented an active learning initiative to assist faculty who are preparing to teach in a classroom newly renovated for active learning pedagogies. Five semi-structured focus groups explored perceptions of faculty and students in the inaugural classes meeting in the renovated space to identify what they perceived to have enhanced or detracted from faculty delivery of content and student learning experiences. Thematic analysis revealed three themes: positive improvements in the physical classroom environment, enhanced student engagement, and improved instructional methodology because of faulty training and classroom renovation. Key findings indicated primarily positive perceptions of the renovated physical environment, especially the tables and mobile white boards; however, participants also noted frustrations with the furniture, classroom layout, and technology influencing student engagement and effectiveness of active learning strategies. Overall, data supported the conclusion that the classroom renovation and faculty training program effectively facilitated positive learning experiences and student-instructor interactions.

Introduction

Lecture halls advocating the teacher-centric style have existed as a means of providing religious education to clergy since as early as 1079 (Beichner, 2014). Within the instructor-centered lecture, students are passive receivers of information and the teacher is recognized as the expert who disseminates information, typically via oration, to students. This mode of instruction still prevails in today's institutions of higher education (Park & Choi, 2014), enabling one professor to instruct large numbers of students. Consequently, the need for multiple sections of the same course is eliminated, faculty have time to devote their attention to other pressing demands of academia (i.e., research and grant writing), and the university preserves financial resources.

Conversely, the educational environment in an active learning classroom is student centered: instruction is purposefully designed to stimulate individual, student-to-student, and student-to-instructor interactions with content (Sabagh & Saroyan, 2014). The primary role of the instructor in active learning is to facilitate and mediate student learning. While the instructional strategies within an active learning setting may vary, the ultimate goal is to foster student construction of knowledge. Systematic reviews of active learning and team-based learning report significantly greater student mastery of content compared to lecture (Freeman et al., 2014; Swanson et al., 2019).

In recent years, research documenting the positive impact of active learning on student academic performance has heightened interest in, and support for, incorporating active learning pedagogies and spaces in higher education (Baepler, Walker, Brooks, Saichaie, & Peterson, 2016; Brooks, 2012; McConnell et al., 2017). Incorporating active-learning strategies within instruction has resulted in significantly larger student learning gains (e.g., improvement in problem solving, conceptual understanding, and examination scores) compared to lecture-based instruction (Baepler et al., 2016; Freeman et al., 2014). For example, the infusion of technology within active learning instruction combined with classroom re-design has been reported to "scale-up" student learning improvements in high enrollment undergraduate science, engineering, technology, and math (STEM) courses (Beichner et al., 2007).

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Despite university efforts to create active learning spaces (Park & Choi, 2014; Savin-Baden et al., 2008) and offer faculty active learning development opportunities (Baepler et al., 2016), some students and faculty remain resistant to active learning instruction. Multiple studies report that student resistance to group-based active learning instruction (Cavanagh, 2011; Knudson & Wallace, 2019; Machemer & Crawford, 2007; Sharma et al., 2013; White et al., 2015). Interestingly, Knudson and Meaney (2018) reported a small minority (i.e., 5-7%) of students disliked active learning instruction, while a larger proportion (17%) believed they were not responsible for helping other students learn. This finding is troubling given the importance of team-based approaches in active learning paradigms. Additionally, faculty have cited multiple barriers to implementing active learning strategies, including: time constraints; lack of resources; lack of training; disconnect between researchers and faculty; non-supportive university culture; large class size; satisfaction and comfort with current instruction modes; and fear of unfavorable student evaluations of teaching (Brownell & Tanner, 2012; Ebert-May et al., 2011; Henderson & Dancy, 2008; Henderson et al., 2018; McCrickerd, 2012; Miller & Metz, 2014; Pundak & Herscovitz, 2009; Sabagh & Saroyan, 2014).

Professional development programs in STEM disciplines have successfully empowered faculty to overcome perceived challenges, increase knowledge and confidence, and initiate active learning instruction within academic courses (e.g., Pelletreau et al., 2018; Sirum et al., 2009). Specifically, establishing learning communities comprising experienced and new faculty minimized apprehension of faculty to try new approaches to teaching (Sirum et al., 2009). While investigations examining the impact of active-learning strategies on student learning have historically been conducted in STEM disciplines (e.g., Beichner et al., 2007; Eddy & Hogan, 2014; Prince, 2004), recent research has expanded in other disciplines, such as education (Dag, Sumuer, & Durdo, 2019), kinesiology (Knudson & Meaney, 2018), and biomechanics (Knuson & Wallace, 2019). Similarly, published reports of professional development programs created to impact faculty adoption of active learning instructional techniques were historically limited to STEM faculty, but in recent years have been expanding to include university-wide programs (e.g., Birdwell & Uttamchandani, 2019; Rands & Gansemer-Topf, 2017). This transition signals a need to engage students across a myriad of disciplines within evidence-based learning processes to enhance acquisition, retention, and transfer of academic content (Ambrose et al., 2010). Therefore, students and faculty in a variety of academic disciplines may benefit from the adoption, implementation, and assessment of active learning instruction.

Study Purpose

The purpose of this qualitative study was to explore perceptions of faculty and students in health and human performance disciplines who participated in active learning instruction in a recently renovated active learning space. The overarching study research question was: *What aspects of the active learning classroom detracted from or enhanced student learning experiences?* To this end, we purposefully probed participants to identify aspects of the space that enhanced or detracted from faculty delivery of content and/or student learning experiences in the inaugural semester teaching and learning in a newly renovated, active learning classroom.

Methods

Setting

This study occurred in one academic department at a public, Hispanic-Serving Institution with the Carnegie classification doctoral university: higher research activity. At the time of data collection, more than half of the university's approximately 39,000 students identified as a racial or ethnic minority. Housed within a college of education, the academic department included four academic disciplines (athletic training, exercise and sports science, public health, and recreation), 51 full-time faculty, and approximately 3,300 students. The department partnered with the university and classroom equipment vendors to transform one classroom into an active learning space during the summer prior to the study. The classroom renovation consisted of new mobile furniture, multiple projection units, mobile whiteboards, and accessible electrical outlets to support computers and mobile technology devices (see Figures 1 and 2 for before and after photos). Built-in computers were excluded in this renovation because students often use their own smart devices and the department has mobile carts with laptop computers for use in the classroom.

Faculty were eligible to teach in the inaugural semester the renovated classroom was utilized (fall 2017) if they completed the department's active learning professional development training. The six-hour training program, Promoting Active-Learning Instruction and Research (PALIR), was delivered via a blended session format (i.e., two virtual, one face-to-face meeting) between April and August 2017 (for a complete description of the program, see Knudson & Meaney, 2018). Eighteen faculty members taught 109 graduate and 411 undergraduate students in 19 courses in the renovated classroom that semester. The total

number of courses taught within each discipline factored into classroom assignment by department leadership: athletic training (12%), exercise and sports science (11%), public health (15%), and recreation (23%). Graduate courses met weekly for 170 minutes. Most undergraduate classes (76.9%) met twice a week for 80-minute class sessions, two hybrid classes (15.4%) met weekly for an 80-mintue class session, and one class (7.7%) met three times per week for 50-minute class sessions. Average enrollment for graduate courses was 18 students (range 7-22) and 33 students (range 15-42) for undergraduate courses.

Figure 1. **Traditional lecture-style classroom space before the renovation.**

Figure 2. **Active-learning classroom space after the renovation with movable tables, chairs, white-boards, and dual projector screens.**

Reflexivity

To improve credibility of findings, the authors engaged in reflexive practices to identify assumptions, experiences, and positions that could impact data interpretation (Probst & Berenson, 2014). The lead author regularly utilizes flipped classroom, team-based learning, and other active-learning methodologies in undergraduate and graduate courses. The second member of the research team is a pedagogist who both teaches courses and conducts research encompassing teaching and learning. The third author has published research on learning biomechanical concepts, effectiveness of low-tech active learning exercises, and student beliefs about learning. Collectively, the research team's overarching assumption related to this study was that the professional development training and classroom redesign would positively impact participants' perceptions of, and engagement in, active learning instruction.

Given the researchers' potential bias for active learning pedagogies, the data analysis process included continuous conversations about the researchers' position and how to avoid influencing data analysis. In order to capture perspectives contrary to the researchers' position, a thematic codebook was developed to distinguish between participants' thoughts on the positive, negative, and neutral impact of the active learning classroom on instruction and learning. Additionally, the lead author recorded a detailed audit trail on research processes, including data collection, analysis decisions and processes, as well as researcher reflections and interpretations regarding study decisions.

Focus Group Protocols

The social cognitive principle of triadic reciprocity (Bandura, 1986) informed the development of semi-structured interview protocols. Triadic reciprocity suggests that human learning occurs within a dynamic framework and initiates interaction between one's personal factors (e.g., motivation, knowledge), environment (i.e., active learning classroom), and behaviors (e.g., engaging in collaborative learning). Bandura (1999) identified three specific stages of the environment: imposed, selected, and constructed. The imposed environment represents the current state of the situation that an individual interacts with daily. When one chooses to react and interact with these perceived imposed factors, the selected environment is created, which nurtures the creation of one's constructed environment. The act of constructing

one's environment mandates active engagement in situations and settings and often gives way to the attainment of new knowledge and behaviors. Specifically, focus group questions focused on participants' perceptions of the active learning space and whether those perceptions impacted their personal factors or collaborative learning behaviors (see Table 1).

Table 1. Sample focus group questions

Sample Faculty Focus Group Questions

- How did the set-up of the room influence your instruction?
- How did the set-up of the room influence student participation?
- What instructional strategies did you perceive to be particularly effective/in-effective for students in the classroom?

Sample Student Focus Group Questions

- How did the set-up of the room influence your participation in the class?
- How was team-based learning in this classroom compared to traditional classes?
- Do you think team-based learning enhanced/detracted from your experience this semester?

Participant Recruitment and Sample

Faculty (n=18) who taught in the active learning classroom during the fall 2017 semester received invitations to participate via email. One faculty member declined because they are a researcher in the study. Of the remaining 17 faculty members, 15 volunteered to participate. Student recruitment entailed purposeful sampling of students (n=520) enrolled in at least one class that met in the active learning classroom during the semester of the study. A member of the research team visited each class in person and read a script informing potential student participants that agreeing to engage in the focus group was voluntary and no negative consequences would result from non-participation. Sixteen students volunteered to participant, 13 of whom attended a focus group.

Participating faculty represented all four department academic disciplines: athletic training (26.7%); exercise and sports science (26.7%); public health (20.0%); and, recreation (26.7%). Participating students (n=13) included majors from all four department academic disciplines: athletic training (46.2%); exercise and sports science (23.1%); public health (15.9%); and, recreation (15.9%). At least one graduate student (n=5) and one undergraduate student (n=8) from each academic discipline participated. Tables 2 and 3 present participant characteristics.

Table 2. Demographic characteristics of participating faculty (n=15)

Faculty participants	Age in years	Sex	Teaching experience in years	Academic discipline[1]
Participant 1	60+	F	20+	PH
Participant 2	40-49	M	5-9	REC
Participant 3	30-39	M	5-9	AT
Participant 4	50-59	F	50-59	REC
Participant 5	30-39	F	5-9	AT; ESS
Participant 6	30-39	F	5-9	AT
Participant 7	30-39	F	5-9	ESS
Participant 8	40-49	F	10-14	ESS
Participant 9	30-39	M	5-9	ESS
Participant 10	40-49	M	15-19	PH; ESS
Participant 11	60+	F	20+	REC
Participant 12	30-39	F	10-14	ESS
Participant 13	30-39	M	<5	REC
Participant 14	40-49	F	15-19	AT; ESS
Participant 15	60+	F	15-19	PH

[1]AT=athletic training; ESS=exercise and sports science; PH=public health; REC=recreation

Data Collection and Analysis

Focus group interviews. Data collection occurred via five in-person focus groups with students (2 focus groups) and faculty (3 focus groups). Students volunteered to participant in one of two established student focus group sessions. Faculty shared their availability and faculty focus groups were scheduled accordingly. Focus groups for students occurred at the end of the semester and for faculty at the start of the following semester. Two study authors led the student focus groups. One study author led the faculty focus groups because the second person was the direct supervisor of participating faculty and the power differential could have potentially impacted participant responses. A graduate level trained colleague took descriptive and reflective field notes during all focus groups. Focus group sessions were audio-recorded; no compensation was provided to participants (student focus groups included food). Focus groups lasted, on average, 42 (student) and 53 (faculty) minutes. Study procedures received approval by the Texas State University Institutional Review Board and participants provided written informed consent to participate and to be audio-recorded.

Table 3. Demographic characteristics of participating students (n=13)

Student participants	Age in years	Sex	Academic status	Major [1]
Participant 16	19	F	undergraduate	AT
Participant 17	unreported	F	undergraduate	REC
Participant 18	24	F	graduate	PH
Participant 19	21	F	undergraduate	AT
Participant 20	28	F	graduate	REC
Participant 21	22	F	graduate	AT
Participant 22	23	M	undergraduate	AT
Participant 23	22	F	undergraduate	ESS
Participant 24	21	F	undergraduate	PH
Participant 25	26	F	graduate	AT
Participant 26	21	F	undergraduate	ESS
Participant 27	23	F	graduate	ESS
Participant 28	20	F	undergraduate	AT

[1]AT=athletic training; ESS=exercise and sports science; PH=public health; REC=recreation

Transcriptions. The colleague who took field notes during focus group sessions transcribed the audio recordings with cleaned up speech (Riessman, 1993). A graduate research assistant was trained by the lead author to check the transcriptions, noting discrepancies using the track changes tool in Microsoft® Word. The lead author reviewed, corrected, and finalized the transcriptions.

Investigator triangulation. To enhance the credibility of findings, multiple investigators collected and analyzed the data (Merriam & Tisdell, 2015). The two lead authors conducted the student focus groups and took descriptive and reflective field notes. The lead author and a graduate-trained colleague participated in the faculty focus. The graduate-trained colleague took field notes during all five focus groups to accurately record descriptive (e.g., factual data like date and time; nonverbal behaviors and actions of participants) and reflective (e.g., personal reflections and questions that arise during the focus group) data. The two lead authors independently analyzed all five focus groups.

Thematic analysis. The two lead authors served as the analysis team and thematically examined transcripts, audio recordings, and field notes simultaneously to increase effectiveness of data analysis (Tessier, 2012). The lead author listened to the audio recordings and recorded key ideas from each focus group into the study audit trail. The two lead authors independently reviewed transcripts and field notes, met to compare key ideas, drafted a codebook, and carried out iterative thematic coding on the focus group transcriptions. Each analyst independently coded focus group transcripts in NVivo 12 and periodically met to compare coding results, refine the codebook, and resolve coding discrepancies until consensus was reached. Five analysis meetings occurred during the ten weeks of data analysis.

Results

Three overarching themes emerged during thematic analysis: physical environment of classroom; enhanced student engagement with peers and instructors; and, the renovated space impacting instructional strategies. Descriptions of themes with representative quotes follow.

Theme 1: Physical Environment of Classroom

Participants reported physical aspects of the active learning classroom positively contributed to the learning environment. Each focus group concentrated on perceived positives of the physical environment, with less attention paid to perceived negatives. Participants spent more time discussing the modular tables than any other classroom feature. Nearly 30% of transcription content was included in codes related to tables, with faculty focus groups having considerably higher proportions of table-related codes (nearly 40% of transcription content) compared to student focus groups (approximately 12%). Faculty liked the idea of rearranging the modular table layout to meet the specific needs of the class; however, in practice, they found the process to be cumbersome and time-consuming:

> I felt like the tables were, they are designed to move but they don't move very easily, and there are quite few in class. I wanted to change the configuration of the room because I have different numbers of groups in different [classes], but it would take 5-10 minutes to move once and 5-10 minutes to move back. If you're doing that, that's about 15 minutes of every class; 15 minutes of class is lot of time. *Participant 3, faculty*

Student comments about tables focused primarily on the usefulness of the electrical and USB outlets located in the floor and in the table tops, as illustrated by the following quote:

> The outlets right on the table really helps [sic], especially with having to carry around your laptop, and you hadn't

> charged it the night before, you could just charge it while the teacher was lecturing and it wasn't distracting; you don't have to play around with the wires. *Participant 19, student*

A primary complaint from both faculty and students was that table outlets worked inconsistently:

> There was one day when I pushed [the tables] all together, but they couldn't get their plug-ins to work, so something wasn't working. *Participant 3, faculty*
>
> Yeah, but sometimes, I don't know if it was something with the outlets socket, but sometimes they wouldn't work. *Participant 20, student*

Several students also noted difficulties when seated due to the table configuration:

> If you're sitting on the sides of the table where the bars are, you can't really slide under the table so much, like your feet are kinda locked by those. *Participant 26, student*
>
> I'm the taller individual, so the table height whenever I sit down, I either have to a stretch my legs all the way underneath the table and impinge on other people's foot space to keep my knees from hitting the table top. *Participant 16, student*

All focus groups identified the two-sided, mobile, dry erase boards as useful tools in the active learning space. Specifically, participants highlighted both how the mobile boards helped students collaborate with, and learn from, each other as well as facilitate faculty assessment of student knowledge:

> I really like the portable white boards because there are almost mini-quizzes, when you give [students] a specific thing they have to accomplish and they have limited time and they turn around and share, it's about, in my class, it's about testing application, here's the information, now apply in this way, that's almost like a mini-quiz. *Participant 4, faculty*
>
> We were in our group, but what we came up with we put on each white board, and then once we were finished, you got to look at the whole room, like, "Okay, this group thought that; oh, I didn't think about this". And so that, with the whiteboards, I guess helped bring everyone together. *Participant 24, student*

The double projector screens placed on opposite classroom walls also emerged as positively contributing to the active nature of the learning space:

> I think my students liked [the double screens] because it's different. I think anything that's different is gonna change student perspective a little bit and they thought it was cool and they told me over and over how much they loved the two screens. *Participant 6, faculty*
>
> My favorite part was the two screens. I mean you don't, especially for the classes that I took in our graduate program, we are constantly moving around, we're doing all sorts of stuff. And so, it's comforting to know that you can sit anywhere, and still be able to effectively learn I guess. *Participant 25, student*

However, some participants mentioned the projector screen placement made it cumbersome for students in some seats to simultaneously view the screen and the instructor:

> That the screens were in the front and the back of the classroom really helped as far as where you sat, but then the con was the teacher didn't always walk around the room, they were in the front. If you happen to be sat [sic] in the front of the table, your back was constantly [to the instructor] and you have to turn around a lot. *Participant 18, student*
>
> There are two screens, back and front, and when I'm presenting, some have to look at the back screen [and are] not paying attention. It's hard to get eye contact with some students because they keep looking at back screen, not the front. *Participant 2, faculty*

Theme 2: Enhanced Student Engagement with Peers and Instructors

Participants indicated that the active learning classroom facilitated student engagement with course content, the instructor, and their peers. All five focus groups discussed perceived higher student engagement in the active learning space compared to traditional classroom settings, as the following quotes exemplify:

> I remember the first day of class. I noticed students were facing each other, they were in a circle and so I think that atmosphere, I noticed the difference compared to regular classroom, that they were ready to discuss and talk to each other. *Participant 12, faculty*
>
> I feel like the kind of openness of the room allows for [engagement] to happen. I forgot who said it, but when in traditional settings, when you're sitting at the back of class, you may not be as inclined to raise your hand and ask questions […] But this openness of the classroom allows you to ask your neighbor or to speak up and ask the professor just because of the discussion-based aspect of the classroom. *Participant 20, student*

Students reported that engagement with peers positively impacted their learning experience in the active learning space, as the following quotes summarizes:

> I really do feel, though, like the environment really helped our class interact with each other, and really get to know each other because you're constantly talking […] everybody's constantly interacting with each other, but it's in a positive way. It's, you know, "Hey, how did you do on your article?" You know, "what did you put for this?" So, I don't know, I just feel like it's, I think it benefited me in a positive way and it really did enhance my learning. *Participant 25, student*

> I think [the active learning classroom] definitely enhances that active portion of learning, which I feel is super necessary, just because it allows you to gather the insights from different people within your group, then your pod. That discussion taking place, it allows you to express your thoughts that you are having to help you find better ways of thinking, better solutions, things like that, as opposed to sitting and looking at a lecture slide, and trying to retain it all and get, I guess, the main points out of it. *Participant 20, student*

However, it was noted that sometimes peer-to-peer communication could take over the discussion, detracting from the learning environment:

> There's sometimes difficulty with focusing, because it's really easy to be like, "Hey, I didn't understand this, can you help me out?" It's also really easy at the same time, especially with grad classes that are three hours [long], to veer that conversation. *Participant 22, student*
>
> But the other thing that's kind of negative for me, maybe this is my instruction style, but [students] start talking among themselves a lot; […] it makes it hard to pull them back together. *Participant 1, faculty*

Additionally, students shared that the active learning classroom enhanced the instructor-student relationship by providing engagement opportunities, as the following quote illustrates:

> I feel like I've gotten to know [faculty member] a lot better and I feel I can go to her outside of class and, when she's in her office, ask her questions and feel comfortable being around her. Or maybe even started feeling comfortable enough around her to, even if it's not class related, going and talking to her about grad school stress and things like that. So, I think [the active learning classroom] kinda helps start that relationship. *Participant 28, student*

Theme 3: Renovated Space Impacting Instructional Strategies

The idea that the renovated space, itself, impacted instructional strategies emerged as a theme during the thematic analysis, as the following faculty participants communicated:

> I think for me it was like a visual reminder to incorporate more active learning tools. So, just being in that classroom was an extra reminder; it was always in my mind that I should incorporate some different tools, help [students] do some active learning. I think I used lots of different types of tools throughout that class; we did some small groups, some big groups, people on one table are sharing other things like tablet and little online interactive things. […] even if was something I did the previous semester in the last classroom which seemed like a normal time to lecture for, but it's like too long in the active learning [classroom] where I felt pressure from the environment, like, "okay, they are ready to do something different". Participant 12, faculty
>
> When I'm teaching in a more traditional classroom setting, one or two group discussions would be enough in the class. But last semester I used that active learning environment to focus more on group discussion, more group exercise for students. I feel less obligated, but encouraged more group work, because the setting helped me create more active learning outcome activities. Because of the setting, I applied more group discussions for the students. *Participant 2, faculty*

Participants believed active-learning and team-based strategies worked better in the active learning classroom compared to traditional classrooms; specifically, faculty reported think-pair-share, jigsaw, and case study activities as especially effective. The following quotes reveal how the space positively contributing to team-based learning activities:

> I feel like my class was much more productive in the active learning [classroom] and they got more out of it. We had more conversation instead of me just standing in front lecturing. Because they are not as mobile in other classrooms, it's hard doing some other things that I like to do, like team-based learning. It's hard for me to do that in those other classrooms, I still do it, and I didn't think that's as productive; I don't think I would get as good an outcome [if] I was doing it back in those other classrooms. *Participant 5, faculty*
>
> I also think that the team-based learning has helped develop communication skills as well as working with the team […] and I think that develops really important life skills that you're gonna need, especially when you get out of college, because you're gonna be working with people every day, and having to be on a collaborative team, and a lot of the activities that happened in the [active learning] room, we had to work together in order to come to a solution […] was really helpful in the room. *Participant 21, student*

Some faculty stated traditional, teacher-centric lectures and delivery of individual examinations were ineffective in the active learning space, as the following quote illustrates:

> I think the lecture is less effective, it doesn't match with that classroom just because [students] are not facing in the same direction and if I can't see their faces, they're probably gonna lose interest quicker, get distracted by other things, or talk a little bit more because they are facing their friends. So, that's probably a less conducive format for lecturing […] I thought it was hard to give exams: I walked around but when they are sitting that

close to each other there's no way that you can really… [*Participant #12 interjecting:* See if they are not looking at each other] …yeah. *Participant 13, faculty*

Discussion

This qualitative study explored perceptions of students and faculty who taught or attended class in a newly renovated active learning space as part of an academic department's active learning initiative. Key findings from thematic analysis indicated primarily positive perceptions of the renovated physical environment, especially the modular tables and mobile white boards. This positive perception was consistent with quantitative ratings of the furniture and classroom layout as positive by over 90% of students in an earlier study phase (Knudson & Meaney, 2018). Perceived increases in student engagement and enhancements to instructional methods also emerged as salient themes. Additionally, students and faculty noted frustrations with the furniture, classroom layout, and technology that may influence student engagement and effectiveness of active learning pedagogies.

The impact of physical learning spaces on student attitudes and behaviors has long been considered an important factor in learning (Weinstien,1979). As higher education has shifted from teacher-centric to student-centric methods in recent years, research on active-learning spaces has expanded (Brooks, 2012; Park & Choi, 2014). Students and instructors in the current study perceived an increase in student cooperative learning behaviors in the active learning classroom compared to their previous experience in traditional classrooms. This positive perception of facilitated interaction from active learning classrooms is consistent with prior studies (Clinton & Wilson, 2019; Parsons, 2017; Sawyers et al., 2016). For example, students in science disciplines had more positive attitudes about movable tables and chairs over fixed auditorium seats (Young et al., 2017). Similarly, students in this study reported that the modular tables facilitated their ability to engage with classmates and instructors more easily than in a traditional layout.

Additionally, students and faculty in the current study reported that the classroom design, tables, and mobile white boards enhanced the learning environment by facilitating peer-to-peer and student-to-instructor interactions. This finding connects to prior assertations that spaces designed for active learning processes can facilitate learning behaviors and pedagogical practices to support student engagement (Rands & Gansemer-Topf, 2017). Future studies should explore whether student collaborative learning behaviors increase compared to traditional classroom spaces and furniture, as only a few studies have directly measured these behaviors in active learning classrooms (Brooks, 2012). Such inquiry would help separate actual benefits from positive opinions about new, moveable furniture.

Participants reported that the faculty training program and renovated classroom improved instructional methods, suggesting that the program was successful in encouraging faculty to utilize active learning strategies. This interaction of instructional space and equipment with instruction is consistent with prior reports (Choi et al., 2014; Sawyers et al., 2016) and underscores the necessity of policies and trainings to support faculty development of pedagogical approaches in active learning spaces (McDavid, Parker, Burgess, Robertshaw, & Doan, 2019). We agree with Herrmann's (2013) call for exploring how collaborative learning might promote a deep approach to learning and the role and impact of the teacher in the collaborative learning process. Future research should explore this theme of the interaction of renovation of classroom spaces with instructors and the instructional methods they implement.

While student and faculty perceptions of facilitated collaboration and engagement from the renovated classroom support the faculty training program, data are needed on student learning. There are few studies attempting to separate effects of classroom design and active learning pedagogies on student learning, and their results are inconsistent (Brooks, 2012). Some studies reported significant improvements in learning attributable to classroom design (Brooks, 2011; Cotner et al., 2013) while others report no improvement (Choi et al., 2014; Stoltzfus & Libarkin, 2016), or impacts moderated by the instructor (McArthur, 2015). Given the interaction of space design, technology, students, instructors, and pedagogy, future investigations including all of these factors show the most promise in advancing our understanding of the effectiveness of instructional innovations.

Faculty and students in the current study lamented that classroom technology functioned inconsistently, wasting limited class time. Given the relatively high cost for active-learning classrooms, it is prudent for universities to invest in user-friendly technology that functions consistently or emphasize low-tech options that preliminary evidence reports to be just as effective as high-technology classrooms (Knudson & Wallace, 2019; Nicol et al., 2018). Weighing the cost of implementation of electronic technology in active learning spaces should consider both the anticipated reliability of the technology and the student learning outcomes when used by large numbers of students in many classes. We noted that some frustrations did not result from furniture and classroom design, but from facility software and wireless network difficulties.

Study Limitations and Strengths

Limitations include the inherent constraints of time and context of qualitative inquiry, which does not aim to be generalizable (Lincoln & Guba, 1985). Regarding sampling of student participants, those who self-selected to be in the focus groups may not be representative of all students who took a course in the active learning classroom. For example, previous quantitative analysis of perceptions of most students in the renovated classroom indicated that some students had negative perceptions of working with or helping other students to learn (Knudson & Meaney, 2018). It is unclear whether students with negative perceptions of active learning would be as likely to volunteer for a focus group as students more accepting of collaborative learning would be. Additionally, the pre-determined focus group dates may have excluded otherwise willing participants. Despite these limitations, the current study adds to the literature on the experiences and perceptions of university students and faculty in active learning spaces. It also provides evidence from a relatively diverse group of academic disciplines.

Study strengths include use of multiple strategies to promote robustness and credibility of data of study findings. First, authors engaged in reflective practices individually and as a research team (Probst & Berenson, 2014) throughout all stages of the study to identify and describe relevant biases, assumptions, and theoretical foundations guiding and impacting the study. Second, a multi-person analysis team allowed for multiple possible interpretations and disagreements, which strengthen coding and analysis processes (Barbour, 2001). Third, the lead author kept a detailed audit trail of study procedures and methodology decisions made throughout the study. Finally, authors provided rich descriptions to contextualize the study in an effort to help others determine whether findings are transferrable to other contexts.

Conclusion

Findings of this qualitative study revealed participants teaching and learning in a newly renovated active learning classroom believed the space effectively created positive learning experiences and facilitated student-student and student-instructor engagement. This study observed positive perceptions of the active learning classroom within three emergent themes: positive improvements to the physical space, enhanced student engagement with others and course content, and impacts of the renovated space on instructional methodology. Overall, data support the conclusion that the learning space renovation and supporting faculty training program were effective in creating positive experiences and interactions with students and faculty in several academic disciplines related to health and human performance.

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