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Exploring the Level of Engagement of Capstone Students in an Active Learning Center

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ABSTRACT:

This study provides a qualitative exploration of the level of engagement of Capstone students attending course meetings in an Active Learning Center (ALC) during their own respective semester at a public research university in the Boston area. A design-based research methodology was employed to study innovative learning environments encompassing learning in context. Study results uncovered three themes regarding the impact of the learning space on students' perceptions of learning and levels of engagement; revealed that one particular tool, the use of small white boards, encouraged deep thinking and reflection; and indicated that the ALC provided a highly collaborative experience.

KEYWORDS:
Active Learning, Learning Spaces, Design-Based Research, Student Engagement

INTRODUCTION

Purpose of Study

The purpose of this study was to explore the level of engagement of Capstone students who attended course meetings in an Active Learning Center, also referred to in the literature as Active Learning Classrooms (acronym used for both environments: ALC) (Fournier St-Laurent & Poellhuber, 2018). Three distinct groups of Capstone students at a public research university in the Boston area met in an ALC, with each group meeting during their own respective semester.

Talbert et al. (2018) discuss common characteristics of ALCs as "*classrooms*, that is, formal spaces in which learners convene for educational activities, not less-formal learning spaces such as faculty offices, library study spaces, or 'in-between' spaces located in hallways or foyers" (p. 2). Also, "ALCs include *deliberate architectural and design attributes that are specifically intended to promote active learning*" (p. 2). [italicized content above from researchers noted here.]

Active learning "develops and uses modes of instruction grounded in social constructivist theories and technological innovations to engage students and focus more intentionally on learning processes to improve learning outcomes" (Cassidy et al., 2019, p. 1). Proponents of active learning seek to respond to the challenges and the complexities of becoming a knowledge society, an evolutionary process

that requires emphasis on critical thinking, problem solving, and collaboration, each of which is an inherent skill of active learning (Cassidy et al. 2019, p. 1). There are also various research strands being addressed in the literature, such as how pedagogy and physical space influence each other; exploring the effects of ALCs on student perceptions and academic performance; and studying how different models for such ALC spaces compare to teaching and learning in traditional classrooms (Educause, 2017, p. 1). This research will contribute to understanding the effects of teaching and learning in an ALC; thus, this study considers both the faculty member's experience and the experience of students participating in a newly equipped Active Learning Center.

Rationale

Research has been undertaken to determine the effects of active learning methodologies in many different disciplines. One study found that a problem-based active learning model affects students' conceptual development positively and keeps their misconceptions at the lowest level (Akınoğlu & Tandoğan, 2007). Roach (2014) found that students respond positively to flipped learning (defined as an active learning methodology), and that flipped learning is beneficial as an instructional design across student groups in a classroom at the collegiate level.

Fink (2003) discussed the fundamental need for students to have a significant learning experience. Fink (2003) suggests that if significant learning

experiences occurred more frequently and more consistently in higher education, everyone – faculty, students, parents, institutions, and society at large – would be more satisfied with the quality of higher education than they are at the present time (p. 6). Fink (2003) asserts that active learning is a way to address this need to foster significant learning experiences (p. 6).

Research by Park and Choi (2014) compared the educational effects of students' learning in the active learning center to the results obtained in the traditional classroom. Their results revealed the existence of a 'golden zone' and a 'shadow zone' in the traditional classroom. These zones discriminate students' learning experiences depending on seating positions. On the contrary, the ALC did not produce such positional discrimination (Park & Choi, 2014, p. 749). However, the researchers found one interesting mediating factor occurring in the traditional classroom setting; students with high GPAs were more motivated to learn than students with low GPAs. Conversely, in the ALC setting this gap in levels of motivation to learn was offset (p. 749).

The research focus for this paper explores the engagement and learning experiences of graduate students in an Active Learning environment at a public research university. The research question is as follows: *What are the learning experiences and levels of engagement for graduate students participating in their culminating Capstone course in an active learning environment?*

LITERATURE REVIEW: ACTIVE LEARNING, STUDENT ENGAGEMENT, PEDAGOGICAL CHOICES

The differences between active learning and traditional instruction generally lie in the roles of the students and the instructor in these different learning environments (Fournier St.-Laurent & Poelhuber, 2018, p. 2). During lectures, the role of students is to receive knowledge passively; whereas, in activity-based learning, the role of students is to take responsibility and remain involved. Lectures have been found to be better for initial presentation of information, while active learning methods and activities are best at reinforcing concepts (Boctor, 2013, p. 97). Activities can center on using clickers in the classroom, problem-solving, case studies, game play, researching new ideas, taking the lead in a project, to mention a few activities typically hosted in an ALC (Fournier St.-Laurent & Poelhuber, 2018, p. 2). One study of particular interest was how active learning is explained or justified to students. Brigati et al. (2019) investigated instructors' justification to students about the use of active learning and student perception of why instructors use active learning. Results from this study found that students were more likely to remember instructor justifications from the first day of class if the instructor justified active learning use in general rather than justifying only individual active learning types. Many students, however, did not recall any

instructor explanation; students most often remembered their instructors saying that active learning keeps students engaged and helps students learn (p. 45).

Fournier St.-Laurent and Poellhuber (2018) researched an instance of the shift from a teacher-centered to a learner-centered paradigm with accompanying active learning methods and found that "minor increases in student-centered teaching approaches result in significant pedagogical changes when they are studied qualitatively" (p. 1). The University of West Alabama (2017) adopted a shift toward a more student-centered approach to teaching in their ALC such that students explore, communicate, and elaborate on the content being taught. University researchers/faculty members reported improved learning outcomes and faster processing of concepts and techniques among their students (p. 1).

One aspect of active learning is the level of student engagement and participation in their learning. Van Ambrugh et al. (2007) "think of the learning process as 'the continuum of engagement,' where students are presented with multiple pathways to engage in learning that must begin with being actively engaged in the classroom" (p. 1). Further, "active learning can be viewed as the first step along an experiential learning continuum that promotes more substantive learning outcomes" (Van Ambrugh et al., 2007, p. 2).

Talbert and Mor-Avi (2018) conducted a review of published research on ALCs to date; this research was sponsored by Steelcase. What they found is that "ALCs are connected with improved student engagement" (p. 3). They shared a

framework for understanding student engagement (Talbert & Mor-Avi, 2018, p. 3) depicted in Figure 1, below:

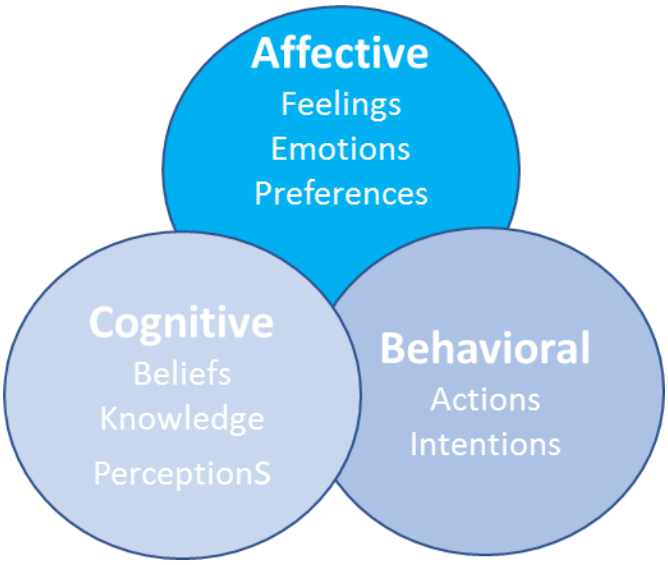


Figure 1: A framework for understanding student engagement
(Talbert & Mor-Avi, 2018, p. 3)

Medina (2017) asked if the active learning strategy makes students' thinking visible (p. 1). Medina (2017) postulates:

> The visible thinking results from students talking, writing, or demonstrating a skill and it allows faculty to evaluate the thinking and ultimately the learning outcome. When active learning makes students' thinking visible, it allows faculty members to reinforce or remediate concepts in the moment. This allows faculty members to provide valuable learning feedback and close the active learning loop. (p. 1)

The overarching goal is to create "an academic atmosphere in which each space is like the middle of the classroom [where] students become more interested, motivated, and involved in the learning experience" (Park & Choi, 2014, p. 762). The word "space" above is intentional. Literature in the field discusses the reasons and results of classroom design and educational spaces. "This spatial issue has become a recent challenge to higher education in many countries, and universities are now searching for new approaches" (Park & Choi, 2014, p. 751). "Learning is influenced by how classrooms are designed and constructed" (Park & Choi, 2014, p. 751). Siegel and Claydon (2016) discuss how professors have redesigned course work and class time to utilize technology and space more effectively (p. 24).

Felix and Brown (2011) make a case for creating a learning space performance rating system which will define a common, updatable standard for learning spaces that can be used to guide the design of new spaces, assess the design of existing spaces, and create a platform for comparison across institutions through a third-party certification (p. 1).

Brown (2015), in subsequent research, discusses seven principles for classroom design that should be considered in an active learning space rating system. The higher the score on this rating system, the better the design for active learning (p. 1). The seven principles follow:

1. Design aligns with the campus context

2. Planning and design process is based on research and documented best practices
3. Providing support and operations to help faculty take full advantage of the ALC's features
4. Addressing the human needs (physical comfort) in the ALC
5. Considering the layout and furnishings in the ALC
6. Providing tools and technology to support learning activities
7. Anticipating innovations in the ALC
(pp. 4-7)

Brown (2015) asserts that to maximize success a learning space's design must align with overarching campus plans, strategies, and support infrastructures.

Below are two pictures taken from the research site of this study, provided to give the reader a sense of the feelings evoked by classroom designs.

Figure 2: Traditional, lecture-style classroom at a public research university

Figure 3: The new Active Learning Center (ALC) at same public research university (Photos courtesy of ALC Learning Community Colleagues)

Of note: The active learning classroom depicted in Figure 3 above is located directly across the hall from the traditional classroom depicted in Figure 2, above, creating a stark contrast for anyone walking down the hallway, passing both open doorways. In fact, faculty members who teach in the active learning classroom note the room appears so inviting that it is common for curious passers-by to wander into the active learning classroom in the middle of course meetings, immersing themselves in the environment.

Sweet et al. (2018) see a link between space design and the enhancement of deep learning. They posit the following linkages:

Space Design	Enhancement of Deep Learning
Circular seating	Promotes student class participation through large-group discussion
Cluster seating (groups of 3-5)	Promotes interaction through problem-based activities
Visual Spaces	Encourages students to make learning visible while sharing with others (p. 9)

Research is also indicating that space or classroom design is influencing pedagogical choices and even the role of faculty in the ALC. Siegel and Claydon (2016) indicate that faculty participating in ALCs "redesigned course work and class time to maximize the opportunities they had in the ALC, including use of space, furniture, and upgraded technology" (p. 28). Park and Choi (2014) (citing research conducted by Alexander, 2008, et al.) discuss the impact on instructors who held classes in the ALC, noting that the role of faculty is shifting from relaying information to serving as a learning coach and facilitator (pp. 752-753).

The University of Arizona (2017) found that their ALC is empowering educators. "Administrators recognized the space as an asset to attract and retain teaching talent – and to bring out the best in these educators. Faculty using the space found the experience more effective and satisfying" (p. 2).

DESIGN OF THE STUDY

The purpose of this qualitative study was to explore student and faculty reflections about their learning experiences in the Active Learning Center (ALC). Creswell (2012) defines a qualitative study as research that involves: (1) gathering information on a single concept or phenomenon, (2) having participants share their ideas and experiences and build general themes on those ideas, (3) employing an intentionally open-ended stance on the researcher's part, and (4) seeking a deeper understanding of the views of a group or single individuals. In qualitative research, researchers do not compare groups or relate variables (p. 128). This particular study, therefore, will view the phenomenon of the engagement and learning experiences in the Active Learning Center through a qualitative lens and, more specifically, employ a design-based research methodology.

METHODOLOGY

In light of the research question -- *What are the learning experiences and levels of engagement for graduate students participating in their culminating Capstone course in an active learning environment?* – this researcher concluded that design-based research (DBR) is the methodology that would best answer this research question. Sandoval and Bell (2004) describe design-based research as pursuing "the goals of developing effective learning environments and using such

environments as natural laboratories to study learning and teaching" (p. 200). This research "paradigm has evolved primarily as a means for studying innovative learning environments, often including new educational technologies or other complex approaches, in classroom settings" (p. 200). Baumgartner et al. (2003) argue that "design-based research can help create and extend knowledge about developing, enacting, and sustaining innovative learning environments" (p. 5). One key feature of DBR is the "study of learning in context" (Baumgartner et al., 2003, p. 5). The overall goals of design-based research are to (1) understand learning, (2) observe and acknowledge the unpredictability of the educational setting, and (3) influence educational practice (Sandoval & Bell, 2004).

Research by Reimann (2011) discussed the key aspects of design-based research as encompassing a process orientation, being qualitative in nature, and involving the unfolding of learning events in the classroom, and the shifts in students' reasoning and learning. The researcher's task is to establish that the shifts in students' learning would not have occurred without the support provided by the instructional design and that a specific competence has been developed through participation in the specific design experience (i.e., the active learning environment) (p. 44). Another key focus with design-based research is the search for causal processes. Such a search often involves the use of a causal process mapping tool such as the causal loop diagram featured below (Figure 4). A causal loop diagram illustrates the interconnections in a dynamic learning process. Design-based research is also

based on an interactive, iterative, flexibility process that encourages collaboration among the participants and researchers (Wang & Hannafin, 2005, p. 9).

The researchers, faculty members, instructional designers and a couple of administrators associated with the ALC engaged in monthly Communities of Practice (CoP) to discuss and reflect publicly on our experiences in the ALC. From those discussions, we would individually or collectively implement new practices as part of this iterative process. Based on our CoP conversations, our iterative and collaborative process can be illustrated as such:

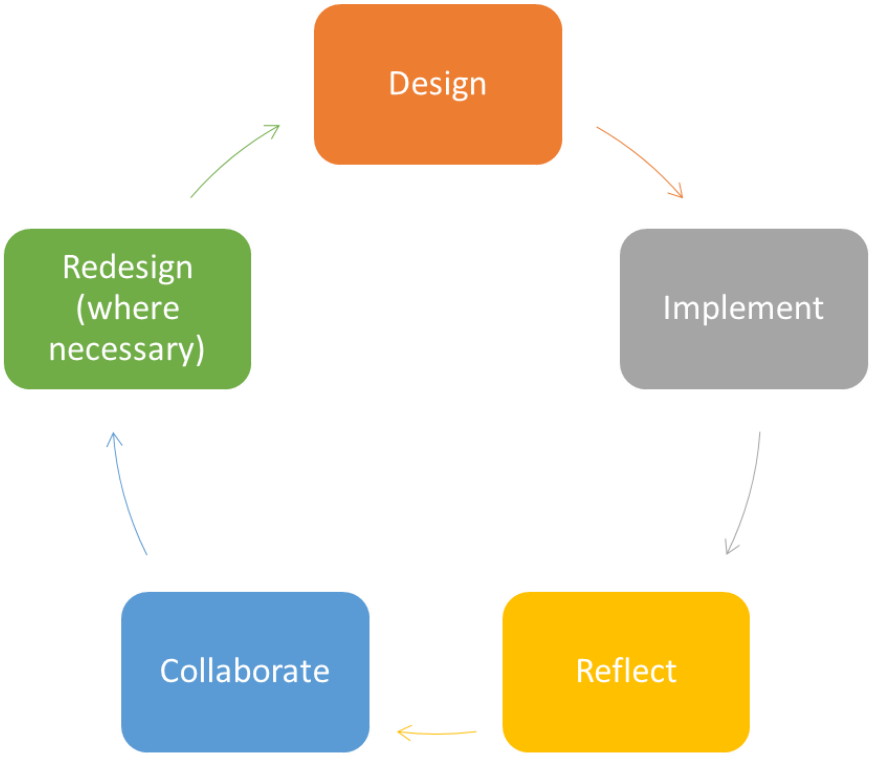


Figure 4: Design-based research overview emanating from Community of Practice (CoP) involvement

The active learning environment designed at this public research university was the first such environment designed at this university for the joint goals of creating a different and more engaging learning environment and simultaneously designed as a learning laboratory for the faculty members who volunteered to undertake research on the effectiveness and efficacy of this active learning environment which will be discussed in more detail below. As such the active learning initiative met the criteria for design-based research. The research undertaken at the ALC has involved the study of learning in context as that learning has unfolded.

DATA COLLECTION OVERVIEW

Data Collection Methods

There will be four forms of data collection: (1) an observation of the participants in the Active Learning Center by a faculty member not associated with the department or with the students being observed (2) self-reflective journal entries I have produced as the faculty member and researcher of this paper (3) self-reflective journals drafted by participants in the Active Learning Center and (4) data from pre- and post-surveys that were administered by Steelcase Education to student and faculty users of the ALC, which data were analyzed by Steelcase Education then shared back to lead members of the institution's active learning initiative. The students were not required to complete these pre- and post-surveys

but did so by choice and anonymously. The observational period was 2 hours in length. The observation protocol is provided in the Appendix.

Participants kept a journal of their learning experiences and engagement throughout each of their respective semesters. As the instructor/researcher, I recommended that study participants draft a weekly journal entry regarding their learning experiences and engagement in the learning.

SITE SELECTION

In September 2016, two colleges from this public research university co-proposed repurposing a 30-foot by 40-foot suite of adjoining classrooms to create an Active Learning Flex Space and Simulation Classroom. This space includes an adjacent observation room wherein educators and researchers can directly observe experimental classroom and lesson designs in real time.

As noted in policy statements from this public research university, “space is considered a scarce resource,” and “space requests for functions or programs strongly linked to the university’s mission, strategic plan or other stated campus priorities will be given priority over competing requests” (internal document/facilities/space).

The Active Learning Center was renovated from this proposed repurposed classroom with the help of a grant received at the end of 2017 from Steelcase

Education[1]. The room selected conformed to Steelcase Education's criteria as a space adequate to create an all-in-one classroom with discrete zones to support key [learning] activities. See below for a picture of the proposed room before renovation.

Figure 5: Proposed repurposed space before awarded grant by Steelcase Education for ALC

THE PARTICIPANTS

This research consisted of collecting data from the Capstone students who registered for this course during either the Spring 2018 semester, Fall 2018 semester or the Spring 2019 semester. The Capstone is the culminating final project for graduate students in the institution's Instructional Design Master's program. For

[1] Research sponsored in part by Steelcase Education.

this Capstone experience students are required to undertake a semester-long project wherein they uncover an organizational issue, ground that issue with relevant academic research, interview key stakeholders familiar with the project, design and develop the necessary learning and development intervention to address the organizational issue. Inherent in this Capstone process is the application of skills needed to solve problems, collaborate with others, engage in conflict resolution, when appropriate, and infuse their project and design work with creativity—all skills that link to the underlying purposes of active learning.

PARTICIPANT RECRUITMENT STRATEGIES

Purposeful sampling was employed for both participant and site selection and, specifically, theory or concept sampling was employed. Theory or concept sampling is a purposeful sampling strategy whereby the sites selected can help the researcher generate or discover specific concepts within the theory (Creswell, 2014, p. 208).

The graduate students who participated in this study are all over the age of 18 years and consisted of different ratios of male-female each semester. Racial/ethnic data was not available to this researcher and has no direct bearing on the research question this study addresses.

Inclusionary criteria: participation in this study was not based on any inclusionary characteristics. All graduate students taking a capstone class during one of the three semesters during which this study was conducted were invited to

participate and all students in each the three course sections, in fact, did elect to participate, voluntarily.

Exclusionary criteria: This study is not based on any exclusionary characteristics that would disqualify prospective participants from inclusion in the study. The pool of graduate students taking a capstone class during one of the three semesters during which this study was conducted comprised the pool of prospective participants with no exclusions and a 100% voluntary participation rate.

A letter went out to each student electronically explaining the new Active Learning Center (ALC) on campus and that we would like to use this room for three meeting times during their Capstone experience. The purpose of our meeting on campus was explained in the letter as:

1. To give you the opportunity to meet in person with each other to discuss your Capstone projects and to receive input/feedback from both your fellow students and the professor

2. Being in the Active Learning Center will provide the professor the opportunity to undertake research on the level of engagement and learning in the ALC

An informed consent and assent form was provided to each student individually to explain in more detail the study procedures, confidentiality, contact information, and their voluntary participation.

Participants did not receive any compensation or incentives to participate in this study nor did they receive any negative consequences (lower grades, for example) if they chose not to participate in this research.

THE INSTRUMENT

After reviewing the literature regarding student engagement in an active learning environment, an observation form was constructed with input from instructors and instructional designers at the public research university, and from the Director of the Center for Innovation and Excellence in eLearning, and the Associate Dean of Learning, Design & Technology. Those designing the measuring instrument used in this study referenced and borrowed from a validated, reliable active learning inventory tool calibrated to quantify the use of active learning in large courses (Amburgh et al., 2007, p. 2). The final draft of the instrument (provided in the Appendix of this work) captured the observer's input regarding the following general areas of concern:

- The description of the pedagogy used in the ALC
- Level of participation in the ALC
- Description of students working together in the ALC

- Feedback given to students, to/from each other and from instructor
- Connection of students during activities
- Access made to classroom tools
- Level of engagement in the ALC – three time periods
- Reflective notes of the observer

ANALYSIS OF QUALITATIVE DATA

Creswell's (2014) five-step coding process for qualitative research was employed. Those steps involve the following activities:

1. Read through all the text data from the journal entries and the observations
2. Divide the text into segments of information
3. Label the segments of information into codes (themes/categories)
4. Reduce overlap and redundancy of codes (themes/categories)
5. Collapse codes into themes (p. 244)

RESULTS

There were four different data streams for exploring the level of engagement of Capstone students in the ALC over three semesters: Spring 2018, Fall 2018 and Spring 2019. These sources of data came from two observations based on the observation form found in the Appendix. One observation was a self-observation by this faculty member/researcher and one observation was from an outside observer who was not familiar with the students in the Instructional Design program nor the Capstone course. Students also were encouraged to write entries in their journals on their experience in the ALC and to pass them in at the end of the semester. All the students from all three semesters who agreed to participate in this research complied with this request to create and turn in journal entries. The faculty member also reflected on the experience and wrote in a journal.

Steelcase Education sent a pre- and post-assessment to the faculty member and students every semester to gather data on their experience, then analyzed and shared back the analysis of data on an annual basis.

Self-Observation Input

The following table is based on self-observation from this researcher/faculty during one class period from the Spring 2018 semester. The table depicts the level of engagement for these Capstone students during three time periods within that one class session during the Spring 2018 course. The three time

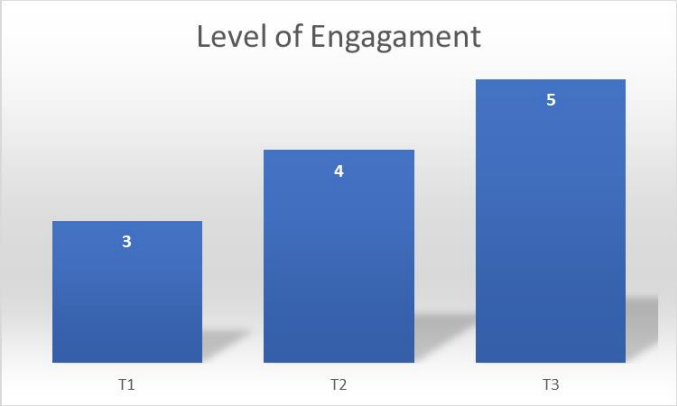
periods are: (1) at the beginning of the class (2) during the middle of the class and (3) at the end of the class.

The scale used is the following:

1	2	3	4	5
(No Engagement)	(Light Engagement)	(Average Engagement)	(More than Avg. Engagement)	(High Engagement)

Results are as follows:

Table 1: Level of Engagement over 3 time periods in one Capstone class



Observation from Outside Observer

The outsider observer shared the following:

The class sat at two tables at the far end of the room with the instructor sitting adjacent to the two tables. The set-up was reminiscent of a meeting of adults in an office setting with all participants on the same level of expertise and power. This class meeting was near the beginning of the capstone course for the degree/certification these students were pursuing. This group/class usually meets online, and this was a rare face-to-face

meeting. The students appeared to know or be familiar with one another from previous coursework together.

Given these factors (age/maturity as working professionals, previous experience together, etc.), they appeared very comfortable with the ALC setting and with operating as collaborative partners exchanging ideas and opinions. While a couple of personalities seemed stronger than others, everyone participated and it did not appear that anyone was shy about speaking up, asking questions, and contributing to the discussion.

The instructor had a clear and focused structure for the class which was run as a dialogue/conversation with no lecturing. This course is designed to take students through the steps to creating their major projects for the program and they spent time discussing what this entails. Much of class was spent in a round-robin with students "reporting" on their projects and discussing course/project protocol.

From my observations, the ALC didn't seem to be a significant factor in the class dynamic. Given the group size of 6 and make-up, the instructor's approach -- she treated or interacted with them as mature professionals intent on learning and completing a goal in which they each were already invested and they responded as such— the type and arrangement of furniture or setting appeared not to be a compelling factor in this group's success. However, it may be that they were more comfortable/could interact a little more easily in this setting than in a traditional classroom. This may be especially true at the end of a long day in a work setting (the students all appeared to be coming to class from work) that more likely resembles the ALC with its rolling chairs and tables and emphasis on collaboration than a traditional classroom with its static rows of chairs/desks and a teacher up front lecturing.

Themes from Student Reflections

Following Creswell's (2014) steps for analyzing qualitative data, the following three themes were uncovered from analyzing all the student reflections:

1. The actual space had an impact on students' engagement and perceptions
2. The use of small white boards encouraged deep thinking and reflection
3. The ALC provided a highly collaborative experience

Each of these themes will be discussed in more detail below.

Actual Space of ALC

While reading the detailed notes and reflections of the students' journal entries, I came to realize how important room set up is when a student first enters a learning space. Having served as a faculty member for over 20 years, I had learned importance of having my room set up in an inviting way. This has always been a part of how I get ready for the upcoming class, making sure projector is on, PowerPoints loaded, chairs aligned, trash from previous class cleaned up. That attention carried over to my teaching role in the ALC. However, in addition to doing all of the above, I have added new practices to my repertoire: cleaning all the desks in the ALC with a disinfectant and arranging the brightly colored chairs around small tables.

My students noticed. One student included the following reflection in her notes:

"When I entered the room, the first thing I noticed were that the chairs were in a variety of colors. Between the colors and the tables grouped together, I found the space to be inviting. I also think the atmosphere helps to promote creativity and collaboration. I love that you could store your belongings under your seat. Genius! I also love that the desks could be separate or arranged so that it accommodates the size of the group. I felt comfortable sitting around the joined table on Monday night. I could easily hear everyone and sitting together in a close space made me feel more comfortable speaking, but I also felt like I had plenty of personal space. I do not feel as comfortable in formal conference rooms with long tables, and I knew I felt comfortable in the ALC."

Another student commented on the ALC as a space and the connection the environment had to his learning. He stated, "I liked the Active Learning Center, as a space. I do think it would work in a lecture-type environment, it did seem like a better place to collaborate/ask questions than a traditional classroom. Everyone seems to be on equal footing, given the way the seating is, and it is easy to make eye contact and speak directly to people in the class." He continued, "I thought the more comfortable environment facilitated conversation in a way a regular classroom might not Compared with a traditional classroom or conference room, I do think the Active Leaning Center was a good choice for these meetings."

Another student linked the room set up to a change in the teacher's role, noting the teaching role had shifted from that of lecturer to facilitator/coach, on

transition discussed in the literature. The student commented, “Our meeting face-to-face in the ALC room on the campus was just great! The room is set up so that we can sit at a desk/table space facing towards one another so that the focus is on interacting with one another rather than all facing Carol standing at the front of the room. It set the tone for us to have conversation with lots of back-and-forth discussion amongst ourselves, creating a collaborative atmosphere. It was nice to have Carol right there as facilitator rather than instructor at the front of the room.”

Small White Boards

None of the students in the Capstone course, in all three of the semesters, have ever used or experienced the small white boards. All of them expressed interest and curiosity about them. One student commented, “I liked how the white board came to me versus going to a white board. It made me feel more in control.” Another student said, “Using small white boards was a great way to begin the course. I think it was a well-needed ice breaker for the couple of us who had not met in person before.”

One student compared the exercise that was used with the white board to another pedagogical option of asking questions. “The use of the white boards was a way for each of us to share; it was a nice way of having us think about (and write

down) our three words[2]—since I think if the question was just posed for us to answer on the spot out loud, it might not generate the same level of participation." Another student shared the same sentiment," I found the ALC room to be highly engaging. I thoroughly enjoyed working interactively with the whiteboards, while we could have easily talked about it out loud."

Another student commented on the small white boards, "At the end of each table were small white boards that allowed for an interactive activity. I thought this was an excellent feature of the room." A deeper link between the actual small white boards and learning can be gleaned from this experience by a student: "The use of the white boards allowed us to put a visual link to the words we spoke to and heard from each other. Carol also allowed us time to think a bit before writing, which helped me focus my thoughts and feelings. As expected, I had thought a lot about my Capstone, but I don't think I had previously said the words out loud. The white boards provided a jumping off point for our other discussions."

Another connection between learning and the small white boards was made by another student. "Using the attached portable whiteboards was a genius move to get us to reflect, organize our thoughts and ideas, and then share them with others. I don't think I would have written down the same things if I had to write on paper. With a manageable-sized whiteboard, you can just hold it up for others to see and

[2] This initial exercise asked the students, where it was the first night of the semester, to list three adjectives of how they were feeling about their upcoming Capstone project

use it to prompt what to discuss. Just loved that aspect of our time together and it's [a] great benefit to being in that space."

Another student shared the focusing effect of having such a tool: "I really enjoy the white board since I tend to be a fidgety person so this makes it fun to doodle my thoughts."

Given the initial physical set up of the ALC and the use of the small white boards for a couple of the exercises during the class time, those aspects contributed to creating a collaborative learning experience for the students.

Collaborative Experience in the ALC

As one student commented in this regard, **"**It makes our experience more of a collaborative experience instead of one where the instructor is lecturing to the class and students do not look at one another.

My second experience [in the ALC] was just as great. I think this is a very good fit for certain types of classes, especially where we were all sharing our projects. I think it also helps facilitate relationship-- people feel more comfortable or at least I did. If an instructor were lecturing the whole time, I do not think this would be a good layout for me since I would be distracted by looking at others. But for our class, and the sharing and collaboration and learning from each other, this is a

wonderful class setting." Another student commented on the effect that the room set up had on collaboration as such: "The round tables allowed for a collaborative feel with the people with whom I was sitting."

Another student believes "the ALC has potential to enhance learning and collaboration." As another student so aptly shares, "I think the ALC room is a fantastic idea. All classrooms should be like this! It promotes engagement and interaction within a classroom."

Even though the three major themes that emerged are presented in a linear way, there is an interdependency among the three features of the ALC, which can be depicted below by this causal loop:

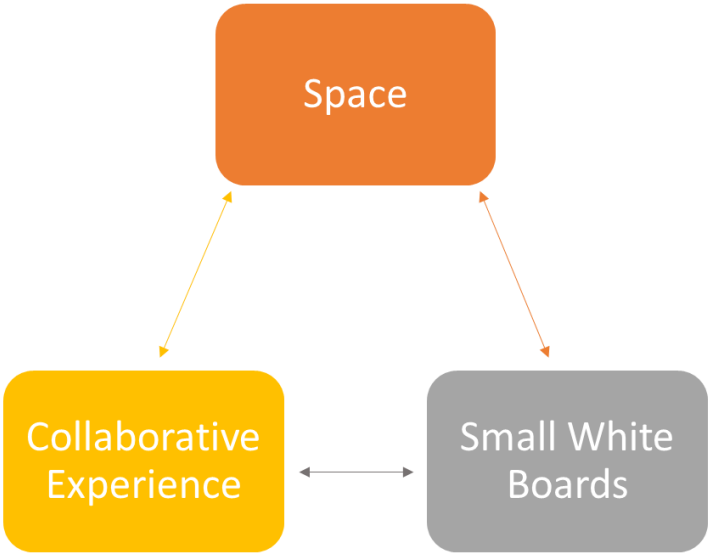


Figure 6: Interdependency of Three Themes from Student Reflections in the ALC

Reflection from Faculty/Researcher

I found myself being very purposeful and deliberate in planning for teaching in the ALC. (Not that I am not that way in a traditional classroom; however, with the availability of different teaching implements, I needed to really give thought to how to use these new implements.)

The one new teaching tool, for me, is the small white boards. I have used small groups before, many times, in my teaching and white boards. However, never used the small white ones.

There was some initial small talk at the very beginning of the class before we formally began.

One of the applications I devised for the first time was to use the small white boards right at the beginning of the class on the first night. After general introductions, I had the Capstone students write on the white board 3 words they were experiencing coming into their Capstone.

Goodness, did they like that exercise!!! The words ranged from "excited," "apprehensive," to "nervous."

After this first exercise, the students were ***very talkative***. I asked students what they liked about using the white boards and they said:

1. They never used them before
2. Felt focused
3. Could erase, re-do, then present

4. It was good for talking points

My observation, to add to the above input, was that many times I would ask a question in class, and many students would "look down" at their paper/at the desk and only one or two people would respond. With the small white board, all participated, listened to each other. All students were very engaged. They also questioned each other and offered support.

Because I became so intrigued with the small white boards, I started to do academic library searches on peer-reviewed research on "small white boards." What came up was research on interactive white boards. After reading one such research article, I realized that they are not the same things.

For the second Capstone class in the ALC, I also had another activity to use the small white boards to reflect on any surprises in their Capstone; challenges encountered/anticipated. Also changed layout within a class period from one large group of 4 plus instructor to two small groups and then back to large group. Amazing interaction. They did not stop talking!!!!

One point that I need to bring up is that the outsider observer did not make any comment on the use of the small white board applications that we had in class. There were two such applications that were consciously designed for students to use the small white boards. The students in their reflections did focus on this new pedagogical tool.

Results from Steelcase Education

Steelcase analyzed and presented their data in the aggregate form, meaning that not just one class could be parsed out from the data. Steelcase gathered data right as the semester started (the very first week or the second week of class) and after the semester ended. Their language in the analysis referred to these two time periods as "Pre-Install" and "Post-Install." Steelcase collected data from the Spring 2018 semester, Fall 2018 semester and Spring 2019 semester.

The scales used in both the student and instructor surveys depict the perception of the individual about the frequency of how often behavior happens (never to always), as well as the level of agreement (strongly disagree to strongly agree).

This researcher culled data from the Steelcase surveys that was pertinent to the findings in this study that centered on (1) space (2) collaborative experience and (3) small white boards. Note that Steelcase used broader category titles such as (1) Perceived Effect of Classroom, which included environmental factors (2) Learning with Others, which encompassed collaborating, communicating, and learning from others and (3) Physical Environment, which included engagement around tool use and movement within the learning space. The environmental factors as labeled by Steelcase is being equated to the term "space" defined here from the students' input as the physical space of the ALC (the color of chairs, the arrangement of the room, the actual layout of the ALC).

The results from the Steelcase pre- and post-installation surveys indicated positive increases in all three categories. Note that Steelcase had post-install data from the Spring 2018 and Spring 2019 semesters. The post-install data from Spring 2019 is being reported here where it represented the last year of the grant. Results are as follows for these three categories:

Perceived Effect of Classroom:

The overall perceived effect of the ALC classroom on collaborating with classmates, communicating work/ideas, facilitating problem solving, being more creative, motivation to learn, and connecting with classmates increased from the Pre-Install data (agree and strongly agree) – 56% to Post-Install data (agree and strongly agree) – 88% for the collaborating with classmates' section, which was the first section in this category. All the other sections had similar increases from pre- to post-install.

Learning with Others:

This category included receiving help from peers, presenting work/ideas to classmates, and feeling inspired by others' work. The questions in this category targeted both behavioral and affective engagement aspects that contribute to student learning and success. This category from Steelcase is corresponding to the data from the students that has been categorized in the area of collaborative experiences.

Pre-Install data (agree and strongly agree) – 33% to Post-Install data (agree and strongly agree) – 60% for the presenting work/ideas to classmates. This section was selected in that it more closely related to the collaborative experience. The data from Steelcase in the other two categories, receiving help from peers and feeling inspired by others' work, also saw increases in percentages from pre- to post-install data.

Physical Environment

This category represented input from the following categories: using classroom tools to communicate, using tools to think through ideas, moving to work with others, moving furniture into new layouts, and moving in chair during class. The second category above, using tools to think through ideas, was chosen to equate with the data found from this study in the category of small white boards.

Pre-install data (agree and strongly agree) – 33%. Post-install data – 72%. The other categories in this section also saw percentage increases from pre- to post-install from the Steelcase surveys.

DISCUSSION: ACTIVE LEARNING

One insight this researcher had while reading the literature, from observing classes in the ALC and from collecting data for this research, is that the Active Learning classroom *itself* facilitates and encourages faculty to be inventive and go beyond just lecture. The structure of the classroom encourages different teaching strategies and practices.

An example of translating this insight into practice is around the use of the small white boards. It must be admitted that, initially, when this researcher saw this tool in the ALC that it did not mean anything. This researcher had used large white boards for various applications and yet not too much thought was given as to how to use the small white boards. It was only during a few of the CoP meetings listening to colleagues on their use of this tool that this researcher began to think more about it. An application was designed which this researcher shared with the CoP for input. With some suggestions, an exercise was developed and implemented for the first night of the Capstone course, of which was discussed in the student reflection section here in this paper. It came as a surprise to this instructor/researcher that this tool would have such an impact.

An article found in the Wall Street Journal by Farhad (2013) discussed the benefits and some disadvantages of large white boards. Even though this article focused on large white boards, there were some insights that could be linked to the

experiences shared by the students in this study where they focused mainly on the use of the small white boards. Note, however, that in the actual ALC, there is a large white board for instructor and student use so key findings from the literature can be applied to their use in the classroom.

Farhad (2013) said of the use of whiteboards, "the whiteboard encourages thinking about the highest levels of an idea, and it discourages getting lost in the details" (p. B1). The [large] whiteboard "is a canvas for brainstorming, product design, strategy war-gaming and, of course, doodles" (p. B1). This point about being able to doodle on this tool links to the student who said that "I tend to be a fidgety person so this makes it fun to doodle my thoughts." Also, "whiteboards also allow for presenting a wide-range of information-writing, sketches, graphs – while requiring no learning curve" (p. B1).

Orlander (2007) discusses key tips for using a while board. His overarching message is that, "used properly, boards promote shared ownership of the teaching session between teacher and learners. This facilitates more interaction, which, in turn, allows better targeted and more effective learning" (p. 89). A key point that Orlander (2007) mentions is that "selective adding of information [on the white board] or the intentional erasing of it allows the visual aspects of the information on the board to dynamically reinforce the teaching process" (pp. 89-90). He further believes that "a board can be more personal and inviting to a group of learners than a session led with fully prepared slides, transparencies, or handouts" (p. 92).

The quantitative research provided by Steelcase was encouraging to see. From each of the categories presented, there was an increase in the appreciation of the space, the students being more collaborative and using the small white boards for thinking and concentration. As had been mentioned previously, this particular tool was a new experience for all the students and the faculty member.

The deep reflections and conversations we had with our colleagues in the CoP really assisted in our shift from traditional teacher to facilitator. In the first year of our grant, the Instructional Designers helped the researchers and other faculty members teaching in that ALC to make that shift to facilitator. In the second year, the original faculty members and researchers (same people) seemed to take the lead in assisting the second generation of faculty teaching in the ALC in year 2, in addition to input from the Instructional Designers. It was really felt that without this support, guidance, input, that the shift would not have been as successful.

Even though the faculty and students, by and large, enjoyed the experience of being in the AlC, and commented on how the ALC space encouraged creativity, collaboration, problem-solving, and more involved interactions, this space may not be ideal for all learners. There is one researcher/faculty member who had a deaf person and two interpreters for this student in the ALC and it was not the most optimal learning environment.

LIMITATIONS OF THE CURRENT STUDY AND CONSIDERATIONS FOR FUTURE RESEARCH

One limitation of this current study centered around the scheduling of observations. Due to this Capstone course being taught in the evening, there were not too many opportunities to have this class observed. On a few occasions, the times that were scheduled met with cancellations due to severe snowstorms during the Spring 2018 and Spring 2019 semesters. Having had a predetermined back-up plan could have helped this situation.

Recommendations for future research would be to include quantitative research on the effectiveness of an ALC, considering those key variables that contribute to an engaging learning environment. There are also opportunities to research further the accessibility of this learning space for all learners.

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APPENDIX

OBSERVATION PROTOCOL

ACTIVE LEARNING CENTER RESEARCH

FOR THE ACTIVE LEARNING CENTER (ALC)

Date/Time of Observation:
Class Observed – Subject & Number:
# of Students:
Graduate/Undergraduate:
Faculty (Optional):

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1. **Description of Pedagogy(ies) used during class**:

2. **Description of participation level in class**:

3. **Change of layout within a class period**:

4. **Description of students working together on projects/assignments during class period**:

5. **Feedback given to students (between students and/or teacher)**

6. **Connection of students throughout activities**:

7. **Accessing of classroom tools**:

8. **Assess Level of Engagement in Class – Three times periods**:

   a. Beginning of Class time:

   1……..……..……2……..……..……3……..……..……4……..……..……5
   (No Engagement) (Light Engagement) (Average Engagement) (More than Avg. Engagement) (High Engagement)

   b. Middle of Class time:

   1……..……..……2……..……..……3……..……..……4……..……..……5
   (No Engagement) (Light Engagement) (Average Engagement) (More than Avg. Engagement) (High Engagement)

   c. End of Class time:

   1……..……..……2……..……..……3……..……..……4……..……..……5
   (No Engagement) (Light Engagement) (Average Engagement) (More than Avg. Engagement) (High Engagement)

9. **Reflective Notes of Observer**: