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Reacting to Classroom Design: A Case Study of How Corrective Actions Impact Undergraduate Teaching and Learning

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In the judgment of the following signatories, this Dissertation meets the academic standards that have been established for the Doctor of Philosophy degree.

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I am especially grateful for the unending support of my mother and the rest of my family.

Imagine that you are in a classroom.

Visualize the ceiling and all the overhead systems that provide lighting
and conditioned air and fire protection.
Be aware of the layout of walls and
envision their subsurface networks for electrical and data service.

Picture the furniture - feel it against your body and
observe the seating arrangement.
Study the doorways and fixtures; inspect the windows and floor.
Imagine strolling across the floor.

Now consider, if you were an undergraduate in class,
how might the very act of compensating because of the design of your classroom,
affect your learning and how you are taught?

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Abstract

It is commonly accepted that physical space has some effect on the educational experience and that teachers and students may respond with remedies if the actual classroom design (which encompasses the physical classroom, including furniture and fixed equipment) inhibits teaching and learning. Corrective responses include efforts to lean to see, or hear and be heard, rearrange furniture, and change class activity due to the nature of the physical space. I conducted this qualitative research to determine what constitutes typical remedial or corrective responses to the classroom, how prevalent these actions are, and the perceived effect of these actions on the educational experience of undergraduate students and teachers. I utilized a case study approach, including observation supported by surveys (solicited on social media), interviews, and document analysis, from participants of Boston, Massachusetts area universities. I collected and analyzed data using the User's Environment Interaction Framework (UEIF: an environment-behavior construct) to discern behaviors resulting from the physical environment, and a modified Community of Inquiry model (CoI: an education construct) to evaluate their effect on teaching and learning, and I propose this integrated approach for future research. Findings indicate that most students did not think that their corrective responses substantially affected their learning experience. Students who did find them important were largely those who reported their personal efforts as the major determinant of a successful educational experience. Students who found them inconsequential were generally those who reported that other persons and events controlled their learning. Secondly, the research showed that students highly valued maintaining attention, which was an impetus for performing remedial actions. Thirdly, teachers characterized the scope of their adaptation measures due to the physical environment, as reconciling the need for added work, acknowledging the responsibility of a teacher to make modifications to work in

the assigned classroom, and mitigating affected relationships with students. This research has implications for many constituents in higher education. I suggest further research to explore the relationship between self-reported actions and the locus of control construct, and to develop a better understanding of the perception of space, to improve post-occupancy evaluation tools and classroom design.

physical classroom, corrective responses, post-occupancy evaluation, case study, control, attention, adaptation, User's Environmental Interaction Framework, *Community of Inquiry*

Chapter One: Introduction to the Research

Recently, I went to a continuing education seminar for my architectural license on the newly remodeled campus of a university in town. The workshop met in a new theater-style classroom with 150 fixed seats with fold-down tablet arms, and a sloped floor. I attended this all-day seminar with a co-worker who was about six feet tall. Immediately after he sat down, he complained that his chair was uncomfortable. All morning long, I noticed that he alternated between sitting angled to the lectern and slouching forward. He also frequently rocked back and forth in his seat. He left the room to go to the bathroom mid-morning and upon return, stood in the back of the room until the lunch break. He returned to the fixed seat for the short afternoon session, and soon began the same re-positioning movements as earlier. Near the end of the workshop, the professor handed out the evaluation sheet for the seminar, and I surreptitiously read my colleague's remarks. When the survey asked about the adequacy of the facility, he rated it "excellent." Furthermore, he rated the whole learning experience as "excellent"!

Watching my colleague experience the discomfort of the physical environment of that classroom, led me to wonder whether his efforts to mitigate uncomfortable conditions had actually affected the learning process, and how other individuals adapt to less than satisfactory spaces. His unqualified praise of the seminar raised questions about how students and teachers perceive the built learning environment. This line of inquiry has led to this study. I decided to look for an explanation for this disparity of expectations, accommodation, and evaluation from these kinds of experiences. This dissertation discusses my effort to explore how students and teachers take remedial action to make up for shortcomings in university classroom design and how this action impacts the teaching and learning experience.

I define the classroom design to include the physical space, as well as furniture, fixtures, equipment and accessories. First, I begin in Chapter One by providing an introduction to my research. In Chapter Two, I position this topic within related literature. In Chapter Three, I define my research methods and the participants in my study. In Chapter Four, I describe the analysis of the data collected. Chapter Five offers an interpretation of the findings, provides my conclusions, presents closing remarks, and includes a repository of research documents and graphical aids.

To introduce my research, I outline my background and connection to this subject, and then present the scope of the issue. Thereafter, I define the problem and offer a framework for evaluation, then impart my research question within a context of epistemologies and topical issues. Finally, I detail the purpose and importance of my work and offer concluding remarks.

1a. Research Background

As a parent of a school-aged child, an architect who designs educational facilities, and a doctoral student, I often wondered about the influence of the built learning environment on teaching and learning. My interest in the assessment of learning environments began with my involvement with the state charter school system as a parent and school board member. I reviewed various educational programs and facilities to locate a school that offered the specialized instruction my son required as their standard method. I finally located a new elementary charter school and eventually served four years on its Board of Directors as executive board secretary and facilities committee chairperson. At that time, I became interested in the assessment of learning environments because, due to financial instability, some classrooms in the charter school were sufficient but not wholly desirable. Moreover, no method was available to ascertain the effect of the physical space on student learning or the implementation of

curriculum goals. Indeed, all the daily efforts by students and teachers to allow for an adequate environment were undocumented and, therefore, not considered for strategic planning purposes.

For several years, I worked as an associate in my architectural firm with expertise in renovation and additions to elementary school and university buildings. Mid-career, I served as a post-occupancy evaluator for both the Arlington Independent School District (AISD) and Dallas Independent School District (DISD), both in Texas. I met with the faculty and administration of both Districts prior to surveying and assessing their existing school facilities for condition, building code life-safety, handicap accessibility, and infrastructure suitability, and then providing estimates of construction costs to formulate cost/benefit ratios. Early on, I realized that while some effective teaching and learning was occurring in substandard spaces, there was no process to analyze and consider the many obvious and subtle efforts made by teachers and students to correct deficiencies in the classroom environment in support of the educational experience. There was no consideration of the toll of inferior learning spaces on educational goals by those in a position to make decisions on where to allocate resources to achieve those goals. Truly, it was not, and is not still, fully understood!

As an opsimath, that is, someone studying late in life, my formal coursework led me to pursue further inquiries to understand the depth of remedial actions by students and teachers due to the physical university classroom. I discovered, early in my tenure as a doctoral candidate, the importance of the classroom environment as a component of the total educational experience of students. As part of my research for one course, I interviewed the academic head of a university undergraduate department who graduated from a doctoral program a few years ago. I inquired about her last semester in college as a student with regard to her physical classroom environment, and whether the classroom supported the method of teaching. She replied:

> Yes, in a very authoritative, top down autocratic manner. It was because with the number of students we had in that group, he [the professor] could have chosen another classroom that was more intimate. He had the power. He had the power of [the university]. He certainly could have requested another classroom. So, yeah, I think for [the professor] it was exactly what he wanted. He didn't have to interact with us, he could just get up and talk at us for an hour (J. Doe, personal interview, September 28, 2009).

For another course, I studied the architectural programming process in the design of a new building on the campus of one of the universities in this research study. I explored how new classrooms were designed to provide state-of-the-art facilities and to respond to shortcomings in existing spaces. That university was in the beginning stages of designing and building a new post-secondary art school, and utilized a local architecture and planning firm. I reviewed over 300 pre-design documents.

The architect designed spaces to accommodate the classroom requirements of courses in the curriculum, to be adjacent to associated functions and with regard to their frequency of use. They considered new technological equipment and connections, types of course presentation, lighting, and acoustical privacy. The curriculum required space for the fine arts library, photography laboratory, art gallery, art history classroom, and 3D, ceramic, drawing, painting, printmaking, and design studios. The faculty was queried about existing classroom spaces and responded with many positive comments, but stated that classrooms lacked good control of lighting quality, some lecture spaces were too small, some floors of the building seemed isolated, there were inadequate storage areas, and some workspaces were too small. The architect's subsequent planning incorporated new room layouts to improve the existing classroom experience. While this process is totally within the industry standard of architectural

programming, they did not catalog the remedial actions actually performed currently by students and teachers in the existing classroom. Documented actions might have provided insight into how professors and students use the rooms in pedagogical efforts to teach and learn, and how attitudes, suppositions, and beliefs about the existing physical classroom environment find expression within the university culture.

I discovered such documentation of remedial actions in another doctoral course. I studied how the campus of the Massachusetts Institute of Technology (MIT—the first school of architecture in America) in Cambridge in the early 20th century was created. I explored the values and motivations of the main players involved in this project through their personal written accounts and other secondary sources, and examined pedagogical practices within the shifting educational theories of the era and, its effect on the design of educational spaces. Interestingly, the architectural programming process during this period (1910 through 1915) was virtually identical to that employed by the architects for the contemporary post-secondary art school a century later. I have referred to ("Efficiency the keynote of general plans," 1913). However, there was one important difference: MIT (at that time a state-sponsored educational institution) documented some remedial actions in annual departmental reports and letters requesting funding to the state legislators. For example, they listed the following: "At present, there being no passenger elevator, the students lure their visitors from floor to floor by encouraging caricatures which they place on the landings of the many flights of stairs" (Rotch, Higginson & Freeman, 1907). Another report from the MIT archives contained the following excerpt:

> …[T]he unusual influx of students is overcrowding our drawing and recitation rooms, and exceeds the number that can be accommodated comfortably in our present quarters…It has been found necessary to put our exhibit room in halves to provide an

> additional drawing room...sadly handicapping the jury in their judgments of the problems in Design [class]. It has also been necessary to separate the graduate students in Design from those in the undergraduate thereby losing to a large extent the very beneficial influence exerted by the more mature students on those in the earlier years. (Lawrence, 1915, p. 164)

Although, the impact that documenting these remedial actions had on the final MIT classrooms design is unknown, those associated with the design of the new facilities did have this information at their disposal. I posit that MIT's listing of remedial actions concerning stair access and room size provides superior insight into actual occurrences at the existing facility, than the aforementioned art school programming comments of "some lecture spaces were too small, some floors of the building seemed isolated" penned onto the programming forms of the new art school. Additionally, this is important because MIT's descriptions of actual corrective measures provide insight into the actual toll that the existing space levies on students and teachers.

Although it is an accepted assumption that the physical university classroom influences teaching and learning, there is little data to substantiate the breadth of that notion beyond conventional wisdom or theoretical conjecture. I outline some of the relevant literature in Chapter Two. I am motivated to inquire how remedial responses to the built environment shape the experiences of students and teachers because there is a lack of comprehensive research that enumerates specific reactions to the classroom learning environment where important teaching and learning activities should occur. Architects and researchers have not conducted studies to determine the prevalence of these corrective actions, and how they individually or collectively affect the learning experience of students in the classroom, or the teachers required to instruct in

the space. This research seeks to make an important contribution to the field of education, university administrative decision processes, investment decisions, and the practice of architecture in that regard.

1b. Definition of the Problem

My background and professional career have led me to this study of remedial responses to physical undergraduate teaching and learning spaces. Generally, I define corrective actions as those that seek to remedy constraints on teaching methods, improve communication and interaction between students and teachers and among students, supplement the inadequate technological tools attached to the space, and accommodate left-handed persons or students with physical or sensory disabilities. These actions include, but are not limited to, rearranging furnishings to improve the line of sight, actions to allow manual or computer note-taking at the desk, supporting better interactions between student and teacher and between students; changing or altering a lesson plan or classroom activities by the teacher; and adjusting room temperature or lighting to achieve environmental comfort. I also describe as remedial behaviors those actions that seek to correct the adverse impression of classroom design, the dissonance between the learning theory as presented or actualized, and any disparity between the values of the student and institution made evident by the physical space. I use the terms *corrective measures*, *remedial actions*, *remedial responses* and the like, synonymously in this research for readers, however, due to negative connotations of the word *remedial* (described in Chapter Three), that term is not used in participant materials.

It is important to have an evaluative framework for the purposes of categorizing and analyzing remedial responses to the physical undergraduate classroom and to "derive a consistent set of general principles and recommendations for understanding and enabling learning"

(Wenger, 1998, p. 4). I reviewed several such frameworks for my purposes and found most of them wanting in some way. Katerine Bielaczyc (2006), Deputy Head of Learning Sciences Lab at Singapore National Institute of Education developed the Social Infrastructure Framework which "indicates which elements to consider in designing the social infrastructure for a given technology-based tool" (p. 321). Her model is based on four dimensions: the epistemology of the classroom; teaching practices; how the physical classroom interrelates with students, teachers, and the technology; and student and teacher relations outside the classroom. Although it is possible to categorize many remedial responses by how they spring from conflicts between the classroom design and these issues, these categories are not comprehensive enough for my work. Alternately, Urie Bronfenbrenner (1994), a developmental psychologist who theorizes about ecological models in child development and emphasizes the importance of one's physical surroundings and personal activities and relationships, developed a model too broad for my purposes. Bronfenbrenner's five contextual environs include the microsystems dimension as the smallest unit, defining the immediate area supporting face-to-face communication in the workplace and classroom. Additional zones denote interrelations between larger settings and incorporate time and growth. Scott-Webber, Abraham and Marini (2000) have developed the User's Environmental Interaction Framework (UEIF), incorporating some concepts of the Brofenbrenner's ecological model, to categorize user feelings about a space, which serves as an appropriate foundation for my study of corrective actions.

The UEIF "consists of four quadrants representing (a) environmental dimensions, (b) value dimensions, (c) behavioral responses, and (d) internal responses" (Scott-Webber et al., 2000, p. 21) within concentric zones that indicate a range from "intimate" through "public" relationships (see Figure 1, which illustrates the framework). The *environmental dimension*,

denoting physical space, is subdivided into issues of ambient conditions like the environmental comfort; space layout and function (which includes all furnishings and equipment in the space, as well as whether they support or hinder the activity in the area); and way-finding and artifacts, which describe matters of signage and aesthetics. The *value dimension* is divided between corporate standards and personal standards.

Scott-Webber et al. (2000) charted responses to these dimensions in two parts. *Behavioral responses* are physical reactions to pleasant, unpleasant or stimulating elements in the environment by users of the space, while *internal responses* concern the users beliefs, feelings and values prompted by the space. For example, fixed classroom seating is a barrier to

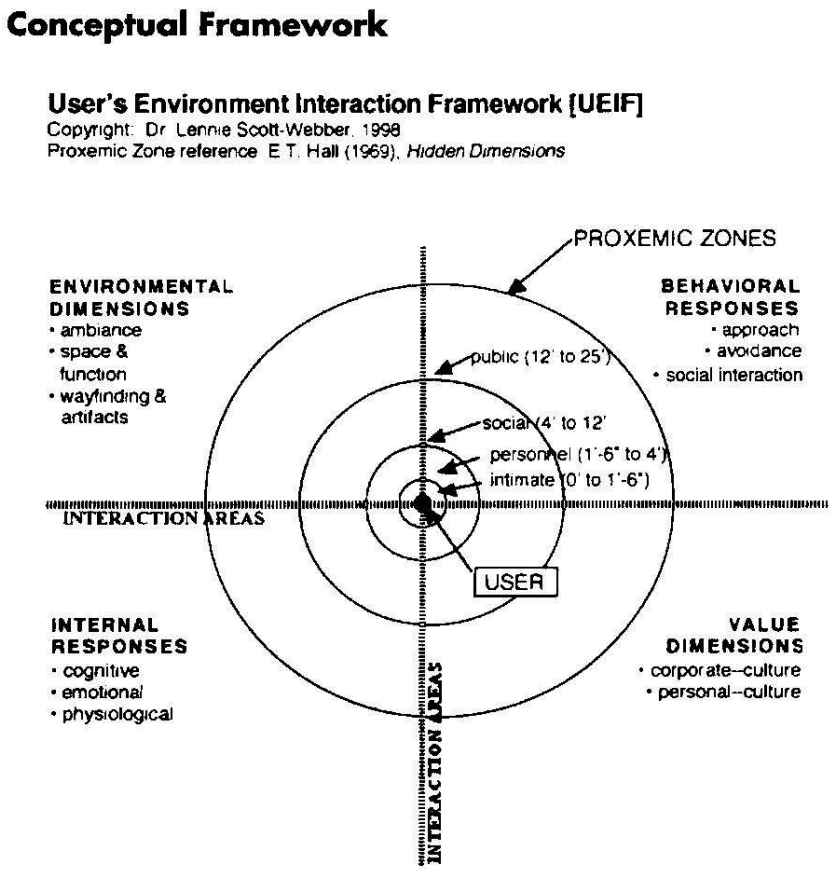


Figure 1. This diagram illustrates a framework for categorizing remedial actions/responses of users to a space. From "Higher Education Classrooms Fail to Meet Needs of Faculty and Students" by L. Scott-Webber, L., J. Abraham, J., & M. Marini, (2000). *Journal of Interior Design, 26*(2), 16–34 (Reprinted with permission from copyright holder).

student group formation (an environmental dimension). A remedial response is one in which the student either straddles the chair (a behavioral response), or the student frets about the inability to enact a remedy (an internal response). Another example might be if the assigned classroom presents a difference of opinion and values between what the university deems acceptable as a learning environment, and that of a student (a value dimension). A remedial response might be vandalism by a student (a behavioral response), or feelings of discomfort, anxiety or uneasiness on the part of a student (an internal response).

I define "experiences of students" taking a college course to include impressions and expressions not just in relation to a classroom during class-time, but also studying for the course at various locales, and the practical social relationships amongst the instructor and student cohort within the context of university auspices. I define the "experiences of teachers" as experiences and impressions from teachers, as they relate to a particular course, to include not only the classroom and class-time, but also course delivery and course preparation at its various locales, and relating with peers and students within university administration governance. My definition of the "learning experience," in line with contemporary notions, is learning anywhere learning takes place (Learning Experience, n.d.). This includes online and virtual ways of interacting with the teacher, amongst the cohort and with teaching materials at any location. Alternately, actions supporting teaching wherever teaching takes place govern the "teaching experience." Not surprisingly, the Community of Inquiry model I use to analyze my data in Chapter Five, was developed from computer conferencing educational sessions (see Figure 2, in Chapter Five).

I define the "classroom" as the most immediate physical environment where class time routinely occurs, and "classroom design" as the whole physical room and its layout including

furniture, fixed equipment and fixtures. A "user" is "any person(s) who uses, walks through, or interacts with an interior of a built space" (Scott-Webber et al., 2000, p. 20).

In this study of remedial responses to the physical undergraduate classroom and the effects on teaching and learning, I considered it important to address *universal design*, and how it relates to concerns for student who are left-handed and those with disabilities.

Ronald Mace, a wheelchair-bound American architect in the late 1970s proposed universal design as a movement to make design professionals serve the needs of the entire community, which meant creating spaces and products more accessible to everyone, including diverse subpopulations (McGuire, Scott & Shaw, 2006). This initiative spawned a faction in the early 1990s for universal design in higher education, with the root principles being equitable use, flexibility, intuitive and perceptible information, tolerance for error, low physical effort, and appropriately sized and shaped furniture, equipment, programs, products and facilities (Burgstahler, 2012).

While I do not focus my study of remedial responses and their effect on teaching and learning on the application of universal design, certainly classroom conditions that fall short of these principles will be identified if they prompt corrective actions. Similarly, my work should substantiate findings from classroom research on marginalized groups of students. Left-handed persons make up about 10% of the undergraduate student and teaching population, yet they remain a marginalized class (Kushner, 2012). M. K. Holder, director of the Handedness Research Institute at Indiana University, hosts a blog, which solicits comments from left-handed persons. The following are online blog comments from a university student and teacher, respectively, relating their remedial responses to the classroom:

> I experienced back pain when using right-handed desks until I bought a clipboard. I would sit the clipboard on my lap to take notes, and used the desk to hold my open book. This served to alleviate my pain, and gave the added bonus of doubling my workspace! (Lorenz, 1998, para. 161)
>
> …[T]he fact that I was left-handed made it difficult to write on the blackboard (I tend to erase what I write since I prefer to drag my hand across the board). Try it left-handed!! … I've turned this into a joke when I teach now. All of my visual aids are slides, overheads and/or handouts. I explain to my audience, quite frankly, that they will prefer it that way. Otherwise they would have to take notes quickly before I erase what I've written!! (Holder, 1998, para. 1)

In similar fashion, there is much research about the needs of the disabled community in post-secondary education with regard to the classroom (Izzo, Hertzfeld, Simmons-Reed, & Aaron, 2001; Quinlan, Bates & Angell, 2012). The estimated number of students with learning disabilities in the whole student population varies, but only about 0.07% of students with learning disabilities have identified themselves as such to their professors (Quinlan, Bates & Angell, 2012). The spirit of universal design as a way to assist more persons by including the marginalized would likely be beneficial to the educational experience of all. For instance, if most students were struggling in a classroom to see or hear the professor, then universal design teaching methods that provide visual or taped lectures as well as audio-enhanced versions, would reduce remedial actions required by the majority as well as the disabled minority.

1c. Research Question

My research question is as follows: how do remedial responses to the physical university classroom shape the educational experiences of students and teachers*?* To answer this question I

explored the phenomenological experience of students in existing classroom spaces and the corrective actions taken by students and teachers through observation of a classroom in use and supplementary surveys completed by participants, interviews, and document analyses. I compiled, interpreted, and analyzed this data, including anecdotes, opinions, beliefs, and values of those participants in order to determine my findings and reach conclusions.

This research will support the role and impact of *place* in the field of college-level teaching and learning by investigating students and teachers beliefs about their experiences and the actions taken by them to improve their environment. It is further intended that this investigation into the role of place in teaching and learning has value to those who are considering the relative merits of face-to-face, hybrid and online instruction.

Although referring mainly to elementary schooling, Linda Darling-Hammond, an educator, spoke to the issue of teaching and learning in the physical classroom by saying, "There are two big problems in the way that we run schools today. One is that the schools we have now are constructed as though teaching doesn't matter, and secondly they're constructed as though relationships don't matter" (Darling-Hammond, n.d). Thus, teaching and how knowledge is best acquired or constructed, is connected to understanding how learning space is designed and how teachers and students operate within it.

Indeed, if one were to subscribe to the fundamental maxim "form follows function," coined by architect Louis Sullivan (1918), then consequently, the design of a learning environment for a course must be congruous with the particular concept of how students learn therein and the paradigmatic basis of teaching. Straits and Wilke (2007) describe models of teaching as having either a transmission approach in which knowledge is being delivered from the knower in a one-way direction to learners (regarded as less important than the knower), or a

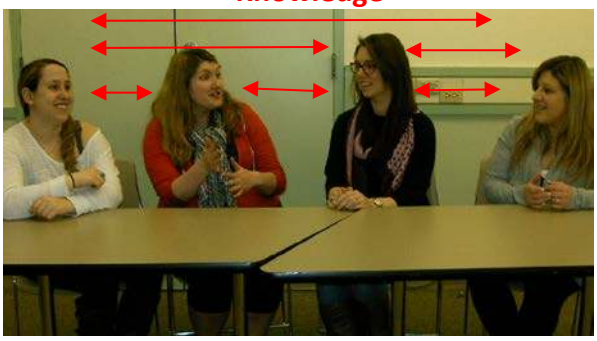
participatory approach in which knowledge is multidirectional between equally-important learners (see Figures 3 and 4 for an illustration of the approaches). They remark that in "participatory classrooms, students, manipulatives and problems are central; whereas in

Figure 3

Graphic representation of transmission-based teaching in which knowledge is being communicated in a single direction from the larger speaking figure to the smaller silent figures. Note that relative size suggests relative importance; in this case the knower is of greater consequence than the learners.

Figure 4

Graphic representation of participatory-based teaching. Note that knowledge is being communicated in several directions among equal-sized figures. As with Figure 3, relative size indicates relative importance; all involved in this learning situation are of equal significance.



Figures 3 and 4. (Graphic representation of transmission based and participatory-based teaching, with the size of the arrows indicating relative importance of the speakers in the process). From "How Constructivist are we? Representations of Transmissions and Participatory Models of Instruction," by W. Straits and R. Wilke, 2007, p. 59, *Journal of College Science Teaching, 36*(7), 58–61 (Text reprinted with permission from copyright holder).

transmission-based classrooms the instructor and his/her words are the focus" (Straits & Wilke, 2007, p. 59). Rengel (2007), states that architectural designers rely upon functional focus as an important component of spatial design to shape built learning environments. Rengel adds the following:

> Most spaces have a functional focus. Depending on their nature, they may sometimes even have more than one. In most teaching classrooms, for instance, there is one main focus: the front of the room, where the lecturer stands. A restaurant, in contrast, may not have a single communal focal point, and instead may be designed to highlight each

> seating section so that each becomes an individual focus. An office space may have both an individual foci at the workstations and a central team-oriented area. (2007, pp. 73–4)

Therefore, in a fixed-seat lecture theater with seating positioned facing the front podium, individual group work, requiring students to focus on their team and relate to each other, is hindered, due to the physical classroom environment. Figure 4 illustrates the quality of a group communication when participants sit aside each other. Note that while all of them are equal participants to this activity, half of the group has its back to a team member and one member has turned in her seat.

Beyond mere models of teaching, there are many theories to explain how students learn. Several establish general principles to describe how learners receive information, the internal processes that ensue, and how that knowledge is held and used. Wenger (1998) wrote:

> Each emphasizes different aspects of learning, and each is therefore useful for different purposes. To some extent, these differences in emphasis reflect a deliberate focus on a slice of the multi-dimensional problem of learning, and to some extent they reflect more fundamental differences in assumptions about the nature of knowledge, knowing, and knowers, and consequently about what matters in learning. (pp. 3–4)

Some theorists may sort their ideas generally into categories of behaviorist, cognitivist and constructivist, or variations and combinations of these approaches. Some might consider these categories as poles within a radar chart, rather than as distinct and separate entities. Reigeluth (1996) explains that most educators accept the notion that rehearsals (with commentary) make learning a new skill more successful. He also goes on to say that, “Behaviorists recognized this, and called them…practice with feedback. Cognitivists also recognized this, but…give them different names, such as cognitive apprenticeship and scaffolding…An analysis of instruction

designed by some radical constructivists reveals a plentiful use of these very instructional strategies" (p. 2).

It is important to note that an appropriate learning theory to employ may be dependent upon the specific coursework and student capabilities. Ertmer and Newby (1993), posited that students' prior knowledge of the area of study, and the degree of cognitive processing required to learn the lesson, can dictate the teaching methods that are most effective (see Figure 5 for a comparison of teaching strategies).

Ertmer and Newby (1993) conclude that the selection of an appropriate learning theory to course content is a continuum. Strategies derived from various learning theories may be equally effective dependent upon the range of cognitive processing needed and prior knowledge of learners on a continuum. In addition, successful teaching methods for constructivist, cognitive and behavioral theories each have zones of particular effectiveness within different areas of

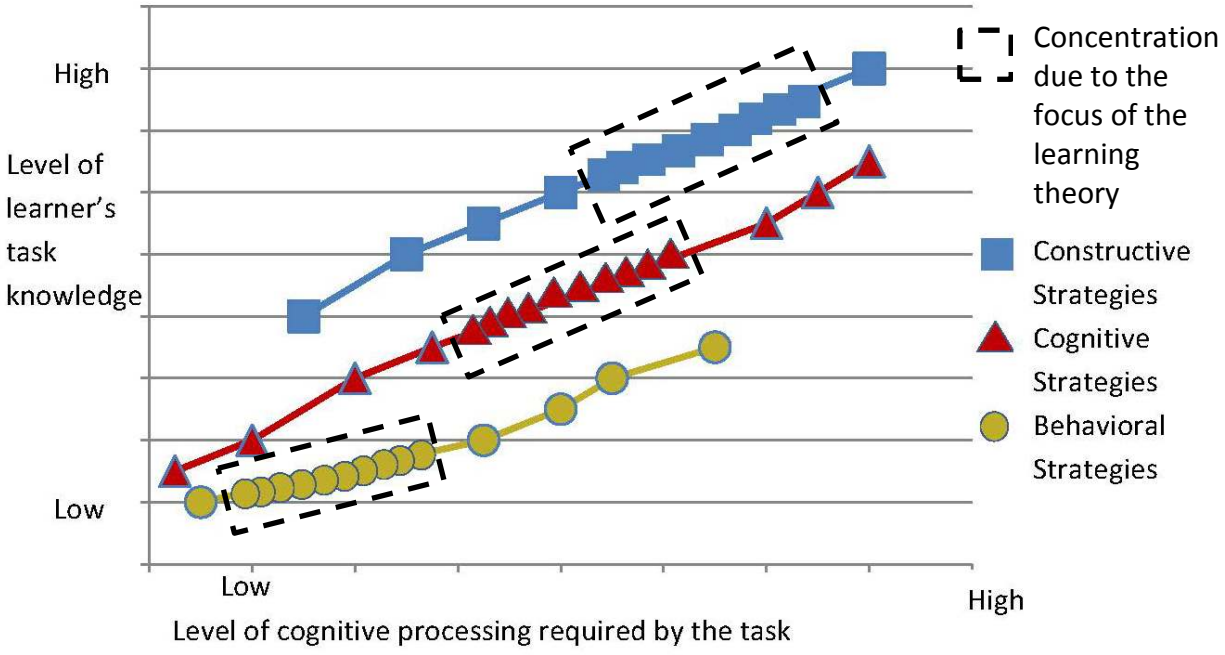


Figure 5. (Comparison of the associated instructional strategies of the behavioral, cognitive, and constructivist viewpoints based on the Learner's level of task knowledge and the level of cognitive processing required by the task). From "Behaviorism, Cognitivism, Constructivism: Comparing Critical Features from an Instructional Design Perspective by P. A. Ertmer and T. J. Newby, 1993, *Performance Improvement Quarterly, 6*(4), p. 69.

those continua. That is, students may begin in an introductory course in which the learner is concerned with "knowing what" accommodated by a behaviorist theory, then as a learner grows to "know how" they train within a cognitive learning environment, and finally achieving "reflection in action" in a constructivist framework.

On the contrary, Yang, Chang and Hsu (2008) found that "that the elements of constructivist teaching could not be defined because constructivism is a theory of learning, not a theory of teaching" (p. 528). Although the research of Yang, et al. was concerned with pre-college teaching, they highlighted the importance of personal epistemological beliefs to effective support of constructivist teaching methods.

Since there are many paradigms that posit how students learn in the university setting, it is important to review these general models to assess how the basic tenets of a learning theory affect the design of the physical environment. The following is an overview of typical stances within various learning theories, for context. Pursuant to the adage "form follows function," an actual review of the impact of remedial actions in response to the classroom space must be evaluated with the specific epistemology espoused for the course. UEIF analysis of corrective measures taken is the *basis* for that specific evaluation with regard to the effect on the educational process (described in Chapter Five).

Many behaviorist learning theories identify actions that demonstrate the acquisition of knowledge. Researchers observe, measure, and analyze the actions of student to validate learning, in relation to a stimulus and reaction. Individual thought processes and internal interactions are less important. Environment plays an important role in shaping learning in combination with the interval in which a student is rewarded for success and the effectiveness of any reinforcement. Operant conditioning, as described by B. F. Skinner, where a conditioned

response receives a conditioned reward, is analogous to behaviorist characterizations of teaching and learning as where the studious are rewarded by good grades (positive reinforcement) or meaningful class participation and, perhaps, attendance might supplant the requirement to write a research paper (negative reinforcement). In general, behaviorism espouses a teacher-centered approach whereby experts package information in portions with behavioral objectives and measurable tasks.

Hebdige (1979), a cultural critic, describes the architecture for a teacher-focused approach in line with behaviorist and cognitive theories: "the hierarchical relationships between teacher and taught is inscribed in the very layout of the lecture theatre where the seating arrangements – benches rising in tiers before a raised lectern – dictate the flow of information and serve to 'naturalize' professorial authority" (p.13). Functionally, this layout supports a one-way "banking" model of education (Freire, 1970) in which learners are considered as vessels in which to collect knowledge, and demonstrates the tacit power of physical elements in support of learning theories.

Cognitive learning approaches explore the brain and memory processes as agents to explain how students learn, extending the reason for behavior beyond the stimulus/reaction framework of behaviorism. These theories recognize an individuals' existing knowledge, or schema, and explain how that is expanded or amended by new information. In addition, internal processes of committing items to short-term memory, long-term memory and its availability for use, are part of this philosophical framework. It is important to note that our focus is college-level students and thus, cognitive approaches utilized are beyond the Piagetian early stages of development. In general, cognitive learning theories also espouse a teacher-centered approach in which the sage instructor packages information in portions to facilitate the encoding, sorting and

retrieval of information.

Hein's (2002) description of constructivism states that learners create their truths from the world around them and, although knowledge can be wholly personal, there is a universality of shared perceptions. Constructivism teaching methodologies may employ independent work, cooperative learning and group lecture within the same lesson plan. Beck's (1997) discussion of contemporary education includes a democratic philosophy with a student-instructor relationship that is dialogical and downplays the role and authority of the professor. This is much in alignment with Freire's remarks that "through dialogue a new term emerges–teacher-student with students-teachers. The students, while being taught, also teach. They become jointly responsible for a process in which all grow" (1970, p. 67).

There are many models of how learning occurs within a constructivist paradigm. Powell and Kalina (2009) argue that a good teacher must differentiate between many methods to accommodate learning for students in a constructivist classroom. "In cognitive constructivism, ideas are constructed in individuals through a personal process, as opposed to social constructivism where ideas are constructed through interaction with (the) teacher and other students" (p. 241). The Community of Inquiry model is a social constructivist framework that describes learning in ways that are applicable to traditional face-to-face methods, online and virtual instruction. Modified versions of this model explain that learning is constructed through the relationship of four presences, or principle elements necessary in the educational process: cognitive, social, teacher and student (Figure 2 in Chapter Five is an illustration of this model).

With regard to constructivist physical environments, Graetz and Goliber (2002) indicate how architectural layouts and furnishings can support constructivist thinking instead of traditional teacher-focused layouts. Graetz and Goliber (2002) note that successful universities

plan “for small groups of students gathered around tables and engaged in discussion. They will anticipate movement, not just of students and instructors, but also of tables, chairs, white boards, data projection, and laptops” (p. 20). This environment encourages a group focus for cooperative learning strategies. Rashid (2009) prepared a white paper for furniture manufacturer Herman Miller, Inc. to explore how furniture and arrangement in university classrooms affect instructor and student behaviors as well as learning outcomes. His work utilized two prototypical classrooms: one laid out with desks in a traditional manner statically oriented toward the front of the room; the other was an innovative room, with moveable tables and chairs that had casters to facilitate movement. Rashid’s findings indicated that student perceptions of classroom experience were significantly improved in the innovative classroom. Rashid concludes however, that learning environments are complex systems so “it is necessary to explore more systematically other potential impacts any physical changes and their interactions may have on learning outcomes” (p. 29).

Therefore, my work seeks to further the research on the phenomena of performing corrective measures and their effect on teaching and learning. It will provide a foundation for administrators to document remedial actions taken by instructors occurring in existing spaces and student efforts to remedy shortcomings in the room, which can inform capital investment decisions by administrators. It will offer insight into the design of appropriate spaces to support teaching and learning. It will inform teachers in preparing their lessons/courses to be taught in specific physical environments, their teaching practices, and their philosophy regarding how students learn. It will aid the improvement of questions in architectural post-occupancy evaluations and contribute to defining the threshold between an adequate and inadequate space. Finally, this research seeks to make an important contribution to the interdisciplinary field of

education studies by documenting relevant postsecondary educational praxis, informing university management about prioritizing capital improvements, and encouraging the architectural procedure of post-occupancy evaluations.

My personal experience and curiosity connect me to this issue. The problems and questions of researchers recently working in this field, my own examples (recent and historic), of the value of engaging and reporting remedial actions taken by teachers and students, and my knowledge of prominent learning theories and their relation to place, motivate the direction of this inquiry. This research is important because "although the literature reveals certain information about classroom design and pedagogy, there is little information about the feelings of faculty and students regarding these spaces…" (Scott-Webber et al., 2000, p. 25). I continue to review these ideas within the context of relevant research in order to achieve my goal of contributing to the understanding of successful learning environments, and weaving a mutually valuable framework for effective collaboration between architects, administrators, and teachers to the benefit of learners. In Chapter Two, I build a theoretical framework from literature concerning this research topic.

Chapter Two: Literature Review

2a. Introduction and Context

I began to explore the effects of classroom related remedial actions on the undergraduate educational experience by reviewing literature about the context of *place* in undergraduate teaching and learning. I reviewed the scope of research on the perception of place in the physical classroom in face-to-face teaching, as well as in the virtual educational setting for online instruction. This enabled me to better situate the reality of contemporary coursework, which is increasingly delivered in a hybrid/blended model. I also explored research on *experience design,* a movement that emphasizes the concept of place in built environments, to highlight the effectiveness of those principles for undergraduate teaching and learning. Secondly, I reviewed literature on methods for evaluating the physical undergraduate classroom for its influence on teaching and learning, beginning with the case study method in qualitative research followed by the largely quantitative collection methods of post-occupancy evaluations. Thirdly, I reviewed literature on adverse and normal effects of the physical undergraduate classroom on the educational experience. In conclusion, I note that an area of research that adequately studies corrective measures performed because of place is underdeveloped. While contemporary case studies may document corrective measures, an interdisciplinary tool has yet to be developed to analyze the effects of remedial actions within the context of architectural design, educational processes, and environment-behavior relationships.

2b. The Sense of Place in the Undergraduate Classroom and Non-traditional Coursework

A classroom, as a physical reality, is shaped by human perspectives (Steele, 1981; Tuan, 1979). The online lexicological website, *Oxford Dictionaries,* includes in its definition of the word "geography" that it is "the study of the physical features of the earth… and of human

activity as it affects and is affected by these" (Geography, 2015). Therefore, being a geographer, Yi-fu Tuan (1979) defined place as both a location and a perception. He said, "As location, place is one unit among other units to which it is linked by a circulation net…Place is not only a fact to be explained in the broader frame of space, but it is also a reality to be clarified and understood from the perspectives of the people who have given it meaning" (p. 387). Thus, the human perspectives are two-fold. They spring from the personal experiences attributed to the classroom by an individual and from that individual's experience of the shared environment.

One way that researchers have studied the physicality of a room (its material location and spatial features) and student and teacher perceptions, is by analyzing the use of *artifacts.* These are physical objects that either carry meaning themselves, or impart an impression (e.g., a projection screen, or an ornate lectern, respectively), written materials that give a singular, short message, or lengthier printed items (e.g., a supplementary graph, or a textbook, respectively), virtual constructs (e.g., some types of gestures) and, ambient features (e.g., room temperature). In addition, these objects in the classroom environment must be relevant to pedagogical and knowledge sharing purposes (Carter-Ching, Levin & Parisi, 2004). In order to examine the effects of remedial responses to the classroom on the teaching and learning process, I reviewed the use of artifacts in the case study of this research (in Chapter Four) to "investigate their relationships to pedagogical goals" (p. 10). I utilized the framework put forward by Carter-Ching, Levin and Parisi (2004), who developed a taxonomy that categorized the physical undergraduate classroom into six teaching artifacts. Unlike earlier work that focused on teacher gestures or tools (Roth, 2001), they expanded the list to include the classroom, furniture, written materials, and ambient conditions mentioned above. Artifacts, such as concrete carriers, are items that do not embody knowledge in them, but may convey meaning. Carter-Ching, et al.

suggested that "small tablet-armchair desks oriented toward the front of a classroom indicate expectations of focus on the instructor, little student-student discussion, and thin and flexible student bodies" (p. 11). Other research has shown that location in the classroom is a variable of place and learning, in that where students sit in the room is a predictor of performance (Cornell, 2002; Montello, 1988; Roxas, Carreon-Monterola & Monterola, 2009; Sommer, 1967). Two more artifacts are inscriptions, which are written objects of knowledge and, texts as in printed books or digital screens. Other artifacts are virtual artifacts, which are not usually found in traditional classrooms, but rather, in the realm of online and virtual instruction. However, an example of a virtual artifact in the classroom would be one where a teacher "referred back to the outline which had been on the blackboard earlier …; he walked over to the board, continued talking, and used his hands to point to various parts of the now-missing outline as if it were still displayed" (p. 14). Lastly, ambient artifacts are the temperature, air quality, physical comfort, and lighting conditions in the room. Careful examination of how these artifacts are used in the classroom during class time reveal the classroom environment's support or hindrance to the pedagogical goals for the course, that is, whether they contribute to a social construction of knowledge, and so forth. Thus, in a classroom, a sense of place is commonly comprised of the physical existence of the classroom, general and specific meanings attached to the space, formal components of the classroom (e.g., concrete conveyers, or concrete carriers) and their use, and the personal experiences of the user and his or her shared experiences with cohorts.

Due to the fact that this study focuses on the impact of physical environments on the educational experience of both teachers and students, it is important to consider how that educational experience (in particular, the sense of place) varies with course type. There has been an emergence of online course offerings in higher education over the last several years (Long,

2014) in all manifestations. " 'Hybrid' or 'blended' instruction involves a combination of online and in-classroom instruction" (Pilati, 2011, p. 97). The sense of place in online courses is defined differently from that of face-to-face instruction (Fontaine, 2002), yet it is important to consider when exploring the impact of the physical classroom during class time on the educational experience in a course not strictly taught in the traditional style (see Table 1 for description of course types).

Table 1.
Categorization of course type by online content

Proportion of Content Delivered Online	Type of Course	Description
0%	Traditional	Course with no online technology used – content is delivered in writing or orally.
1 to 29%	Web Facilitated	Course that uses web-based technology to facilitate what is essentially a face-to-face course. May use a course management system (CMS) or web pages to post the syllabus and assignments.
30 to 79%	Blended/Hybrid	Course that blends online and face-to-face delivery. Substantial proportion of the content is delivered online, typically uses online discussions, and typically has a reduces number of face-to-race meetings.
80+%	Online	A course where most or all of the content is delivered online. Typically have no face-to-face meetings.

Note. From "Class differences: Online education in the United States," by E. Allen, and J. Seaman, 2010, Babson Survey Research Group. Retrieved from http://files.eric.ed.gov/fulltext/ED529952.pdf

Online university education had its beginning in correspondence courses of the early 20th century in which the main communication between teacher and student was by mail. Distance

education, as we know it today, originated in the early 1990s after development of the Internet Protocols for telecommunication, incorporation of the hypertext markup language rules for creating the "world-wide web," and document transmission over the public Internet. By 2002, over 1.5 million college students in the United States were taking courses asynchronously online. Thus, "the mail-delivered correspondence course of yesterday had become the Web-delivered online course of today" (Perry & Pilati, 2011, p. 95). Allen and Seaman (2010) define the continuum of course type from traditional coursework, which does not require Internet access, through greater levels of online involvement (such as requiring students to relate in asynchronous online discussions), to online instruction in which substantial content is provided on the Web and there no (or very few) classroom sessions (see Table 1). The course delivery method, whether written, oral or online, determines the type of student-teacher and student-cohort interactions, and the degree of association with a shared physical classroom space.

Fontaine (2002) describes the importance of cultivating a strong sense of place in online learning education for greater student engagement, and therefore higher educational outcomes. Allowing discussions of students' and the instructor's physical location will support an individual's efforts to develop personal sense of place. For students who "experience a greater sense of place...this sense may be just enough to keep them "switched on" to learning in the online environment long enough to "hang in there" and succeed" (Northcote, 2008, p. 677).

However, Kupfer (2007) decries how online education can transform the sense of place to the detriment of the learning experience. In a traditional classroom setting, all the participants are receiving delivery of the curriculum in the same place and at the same time. In contrast, online instruction also allows for mobile reception of material and communication—literally:

> People are moving in their cars, [and] so too are they moving through cyberspace. This renders the actual location of the car still further irrelevant and unnoticed… We therefore lose not only a sense of place but also a sense of the importance of being placed…. Anywhere is nowhere. (pp. 39–40)

While being in motion is still occupying space, albeit multiple spaces, Kupfer said the biggest deprivation is the loss of the importance of place and alternately, the shared experience of physically gathering. In addition, the asynchronous nature of most online education offerings further distinguishes the sense of place experienced in the traditional classroom space from that of online learning.

Northcote (2008) describes the context of place in online education through a framework for developing place in distance education (see Figure 6 which illustrates this framework).

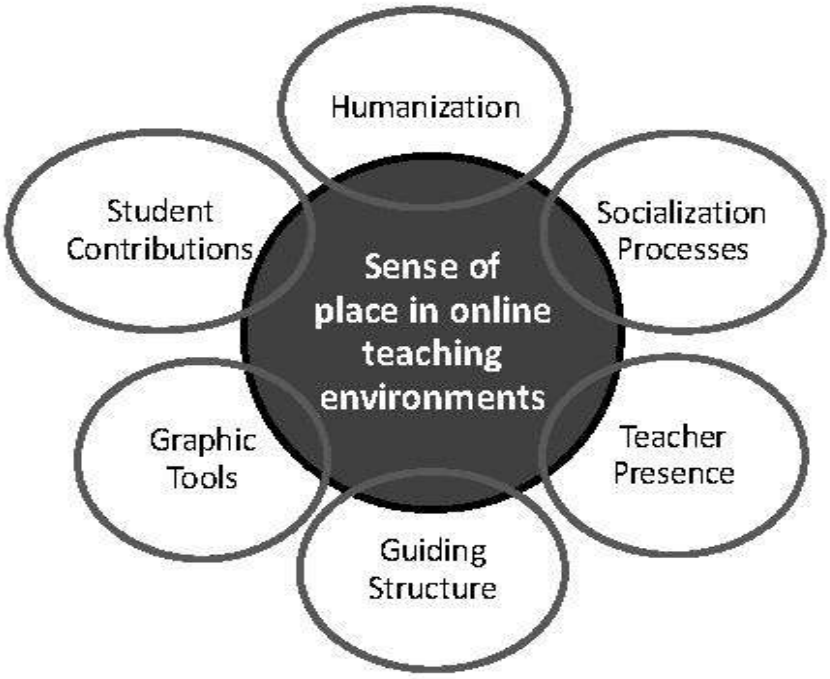


Figure 6. Diagram illustrating a framework for creating a sense of place in online teaching environments. From "Sense of place in online learning environments" by M. Northcote, 2008, December. Retrieved from http://www.ascilite.org.au/conferences/melbourne08/procs/northcote.pdf

Based upon this framework, place in online education consists of those locations, elements, meanings and processes that support the humanity of participants, relationships between teacher and student and within the student cohort, student engagement, teacher guidance, engaging interfaces, and an effective framework of instruction.

In hybrid or blended courses "the enhancement of face-to-face teaching with the use of CITs (communication and information technologies) represents a shift from campus-bound activities - enabling increased flexibility over *when, where, what, how* and *with whom* students learn" (Jamieson et al., 2000, p. 2). Consequently, *two* places are important in that learning experience. They are the classroom space consisting of its physicality, and individual perceptions of the room and cohort experiences; and the online space shaped by the online course structure with graphic tools, and student perceptions of their teacher, social relationships, personal contributions, and feelings of his or her humanity within the format. The importance of each place is dependent upon the degree of "online-ness," or rather, the portion of the course delivered on the web (Northcote, 2008; Salmon, 2004). I posit that each sense of place should support, not undermine, the other. For instance, a classroom laboratory that was inadequate in size and quantity of workstations, in which some students had to stand and share a computer terminal, might elicit student perceptions of the space as being dehumanizing, which, in turn, might influence those students' feeling of humanity in the online interfaces of the course.

In summary, I explored place within the traditional classroom, online instruction, and hybrid/blended courses. A contemporary movement, experience design, is poised to elevate the sense of place to be a primary factor in the design of the built learning environment. Beck (2014) explains that typical building designs are conceived at the behest of owners for economic reasons – to encourage revenue and profit. This design initiative focuses on enhancing the

experience for the users of the space, much like "Hotels that are hotel-centered will not treat their guests as well as ones that are guest-centered" (Norman, 2014, p. 1). A classroom that is designed around teaching and learning, and the elements involved in place-making, has the opportunity to heighten the educational experience, much like the owners of a popular coffee shop might design the space to heighten the coffee drinking experience, allowing patrons to see, hear, smell, taste and feel the coffee product.

I began with research on place in the traditional classroom environment, and explored the idea of place in online education. I have introduced the concept of experience design, as a contemporary design practice that may provide perspectives to improve educational spaces. Now that I have established my concept of place for classrooms in the university setting, I will address the issue of evaluation of the physical classroom for effectiveness.

2c. Evaluations of the University Classroom

There is research that peripherally includes the evaluation of remedial responses by students and teachers to their classroom. Scott-Webber, Marini and Abraham (2000), professors and researchers at Virginia Polytechnic Institute and Virginia State University, studied the differences of opinion between undergraduate students and their professors about their classrooms, using surveys and observation. Their research focused on three questions about 15 multipurpose undergraduate classrooms: Is there a difference between faculty and student responses; what were the positive and negative attributes of the room; how were the rooms actually used? Their research indicates that faculty and students agreed most of the time on lighting quality and environmental comfort. Furthermore, "faculty felt the classrooms did not convey a positive experience relating to noise control, seating flexibility, and lacked provision for social interaction. Students found signage inadequate and felt classrooms were uninspiring,

nonanticipatory [*sic*], and lacking symbolic meaning" (Scott-Webber et al., 2000, p.16). The faculty response supported the sentiment conveyed in students' reports of not having a feeling of expectation when entering a space. Their research also indicated that classroom redesign would make the rooms sufficient for learning.

Likewise, Hill and Epps (2010), both professors of accountancy at Kennesaw State University, studied how students rated their physical environment and how they evaluated the teaching in that setting. Hill and Epps (2010), surveyed two sections of the same accounting course in an existing and a renovated room: "In the updated classroom, the seating was tiered with tables in fixed rows and rolling cushioned chairs, while the standard classroom has one-armed movable desks on a level floor" (p. 8). Their research indicated that students recognize the updated classroom and preferred many elements of it in contrast to the older classroom environment. Notably, there are conflicting results between this study and the work of Scott-Webber et al. (2000) who stated that students "do not perceive classrooms as being importantly different in terms of aesthetics and type of seating" (p. 34). The latter researchers stated that students may perceive all classrooms on campus to be usually bad and generally the same. Hill and Epps reported that students enjoyed the course and learning in the updated classroom and they perceived the professor to be more organized in the remodeled room.

Similarly, Veltri, Banning, and Davies (2006) conducted a qualitative study with community college students to evaluate how the physical environment affected their learning. The study explored student involvement in classroom design and their descriptions of ideal environments for learning. This research confirmed that undergraduates recognized positive and negative aspects of their classroom environment, including taking some corrective actions, albeit within the context of a participatory exercise to design a new space.

However, while existing studies explore the overall assessment of undergraduate classrooms, none have been conducted to determine exactly what constitutes remedial responses to the physical university classroom by students and teachers.

There are other contemporary strategies to review the physical university classroom with regard to teaching and learning. In the proceeding discussion, I focus on literature that explains two widely used research methods: the case study method and the post-occupancy evaluation (POE), a largely quantitative tool by design professionals. Both have characteristics that provide effective strategies for research on remedial actions.

A case study is a systematic way of doing research about an incident or process that exemplifies a widespread issue. Many disciplines use case studies to further their understanding of a particular practice or occurrence; the specific format and methods employed vary from study to study and across fields of inquiry. Stake (1997a) reminds us "people have different notions as to what a case study is…It belongs to science and to social service" (pp. 401–402) and indeed to many other discourses. Therefore, I reviewed an education case study (within the Social Sciences Model), an architectural case study, and an environmental-behavioral version, used for researching post-secondary educational facilities.

2c1. Case studies.

Educational case study model.

Stake (1997a), a long-time researcher and developer of the case study method, declared that case studies are "one of the most popular, and usually respected, forms for studying educators and educational programs" (p.401). In the following discussion, I outline his commentary on the elements of case studies with regard to purpose, process, the researcher, intended audience, and establishment of credibility.

Stake examined the purposes of case studies and admitted that they do not necessarily provide a comprehensive remedy to a specific circumstance; rather, they shed light on problems that may be transferable to other situations. One may not find that the "particulars [of the case study are] generalizable, but the systematicity [methodical organization]" (Stake, 1997a, p. 403) may help to identify and analyze those other situations. Consequently, the extent of the case must be defined by clear boundaries to understand the limitations of the study. Therefore, Stake stressed the importance of setting the focus, timeframe, and theme. Stake said that the usual audiences, fellow researchers, "have appreciated deep, self-referential probes of problems" (p. 401). It is said of the researcher, that "this was his story, …his construction of truth" (Stake, p. 409), and researchers look for "patterns, co-variations, and regularities that beg for better interpretation" (Stake, p. 408). So, it is common in the practice of case studies to employ subjective interpretation or to interact with the subject or the phenomenon. However, despite this subjectivity and personal involvement of the researcher, as will be discussed in Chapter Four, a case study is a reliable means of inquiry that can incorporate qualitative, quantitative and mixed method research.

Stake also said that a researcher should try to get a reader engaged in the story, but Stake stated what a case study is not:

> It is not like a newspaper story. There are some important similarities. Both are trying to develop an understanding through the description of what, where, how, when and why. Both use narrative and testimony. The difference is in the use of theme. The reporter tries to tell the story primarily to be interesting to the reader. The case researcher starts out looking for what is meaningful to researchers but simultaneously

> tries to discover what is meaningful to the case people. Really, the case is precious [paramount]. (Stake, 1997a, p. 404)

There are some drawbacks to case study research. If one were looking for trends across several different instances, this strategy is not ideal to discover those patterns, but Stake suggested that, oftentimes, the documentation of common/ordinary occurrences and key players in a particular case study may highlight personal and administrative weaknesses that exist in other settings that were previously overlooked.

Lastly, in establishing the credibility of the case, Stake advised researchers to consider elements within the study that reinforce the accuracy of the work, and the overall rigor of the research. It is helpful to the reader if documentation is included in the case study that buttresses the research, like including relevant information in the appendices (I discuss my methods of triangulation and supporting documents in Chapter Three).

Architectural case study model.

Like Stake's assessment that format and methods for case studies vary widely, there is no one model for an architectural case study. I review two of the most prominent types. One is an academic version developed by architecture and design practitioners in a university setting. Another, was produced in a commercial environment by practitioners directly involved in the architecture and construction industry.

Dr. Dilanthi Amaratunga, director of the Research Institute for the Built and Human Environment at the University of Salford (Amaratunga & Baldry 2001) concurs with Stake's (1997a) understanding of the requirements of case study that examine the process of a singular instance. Amaratunga and Baldry (2001) wrote that in architecture "case studies are tailor made for exploring new processes or behaviours or ones which are little understood. In this

sense, case studies have an important function in generating hypotheses and building theory in built environment research" (p. 13). In addition, architectural case studies tend to focus on the functioning of a facility or space and examine not only the existing space but the "historical context of its design" (Alizadeh, 2006, p. 57). Amaratunga and Baldry described the philosophies of conducting architectural research:

> In research design, therefore, the issue then becomes not whether one has uniformly adhered to prescribed canons of either logical positivism or phenomenology but whether one has made sensible methods decisions given the purpose of the study, the questions being investigated, and the resources available. (p. 3)

Ultimately, the purpose of this case study research method is to add to existing knowledge in a way that advances understanding by providing a solution or asking better questions. Amaratunga and Baldry said that a case study should not be used to reinforce a known fact, rather, this type of research provides the ability "to draw on inductive methods of research, which aim to build theory and generate hypotheses rather than primarily to test them" (p. 14).

Alternately, case studies are regularly published by trade magazines like *Architectural Record*, a national award-winning magazine distributed for over a century by the American Institute of Architects, a non-profit entity, with a circulation of over 70,000. The magazine is published for the purpose of stimulating and informing its patrons (Architectural Record, 2009a). The case studies are intended to present "a comprehensive look into construction goals, plans and implementation [offering]…the very best of analyses, case studies and write ups by expert architects" (Architectural Record 2009b, para. 6). The intended recipients are design students and professionals, and those individuals involved in the architecture industry around the world. Gonchar (2008), a senior editor who focuses on building science and

technology issues at *Architectural Record*, wrote that the goal of the series of case studies on educational facilities was to provide a comprehensive study of finished schools with an emphasis on innovative and successful strategies.

For architectural practitioners, these short case studies with high quality pictorials highlight novel ideas and the incorporation of new technologies. They are meant to be inspirational, but they do not provide the in-depth coverage nor do they discuss implementation of curriculum at a comprehensive level. Usually a list of project team members, university administration, and manufacturers of major products and building systems are included, so it seems unlikely that the unsuccessful aspects or deficiencies of the building projects would be revealed to the readers of the magazine. I posit that this work is situated somewhere between research and journalism.

Environment-behavior case study model.

In architecture, there is a movement called *evidence-based design*, which encourages a process to bring verifiable behavioral research into the design of architectural spaces (Hamilton & Watkins, 2009). This is similar in concept to evidence-based research, a trend in education to stem "the adoption of instructional programs and practices…driven more by ideology, faddism, politics, and marketing than by evidence" (Slavin, 2008, p. 5) as well as in contemporary medicine to authenticate the usefulness of alternative medicines (Chiappelli, Prolo, Rosenblum, Edgerton, & Cajulis, 2006). The purpose of an environment-behavior case study is to address the needs of the users of the space, to seek verifiable answers and to evaluate satisfaction of those needs. Good basic research advances environmental behavior knowledge and aims to close the gap between environmental design and architectural practice. The researchers are academic professionals and the intended audience is the architectural and

academic community. Rigorous methods establish credibility for this type of case study and the foundation of this research is largely positivist in nature.

For example, Cherulnik (1993) reports on the Jones dormitory redesign case study for Trinity College in Hartford, Connecticut, which was conducted by Andrew Baum and Stuart Valins, researchers who have studied crowding behaviors in human populations. Over a period of three years, they studied two areas of one floor in the existing dormitory at the College. The spaces varied in social density within their residential units. The researchers collected data through observation, questionnaires, and discussion groups. Their findings influenced the redesign of the space. Cherulnik reported:

> The project succeeded in demonstrating a promising approach to environmental-design research, one rooted firmly in the traditions of social science. It began with a sophisticated conceptual analysis bringing together several separate theories and extensive supporting research from such diverse traditions as ethnology, laboratory experimentation, and naturalistic quasi experimentation. It continued with dedicated research in the context for which new design solutions were sought, research that was conducted using state-of- the-art methods. Finally, the design inferred from that research was evaluated with the assistance of careful arrangements that provided experimental comparisons in a natural setting. (Cherulnik, 1993, p. 129)

Much like the architectural case study model, the purpose of this case study was to inform the new redesign and it was essential in the theory supporting the renovation. Likewise, this study went beyond simply documenting existing fact. For the architectural practitioner, this type of case study is specific, directly relevant and comprehensive, delivering valuable research information. It included one simple line drawing illustrating the physicality of the layout, in

contrast to the glossy inspirational pictorials of the case studies published in trade magazines. The Jones dormitory redesign case study is a good example of efficient environment-behavior research in that it is detailed in context, description of place, method, and results. It goes on to provide favorable comments from students after the dormitory renovation was completed. Results of this study were incorporated into research that culminated in a post-occupancy evaluation.

Conclusion.

The review of the literature on case studies to evaluate the impact of performing corrective measures on the undergraduate teaching and learning experience reveals no one strategy that rigorously examines the relationship of the architectural form to the resulting human behavior and how that shapes the educational process of the course. While the case study models presented may be successful within their own disciplines, there is not one that meets the needs of all stakeholders. Likewise, Fulton (1991), when speaking of research on university spaces, found the following:

> Many researchers have attempted to establish and report the relationships of space to learning… Much of this research conceptualizes the relationships from an architectural point of view. Other information is found in psychological frameworks, workplace training, aesthetics, sociology, and human factors engineering. Even when the relationships of a setting's physical attributes to learning have been considered within an educational framework, findings frequently have been limited to children and may or may not be applicable to adults (pp. 13 – 14).

With all this in mind, I turn to another method of researching an existing space, the post-occupancy evaluation.

2c2. Architectural post-occupancy evaluation of post-secondary educational spaces.

Architectural practitioners researched ways to rate the effectiveness of higher education facilities at the very beginning of the environmental psychology movement. Post-occupancy evaluations (POE) are a relatively contemporary method (originating around the 1960s in America) to determine whether design decisions made by design professionals are delivering the performance intended as evaluated by those who use the building. These assessments provide several long- and short-term benefits, unlike the traditional case study published in architectural trade magazines, which tend to highlight buildings that photograph well or those designed by architectural celebrities, or those of particular interest to architectural critics. Some of the POE benefits include the identification of spatial problems and successes, the opportunity for user involvement and the establishment of prototypical spaces. Preiser, Rabinowitz, and White (1988) describe the intent of a POE as "to compare systematically and rigorously the actual performance of buildings with explicitly stated performance criteria; the difference between the two constitutes the evaluation" (pp. 3–4). Since the late 1980s in America, the *performance method* concept has been widely employed as the foundation of the evaluation. Performance criteria are usually developed by the university administration (in response to their goals for the institution), and performance measures are determined by a post-occupancy evaluator.

The process is subjective on several levels. The actual building ratings are dependent upon the performance criteria developed by the administrators. The performance is derived directly from those values that the university deems important, which are not necessarily the same as the values of the evaluator or the users of the space. Moreover, the building evaluation result is reliant upon the goals of the evaluator and the performance measures developed to test the criteria. Lastly, not only may different users give different responses, but also the same users

of a space may give varying responses at different times. Preiser, Rabinowitz, and White state that, "there are no absolutes in environmental evaluation because of cultural bias, subjectivity and varied background of both the evaluators and building users" (1988, p. 33).

POEs can collect data with quantitative or qualitative methods, but they are mostly considered a quantitative tool. For example, even aspects of the building examination, such as personal assessments of the quality of lighting or the performance of the mechanical systems, are defined in terms that are computed and comparative. I found no research indicating that the qualitative aspects of the building influenced perception of the quantitative performance (e.g., the overall reputation of the facility affected the report of specific actual conditions), although Preiser, Rabinowitz, and White surmised as such. Post-occupancy evaluations originated at a time when electronic computation was at its early stages. Thus, the format of POEs was favorable to collecting large amounts of data and to sorting and computing values for a building. Data from the first evaluation of schools in the mid-1970s were noted for being very wide-ranging and detailed (Preiser, Rabinowitz, & White, 1988); however, the evaluation structure was rudimentary (Preiser, Rabinowitz, & White, 2005). Eventually, POEs were grouped into three levels of sophistication –indicative, investigative, and diagnostic (respectively), with each successive level costing more money and involving more effort and time. Within each level, there were three phases, (a) planning the POE, (b) conducting the services, and (c) applying the data to produce the deliverables, which document the appropriate amount of work at each level. Methods employed included utilizing questionnaires, site visits, personal interviews, document review, and analysis. The authors remarked that although this format was easy to comprehend, it was often not comprehensive enough for the task.

While the performance method was one technique that originated, other ways did develop. One was by Pena and Parshall (1983). They were interested in architectural research for both evaluation of existing buildings and for the programming (the collection of pertinent information to initiate design work) of new spaces. They authored two books, the first on post-occupancy evaluations, and the next on architectural problem-seeking. Within their method, the evaluation strategy used the same format as in the initiation of an architectural project and they categorized their efforts into four key elements (which correspond to the phases of the method created by Preiser, Rabinowitz, and White) used throughout the POE.

It is important to note that while a post-occupancy evaluation is said to get its name from the *certificate of occupancy*, which is commonly issued in the United States allowing a new facility to operate, there are other monikers that have evolved from the initial POE model. One is the *building performance evaluation* (BPE). The integrative framework of this evaluation method (Preiser, Rabinowitz, & White, 2005) covers concerns like building code related issues, life safety requirements, space utilization and human personal, cultural and social needs.

There are several concerns often cited about the effectiveness of post-occupancy evaluations. Firstly, the institution often commissions POEs. Therefore, the values of that entity may influence the development, conduct, and findings of the evaluation (Preiser, Rabinowitz, & White, 1988) and serve the administration's perspectives as the primary recipient of POE data (Hewitt, et al. 2005). This may be problematic if the purpose of the evaluation is to provide objective data to evaluate the feasibility of capital improvements to benefit all constituents. It may be advantageous to review the results as referenced to other priorities and other stakeholders. Likewise, the performance measures developed by the evaluator also serve to influence the process (Preiser, Rabinowitz, & White, 1988). Moreover, Doidge (2001) maintains

the need for setting up a national system of post-occupancy studies within the architectural design curriculum. He advises that, oftentimes, architecture students are not introduced to client and user issues to the point that they could be an effective part of a POE team.

Second, as Doidge (2001) goes on to state "The greatest obstacle to POE studies is that professionals must guard their reputation and avoid litigation," and he adds that such studies "have been conducted for at least half a century but the results are not encouraging. Most take the form of 'internal enquiries' either to 'whitewash' or to 'apportion blame' and are rarely published" (p. 2). Indeed, Lackey (1999a) reports that in most instances there is "no clear economic incentive for conducting the POE in the first place. Client organizations are not quick to support the POE due to the potential for bad publicity if problems are uncovered so soon after a large expenditure of public funds" (p.5). In addition, because the performance criteria and performance measures are not developed by the users, it is useful to critically consider the following: What are the consequences of false positives or false negatives (if an evaluation of a university space is inaccurate) who will gain and who will lose?

Thirdly, a critic might argue that the most important criteria for school design is flexibility. Ponti (2005, p.85) states that "the pedagogical and didactic activities are continuously changing" and, therefore, the ability to easily change the environment to adapt to new pedagogies is paramount, whether the changes are daily or annually. Also, with regard to the lifecycle costs of the facility, long-term adaptability to accommodate multiple uses is prudent.

Lastly, Tombs (2005) remarked that developing quality indicators within the framework of a POE was not without criticism. Some individuals in the design professions were skeptical of the categories to evaluate quality. They saw the indicators as giving less emphasis to

epistemology/pedagogical practices, which they maintain are "required to be a headline item, because without an appropriate understanding of these matters, a very fine building may not end up delivering the places/spaces within which appropriate teaching can take place i.e. the school might be a very poor performer!" (p. 70).

While there are many ways to judge a university classroom, the two contemporary methods of case study and POE are both wanting. POEs often use comparisons to educational goals, rather than documenting the behaviors that are currently occurring to make up for the shortcomings of the space. While case studies should document remedial actions performed, as a vehicle, there is no a format in use that responds to the needs of the architect, educator, and environmental-behaviorist. Currently, there is no tool to evaluate the toll placed upon the education process for corrective measures. My research is about evaluation of the built learning environment, specifically, the influences of corrective actions, so it is fitting that I review conditions where the design of the facility meets the need of its inhabitants and when it does not.

2d. Normal and Extraordinary Effects of the Physical University Classroom Environment on Teaching and Learning

When remedial behaviors become unusually pronounced, they may be an exceptional result of shortcomings in the environment and provide a range of human expression (Abramson, 1992). The physicality of the classroom is often unnoticed beyond the opening of a new facility. However, anecdotes persist of university spaces that are unusual for their influence on teaching and learning, whether liked or not.

Dutton and Grant (1991) advocate support of marginalized peoples and a politics of voice. They point out the benefit of this recognition by stating that "coming to voice, within relations of difference characterized by asymmetrical relations of power, should be an

empowering process" (p. 40). To illustrate their theory, Dutton and Grant describe the design of the National Heritage Rooms at the University of Pittsburgh. They created these traditional rooms in an on-going effort to celebrate national heritage and ethnic diversity, and inspire cultural expression. Existing heritage rooms include Scottish, German, Swedish, Russian, Early American, Israeli, Armenian, African, and Ukrainian. They remark how the classrooms in general, successfully evoke a multicultural experience while providing an exchange of culture.

Kroll (1984) describes conditions on the University of Louvain campus in Belgium, where he accepted a commission to design a facility to counter the uniform institutional feel of adjacent buildings, and celebrate diversity. The materials used in construction of the windows and their colors, curtains, balconies, and plants increase the sense of diversity. "They reinforce the individuality and the autonomy of the occupants and not the power of the central administration" (p. 167).

Christian Kuhn (2005) explores the success of Building 20, formerly standing on the campus of Massachusetts Institute of Technology in Cambridge, Massachusetts. This laboratory facility, designed in one afternoon by a graduate student and constructed in six months, was used for radiation research during World War II. Although it has been occupied for over 50 years, it was initially expected to be a temporary structure and, therefore, did not have to meet the normal cadre of building codes. Kuhn claimed that the building was one of the most prized on campus because of the unpretentiousness of it. The provisional character of the building allowed its inhabitants to create and re-create spaces and personally identify with the built environment.

Alternately, Grannis (1994) points out another instance in which environmental-behavioral research would have aided in the design of a particular higher educational facility. His review of the Yale University Arts and Architecture building in 1987 gave many examples of a building

not designed to fit the behavior of the inhabitants and how the students retaliated by vandalizing, defecating, trashing and eventually trying to burn down the facility.

There is much anecdotal and theoretical discussion of how the built environment supports effective teaching practices and student interactions, consisting of case studies of exemplary school environments (Architectural Record, 2008; Dittoe, 2002; Dutton & Grant, 1991; Kuhn, 2005; Van Note Chism, 2002), and unsettling stories of how inadequate spaces inhibit learning or promote behavior by students and teachers that is adverse, inefficient, or ineffective (Foucault, 1995; Freire, 1970; Hebdige, 1979; Piro, 2008). It is also a common assumption that students and teachers often act in some way to make up for the deficiencies in the built environment or use those shortcomings to enrich learning experiences (Burgan, 2006). However, there is no formal process currently utilized to analyze and consider the many obvious and subtle efforts made by teachers and students to correct deficiencies in the classroom built environment in support of their educational experience.

2e. Summary

In the preceding discussion, I reviewed literature on the concept of place in the traditional classroom, and online and hybrid/blended learning environments. I reviewed the experience design movement, which can spur focus on designing spaces with teaching and learning as their priority. Then, I appraised available literature for disciplinary case study models to determine their capability to meet the needs of the major stakeholders in evaluating remedial actions for their impact on teaching and learning. I found that an interdisciplinary method must be developed in that regard. I assessed post-occupancy evaluations and found them also lacking. Finally, for perspective, I reviewed anecdotal information about learning facilities with exemplary and inadequate designs, which are important contextual information to consider in my

research. It is clear, however that my work to study remedial actions cannot employ the aforementioned methods as they exist. An area of research that adequately studies corrective measures performed because of place is underdeveloped. While contemporary case studies may document corrective measures, an interdisciplinary tool has yet to be developed to analyze the effects of remedial actions within the context of the architectural design, educational processes, and environment-behavior relationships. In Chapter Three, I outline my research methods.

Chapter Three: Paradigm and Methodology

The purpose of this qualitative study is to examine how corrective actions, or rather, remedial responses to the physical undergraduate classroom, shape the educational experiences of students and teachers. To address this purpose, I conducted a case study of the experiences of students and the teacher who participated in my research, in a blended/hybrid class at a large urban private university in the northeast of the US. My philosophical perspective values multiple participant experiences, and I chose to use qualitative methods since they allow exploration of phenomena in natural settings as well as in-depth analysis of participant data to seek an understanding and meanings of experiences (Jones, 1995). I selected the case study approach because it "affords researchers opportunities to explore or describe a phenomenon in context using a variety of data sources" (Baxter & Jack, 2008, p. 544). Thus, in addition to the course observation, a survey of the class that comprised the case study, and an interview with that class' teacher, I collected data outside of the case study consisting of a survey of other students and teachers, and another one-on-one teacher interview. In order to study the experiences of students and teachers, the surveys and interviews included questions about individual perceptions, beliefs, and opinions from those who experienced the need to take corrective actions in response to limitations in the classroom design in order to enhance teaching and learning. I deliberately used the term "corrective actions" with participants (as noted in Chapter One), because the term "remedial," like the term "developmental," is often controversial (Boylan, Bonham & White, 1999; Preuss, 2012) because it refers to a policy of providing instruction to college students in response to deficiencies in their preparation for entry level and advanced college courses (Hanover Research, 2013). Most two-year community colleges and many four-year public and private colleges provide this coursework under the name

of remedial or developmental education (Deil-Amen & Rosenbaum, 2002). Teachers and students find "negative stigma attached to remedial classes" (Hanover Research, 2013, p. 4; Deil-Amen and Rosenbaum, 2002). I, therefore, used the synonym "corrective" to participants to describe the actions taken by them to improve their learning and teaching experience.

This chapter describes my paradigm for inquiry, the case study approach, method and research questions, the selection of the study participants, and data collection, management, and response. I end the chapter with a discussion of research credibility, or trustworthiness.

3a. Paradigm, Methodology and Methods

Qualitative research terms and conceptual organization in literature can be inconsistent and misleading, failing to do the following:

> …[A]dequately define research terminology and sometimes use terminology in a way that is not compatible in its intent, omitting important concepts and leaving the reader with only part of the picture. Texts are sometimes structured in a way that does not provide a clear path to information terms and major concepts. (Mackenzie & Knipe, 2006, Discussion section).

Discrepancies exist between researchers regarding the meaning, importance and sequence of establishing the *paradigm*, also known as the theoretical framework for research (Mertens, 2005). For instance, the paradigm may be situated as the starting point by which to derive research *methodology* and *methods* (Erikson, 1986; Mackenzie & Knipe, 2006); or be a methodology of its own (Neuman, 2000). It could also be a perspective to be explored during research (Berg, 2001); or the methodology employed could influence the paradigm subsequently chosen (Walter, 2006). Some assert that the concept of paradigm and methodology are synonymous (Anderson, 1987; Somekh & Lewin, 2005).

Likewise, a case study in the reviewed literature is defined as a research approach and a methodology (Baxter & Jack, 2008; Berg, 2001). Other experts state that "case study research appears to be based on its own separate *method*, related to but not wholly part of the qualitative or quasi-experimental domains" (Yin, 2012, p. 19). Also, listed as methods are qualitative research (Hatch, 2002; Mackenzie & Knipe, 2006) and data collection instruments (Jones, 1995). In light of the variety of definitions of what constitutes a research paradigm (theoretical framework) versus methods and methodology to conduct the research, it is necessary for me to clearly outline the foundation of my research in the ensuing discussion.

I assented to Creswell's definition of research as "a process of steps used to collect and analyze information to increase our understanding of a topic or issue" (2008, p. 3). I based my research upon an interpretivist paradigm that posits that the world is defined by construal, both by parties within and beyond the social sphere (Angen, 2000; Creswell, 2003; Erickson, 1986; Mackenzie & Knipe, 2006). I do so because that paradigm fits my epistemological and ontological view of how the world is experienced and elements and processes are defined. "There can be no understanding without interpretation" (Angen, 2000, p. 385). This was the framework that set "down the intent, motivation and expectations for the research" (Mackenzie & Knipe, 2006, Research Paradigm section) and it was the foundation for all my decisions regarding the approach, type of research I conducted, and choice of data collection instruments (Mac Naughton, Rolfe & Siraj-Blatchford, 2001). Indeed, this worldview was an appropriate frame for study of the physical classroom and the influence on the learning experience, because it recognizes the social and cultural aspects of the classroom environment, with teaching being only one factor of many, and the importance of the perspectives of both teacher and students (Erickson, 1986).

Pursuant to my interpretivist paradigm, I selected the case study approach. This approach "explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information…and reports a case description and case themes" (Creswell, 2013, p. 97). The case study approach is appropriate for my research because it is aligned to an interpretivist framework of valuing the varied perspectives of participants, and, because there is little research concerning remedial responses, case study findings serve to provide a "rich and holistic account of a phenomenon. It offers insights and illuminates meanings" (Merriam, 1998, p. 41).
In addition, the case study approach was an appropriate strategy for this research problem because I asked a "how" (descriptive) question, I could not prohibit participants from performing corrective actions to study the phenomena so it is best examined in the natural setting, the context (classroom) was important to the phenomena, and the relationship between the context and phenomena was unclear (Yin, 2003).

In Chapter Two, I discussed different case study models and deemed no single strategy to be adequate. For this case study, I used an interdisciplinary approach. The study was essentially an education case study (within the social science model), which gave emphasis to epistemology, pedagogical practice and educational process, but incorporated attention to the architectural features and context of the space, including its historic origins (as in the architectural case study), and also paid great attention to human behaviors in response to the built environment.

The case was a single undergraduate class period at a large university in the metropolitan Boston area in which a constructivist course was taught in a classroom principally designed for non-constructivist instruction. The case was *descriptive* because it defined phenomena *in situ*

(Baxter & Jack, 2008; Yin, 2003). I chose a unique case of profound disparity between pedagogy and physical environment to highlight issues regarding remedial responses to the physical classroom (Flyvbjerg, 2006; Merriam, 1998). The benefit of selecting an exceptional case to explore phenomena of which there is little research was threefold:

> First, since such data are rare, they can help elucidate the upper and lower boundaries of experience. Second, such data can facilitate….prediction by documenting infrequent, non-obvious, or counterintuitive occurrences that may be missed by standard statistical (or empirical) approaches. And finally, atypical cases….are essential for understanding the range or variety of human experience (Abramson, 1992, p. 190).

Within this case study, I situated sub-units of data compiled from surveys of local students and teachers, a document analysis, and a teacher interview to support my interpretation of the findings. I compared data within each method, and then looked for a cohesive understanding between the surveys, document analysis and interview, and then compared those findings to the entire case to provide a *single-case study with multiple data units embedded* therein (Baxter & Jack, 2008; Swanborn, 2010; Yin, 2003). This allowed me a better understanding of the phenomenon, both in its distinct parts and holistically.

While a case study can be part of quantitative, qualitative, or mixed methods research (Yin, 2012; Stake, 1994), I chose a qualitative methodology because it is "research that produces descriptive data - people's own written or spoken word and observable behavior….[and] the researcher looks at settings and people holistically" (Bogdan & Taylor, 1975, pp. 7–8). This is in congruence with my theoretical framework for research. Working within this methodology, my philosophical assumptions of "the nature of reality (ontology), how the researcher knows what

she or he knows (epistemology), [and] the role of values in the research (axiology)" (Creswell, 2003, p. 16) were as follows.

Knowledge obtained from this research was through my relationship with the participants and my immersion into phenomena *in situ.* My ontological view is interpretivism; therefore, I defined reality as truth constructed from the construed meanings from many and various participants. For that reason, my research included comments and stories of participants and their stated conclusions as well as my interpretations. Of course, each participant and the researcher contributed evidence of their value systems within their input. I analyzed all data from students and teachers for value, attitude, and belief content. My interpretations and analysis of participant's conjecture provided the reasons for arriving at conclusions.

Ericson (1986) valued participant perspectives in interpretive research, because he said it is largely overlooked in other studies for three reasons:

> One is that the people who hold and share the meaning perspectives that are of interest , are those who are themselves overlooked, as relatively powerless members of society….A second reason that these meaning-perspectives are not represented is that they are often held outside conscious awareness by those who hold them, and thus are not explicitly articulated. A third reason is that it is precisely the meaning perspectives of actors in social life that are viewed theoretically in more usual approaches to educational research as either peripheral to the center of research interest, or as essentially irrelevant. (pp. 124–125).

These reasons reinforce my decision to conduct interpretivist qualitative research. In Chapter Four, I analyze conditions of power and control concerning remedial responses to the classroom design between students and teachers, and between teachers and university

administration, to uncover that the least powerful have an important perspective. However, true to the sentiment of Erickson, Chapters Three and Four also show a majority of those performing corrective actions label them as inconsequential to their teaching or learning experience, thus making the scarce input more valued. Lastly, as I mentioned in Chapter One, there is little research on the effects of remedial responses and only minor exploration in research on other topics.

Erickson (1986) lists the two main inquiries of qualitative classroom research as, "What is happening here, specifically? What do these happenings mean to the people engaged in them?" (p. 124). Likewise, I interrogated the phenomenon of performing remedial actions by asking four basic questions:

- Question 1: "What is existing?" This was followed with a request for a thorough description of the existing classroom situation in order to set the context;
- Question 2: "What actions were done or attempted?" This question solicited the experiential account of corrective actions attempted or executed to better understand the influences that impact these experiences;
- Question 3: "What comprises your learning (or teaching) experience for this course?" This was followed with a request for a list of components and locations (for example, preparing lesson plans in my office) to better understand how class-time is situated within the course experience, and;
- Question 4: "How is the learning (or teaching) experience in the course influenced by the corrective actions that you took (or continue to take)?" This question was asked to better understand the impact of these acts.

The areas of exploration noted above have evolved throughout the research. Beginning with my casual observation and questioning, and substantiated by the initial review of the first surveys and formal classroom observation, I advanced the notion that perceptions of classroom adequacy were contextually different among students and professors. Indeed, the initial numbers of students who described an inadequate physical classroom environment, yet labeled it as inconsequential to their learning experience, compared to teachers who described a similar context, but reported that it was an important issue, prompted the addition of Question 3 above. I found it necessary to understand how participants' perceive their teaching and learning experiences, and how their corrective actions have affected these experiences. I asked these four basic questions throughout my data collection and specifically asked one or more of these questions in each data collection method (see Figure 9 in Chapter 5) as one of the techniques to support research credibility, which I will explain later in this chapter.

To support my research inquiries, I selected data gathering techniques that were appropriate for an interpretivist case study approach using qualitative research methodology (Brikci, 2007). According to Mackenzie and Knipe (2006), research that is predominantly qualitative employs methods such as "Interviews, Observations, Document reviews, [and] Visual data analysis" (Table 2: Paradigms, methods and tools) but can also adopt methods used mainly in quantitative research. Consequently, I chose all of these aforementioned qualitative research methods, plus that of survey, often used in quantitative work to collect numerical data (Creswell, 2003), but, for my purposes, I solicited descriptive data through that tool.

Byrne (2004) said that "qualitative interviewing is particularly useful as a research method for accessing individual's attitudes and values – things that cannot necessarily be observed or accommodated in a formal questionnaire…[and] when done well is able to achieve a

level of depth and complexity that is not available to other, particularly survey-based approaches" (p. 182). For these reasons, I chose the interview method as a way to delve further into participants experience performing remedial actions, beyond the class observation and surveys. I utilized an unstructured interview style, in which there were no pre-determined questions and researcher's inquiries were largely in response to participant comments; to deeper understand participant's experiences without the constraint of the researcher's pre-conceived frameworks or limitations (Punch, 1998).

Creswell (2012) stated that observation is the most frequent method used in qualitative research and defined it as "the process of gathering open-ended, firsthand information by observing people and places at a research site" (p.213). Thus, it was an obvious choice to explore the phenomenon of performing corrective actions, to surveil existing conditions, and the results of those actions in context. I assumed the role of a nonparticipant observer, simply viewing the proceedings without comment (Creswell, 2012).

I used the document review method to examine course literature distributed by the teacher to students. Bowen (2009) describes document analysis as "a systematic procedure for reviewing or evaluating documents-both printed and electronic (computer-based and Internet-transmitted) material….in order to elicit meaning, gain understanding, and develop empirical knowledge" (p.27). I used this method because insight developed from this technique is often used to support case studies (Bowen, 2009) and key documents may constitute "social facts, which are produced, shared, and used in socially organized ways" (Arkinson & Coffey, 1997, p.47).

I incorporated the visual data analysis method for my research to study video recordings of the observed class period. The use of audio-visual recording for analysis, documentation,

conferencing, and social interactions is widespread in today's society (Knoblauch, Baer, Laurier, Petschke & Schnettler, 2008). In particular, "video is an important resource for many contemporary social researchers across a range of fields" (Jewitt, 2012, p. 21). A major reason is that video recording provides a lasting rendition of events that is often clearer and more comprehensive (Knoblauch, Schnettler & Raab, 2012), and the media allows multiple interpretation and analyses, when compared to personal accounts of observed phenomena. My technique was *video-based fieldwork*, which involved "the collection of naturally occurring data using video cameras and is perhaps the most established use of video for data collection within the social sciences" (Jewitt, p. 4).

Finally, I chose a qualitative survey method because it is well suited to my interpretivist view of supporting participant perspectives. This technique differs from a quantitative research survey which aims to gather "information from (a sample of) entities for the purpose of constructing quantitative descriptors of the attributes of the larger population of which the entities are members" (Groves, et al., 2004, p. 4). My intent is to explore the full range of the participants' diverse perspectives (Fink, 2003) concerning the influence of doing corrective actions on the educational experience. Thus, "the qualitative type of survey does not aim at establishing frequencies, means or other parameters but at determining the *diversity* of some topic of interest" (Jansen, 2010, para. 2). In order to solicit for a variety of perspectives, most of the questions in the questionnaire used in this study were open-ended, in that they asked participants for descriptions of phenomena and explanations of their feelings and behaviors (Roberts, et al., 2014).

Within these five research methods, I utilized specific data collection tools that I developed to obtain the demographic data of my research participants, including typical values,

attitudes, beliefs, and trends. The following outlines my sampling strategy, summarizes relevant participant information, and presents my data collection tools.

3b. Sampling, Participants and Data Collection Tools

My sampling approach for this qualitative research was *purposeful* because I selected participants based upon the information that they were likely to provide as opposed to a quantitative method, which randomly selects a probability sample from the population to promote generalization (Miles & Huberman, 1994; Patton, 1990). I followed the sampling rationale of Creswell (2012) that a qualitative researcher "selects people or sites who can best help us understand our phenomenon; to develop a detailed understanding that might provide "useful" information; that might help people "learn" about the phenomenon; that might give "voice" to silenced people" (p. 206). My sampling strategy was dynamic because early data collection informed my sampling intent.

The selection of participants in this study took place in the following way. Before data collection, my intent was to conduct multiple case studies and develop as many perspectives as possible through *homogenous sampling* (Creswell, 2012; Patton, 1990) comprised of teachers who teach an undergraduate course in more than one room, and their students. After some initial data collection, it was evident from early responses that few students and teachers reported performing remedial actions, but those who had acknowledged taking such actions, provided rich data about their experiences. Therefore, to explore the phenomena of doing corrective actions and the effect on the educational experience as the central focus, instead of an outlying issue, I changed my intent to a single case chosen by *critical case sampling* criteria (Creswell, 2012; Flyvbjerg, 2006; Merriam, 1998; Patton, 1990), which sought an extraordinary incongruity between epistemology, teaching method, and physical space. Accordingly, I looked for cases

where it seemed the classroom layout would be in conflict with the professed pedagogical goals for the course.

For the interview and survey methods that support the case study, I utilized a homogenous sampling strategy of a subgroup of undergraduate students and their teachers who have performed corrective actions. The intent of that strategy remained constant throughout data collection.

In addition to the sampling protocol, I set boundaries for my research. Miles and Huberman (1994) state that boundaries define those "aspects of your case(s) that you can study within the limits of your time and means" (p. 27). I chose to conduct research at the eight largest universities in the Boston metropolitan area for four reasons. The first related to the number of students and teachers in the area; the second, to available facilities to study; the third was in response to the difference between large and small institution experience; and the fourth was the limits of my own resources. The Boston-Cambridge-Quincy region in Massachusetts has the highest concentration of the higher education industry than any other location in America and is over 3.5 times denser than the national average (Sweeney & Marshall, 2009). Consequentially, university spending on facilities is high for this region despite the downturn in the economy that began in 2008, and one of the schools in my study, Harvard University, is in the midst of a multi-billion dollar expansion (Martin, 2012). My research involved the largest schools because "college isn't a one-size-fits-all kind of experience" (Snider, 2014, para. 1), and prevalence of different learning accommodations, class size and experience of instructors may differ for schools under 5000 students (Jacobs & Hyman, 2010; Flaherty, 2013; CollegeBoard.org, n.d.). My preference was, therefore, to study this phenomenon in the bigger institutions, and my resources allowed an exploration of this scope (see Figure A1, in Appendix A).

In accordance with my sampling guidelines, I described the participants by their race, age, gender, and other characteristics. To better understand group dynamics, I situated the data amid national trends which finds the typical undergraduate age range trending older (albeit slowly), and class make-up becoming more female and more foreign-born (The National Center for Education Statistics, 2014; US Census, 2010). I used this information to develop appropriate data collection instruments for the participants.

Undergraduates and their teachers from the eight largest universities in the Boston metropolitan area (see Table A1, in Appendix A for details of these universities) made up the participant group. I omitted institutions of higher education that were devoted entirely to the medical field because they employed a pedagogy heavily based upon laboratory and *in situ* training. There were approximately 79,728 undergraduate students and 6,867 fulltime professors included in my initial survey population. This set also included an unknown number of teaching assistants and adjunct professors. The universities from largest to smallest were Boston University, Harvard University, Northeastern University, the University of Massachusetts in Boston, Boston College, Massachusetts Institute of Technology, Suffolk University, and Lesley University. The student population of these institutions ranged from nearly 33,000 students to just fewer than 6,000 (see Figure A1in Appendix A, which illustrates the clustering of the 29 universities within five miles of Boston center). Although Bunker Hill Community College seemed to qualify for my research (because it claimed to have a student population of 13,504), in actuality only 34%, or 4,577 students were enrolled in 12 credits or more (which is a tenet/principle used by *U.S. News and World Report* in order to determine actual student population). This disqualified it because it therefore fell under the 5,000 student limit (Jacobs & Hyman, 2010).

The top eight universities in the Boston metropolitan area had an undergraduate gender breakdown of 45% male and 55% female. Likewise, on average, US campuses are majority female and trending towards an increase in that percentage. The majority ranking of male students changed in the early to middle 1970s. At that time, males outnumbered females, but the male population was rising at a lower rate. The number of female students on campus in second and fourth year post-secondary institutions overtook male students around 1977. Since then, the rate of undergraduate female students has increased at degree granting post-secondary institutions, widening the gap between male and female students on campus (National Center for Education Statistics, 2006). The National Center for Education Statistics (2014) projected the average US female undergraduate enrollment to reach 58.7% by 2022, which was slightly greater than the schools of my research group.

The overall racial composition of the student population in the 8 universities I included in this study was 48% White and 52% non-White. The US Department of Education, National Center for Education Statistics (2009) reported an increasing enrollment of minority students, from 15% in the mid-1970s to 32 % in 2007. The largest non-White group is that of Asian students. The National Center for Education Statistics (2014) now projects average US post-secondary minority enrollment to reach 41% by 2022, which is substantially lower than my research group. However, the US Census (2010) reported that Middlesex County, Massachusetts, where all the universities in this study are situated, has 10.5% persons of Asian descent (nearly twice the national average). The Institute of International Education (IIE) found that, “The strong increase in international student enrollment shows the continued conviction by international students and parents that a US degree is a sound investment in their future” (2013a, para. 8). IIE listed Massachusetts as one of the top ten recipients of international post-secondary

students with a 13% increase in 2013, and ranked Northeastern University and Boston University as the top seventh and twelfth universities, respectively, nationwide, for hosting international students of which an overwhelming number are Chinese undergraduates (Institute of International Education, 2013b).

In my set of participants, 83.5% were 24 years old and under, while 10.5% were over 24 years old; 6% did not report their age (see Table A2, in Appendix A for population data). Nationally, traditionally aged (18 – 24 years old) students remained the largest block of undergraduates, and this group is slowly increasing. The traditional aged student currently makes up about 59.4% of total US college enrollment, a number expected to grow through 2021. The difference between my participant group and the national average in this regard is partially explained because the age of undergraduates vary widely between public, private non-profit, and private for-profit educational institutions, as well as those attending as fulltime versus part-time (NCES, 2013).

While specific information was unknown about student attitudes at the universities included in this study, it was useful to consider general student characteristics, contemporary coed values, and undergraduate expectations to examine the complexity of the typical college student. Shared lived experiences and similar traits characterize every generation (Coomes, 2004; Coomes & DeBard, 2004). The generation largely born in the late 1980s or early 1990s is labeled as "Millennials" and is the largest demographic population in US history. Besides sharing similar traits, they also have a shared history. With regard to student values toward education, administration, and evaluation, DeBard (2004) characterized the Millennial generation as one that is staunchly faithful to institutions, cherishes a system which is answerably responsible, requires appraisal on demand, and which finds trivial work unrewarding (see Table

2, which outlines generational values). Likewise, Richard Sweeney (2006), university librarian, indicates that contemporary students value flexibility and choice in order to have maximum convenience. When considering the whole student, Perry (2003) writes that "the first year of college is a transitional period in students' lives in which psychological control is diminished or undermined due to the emphasis on success/failure, heightened academic competition, increased pressure to excel, frequent academic failures, unfamiliar academic tasks, new social networks, and critical career choices" (p. 316). Perry and other researchers have studied the effects of locus of control, that is, whether students felt that their educational outcomes were controlled by them or beyond their control. Lavender, et al. (2010) showed that the typical student exhibited better "task-persistence, affect, motivation, and creativity" (p. 211) when they had an enhanced attribution of personal control. This characteristic will be further discussed in the presentation of findings in Chapter Five.

Table 2.
Generational traits of Millennials.

View Toward	Millennials
Level of trust	High toward authority
Loyalty to institutions	Committed
Most admire	Following a hero of integrity
Career goals	Build parallel careers
Rewards	Meaningful work
Parent-child involvement	Intruding
Having children	Definite
Family life	Protected as children
Education	Structure of accountability
Evaluation	Feedback whenever I want it
Political orientation	Crave community
The big question	How do we build it?

Note. Excerpted from "Millennials Coming to College," by R. DeBard, 2004, *New Directions for Student Services, 106*, 33–45. doi:10.1002/ss.123

Compared to information concerning the student population, far less was known about the teaching assistant or adjunct professor of undergraduates. The only statistical information available was for full-time professors and that data was derived from the published student /teacher ratio and the number of undergraduates at the institution.

Based upon the demographic statistics of my participant group, and research on general attitudes (DeBard, 2004), I modified my data collection instruments and methods to be conducive to access by this research set, and to be mindful of matters that concern the typical values of this age group. I utilized survey, observation, document review, visual data analysis, and interview, for gathering research data; in the following discussion, I review them and describe how I modified these instruments to suit this group. In addition, I outline my recruitment strategy for this population.

3b1. Survey.

I first administered an online experiential survey of issues (Appendix B) regarding remedial responses to teachers and students, and used responses to support case study findings. I then distributed a different hard-copy initial survey to students at the end of the observed class (Appendix C), followed by a separate online supplementary questionnaire to those same students, as well as to students in another classroom in the same course taught by the same teacher (Appendix G). All of these survey results comprise part of the foundation of the case study. The online experiential survey of teachers and students (Appendix B) initiated this research as an effective method for establishing a common framework and language for exploring the issues involved with remedial responses to classroom environments (Jansen, 2010). I conducted a trial release of the survey by issuing my “means for collecting and analyzing data on a small sample of participants with the same or similar inclusion criteria as would be the case

in the main study" (Chenail, 2011, p. 257) for two months, and collected feedback from respondents to revise the online survey. There were many advantages to utilizing online distribution and data collect for survey instruments, which included easier access to my research group, inherent scalability of participation, and the ability to "reach thousands of people with common characteristics in a short amount of time" (Wright, 2005, para. 9). Moreover, online data collection reduced the potential for input error because I extracted data directly from the survey instead of having to transcribe, interpret, or "cut and paste" participant responses (Wright, 2005).

This online experiential survey also provided a context for shared experiences and set a foundation rooted in actuality for the direction of the research. I designed this collection tool to first solicit general demographic information about the participants, and then to explore specific experiences of remedial actions, with the following topics of inquiry.

- Question 1 inquiries asked for specific classroom situations and requested the participant to "describe in vivid detail" the existing classroom environment and the deficiencies that prompted the best example in which the participant acted "in response to the shortcomings of the physical classroom;"
- Question 2 inquiries asked for details of remedial actions performed, soliciting the participant's description of his or her actions, the frequency of those actions, and whether the participant felt the actions were an effective remedy;
- Question 3 inquiries asked for the components that comprise "your overall learning or teaching experience (respectively for teachers and students) in the course." I asked respondents to consider, for example, "studying for exams, class-time, meeting with the Professor during office hours, study group meetings,

etc.," for students, and situations like "preparing your lesson plan, creating assessments, class-time, meeting with students during office hours, etc.," for teachers;

- Question 4 inquiries asked how the corrective actions taken affected the learning (or teaching) experience in the course.

In addition, I inquired about the motivation for doing well in the course or with teaching it (see Appendix B). I designed the survey with *skip logic*, that is, to interactively present questions based upon participant responses. Thus, the survey could be long enough to accept detailed information for up to three different situations of remedial responses (forty-four questions), or very brief for the active respondent who had less information to offer (eight questions minimum). Most questions were open-ended in that they "encourage the informants to 'tell their story' " (Öhman, 2005, p. 275). The survey also included a section to grant consent, which included my contact details, credentials, and information about the survey (Lesley University, 2014; Wright, 2005).

DeBard (2004) stated that one attribute of the student participants (Millennials) is that they demand access and feedback at their bidding, so I administered the experiential survey online, therefore making it accessible 24 hours a day/7 days a week.

In the same way that I modified the data collection tools for this population, characteristics of the participants informed the manner of advertising for the online survey and participant selection for interviews and observations. I initially expected to seek participants by putting up posters on bulletin boards at the major universities, flyers in campus kiosks, ads in the local newspaper, and point-of-sale announcements at nearby metro stations. However, based upon my participant data and contemporary practices, the recruitment process was substantially

different than I had imagined. After reviewing advertising opportunities on prominent social media sites, I chose Facebook, Twitter and LinkedIn. All of them purport a very high usage on mobile and telephone devices (Coomes, 2004), so I constructed my online data surveys and consent forms to be legible on a small screen as well (see Figure A2, in Appendix A for image of devices). In fact, 76% of active Twitter users accessed it from a mobile device (Getting started with Twitter, n.d.). My own advertisement statistics indicated that 83% of my audience used mobile devices and telephones, and 17% used desktop and laptop computers.

In order to recruit participants via Facebook, I selected an audience who lived in Massachusetts, and who, through the "like" button, had digitally linked their online presence to the Facebook pages for the University of Massachusetts Boston, Lesley University, Boston College, Harvard University, Suffolk University, Massachusetts Institute of Technology, Northeastern University, or Boston University. I posted new information on Facebook twice a week. I reached out to a Twitter population that included residents of the Boston Metropolitan area that communicated on one of 42 *hashtags* related to the eight universities in the study (a *hashtag* [#] is a specific topic). I sent invitational tweets to these hashtags twice a week (see Figure 7 for Twitter and Facebook advertisements). On LinkedIn, I reached out to anyone in Boston and surrounding regions associated with the eight schools of the study and who identified their profession as that of student, professor, assistant professor, associate professor, adjunct professor, visiting professor, lecturer, senior lecturer, teaching assistant or PhD student. These advertisements seeking participants for the online survey achieved over 150,000 views. In addition, I selected several large undergraduate courses that met my participant selection criteria, taught in different buildings, and corresponded with teachers of those classes, which resulted in the distribution of an email with links to the online experiential survey through those teachers to

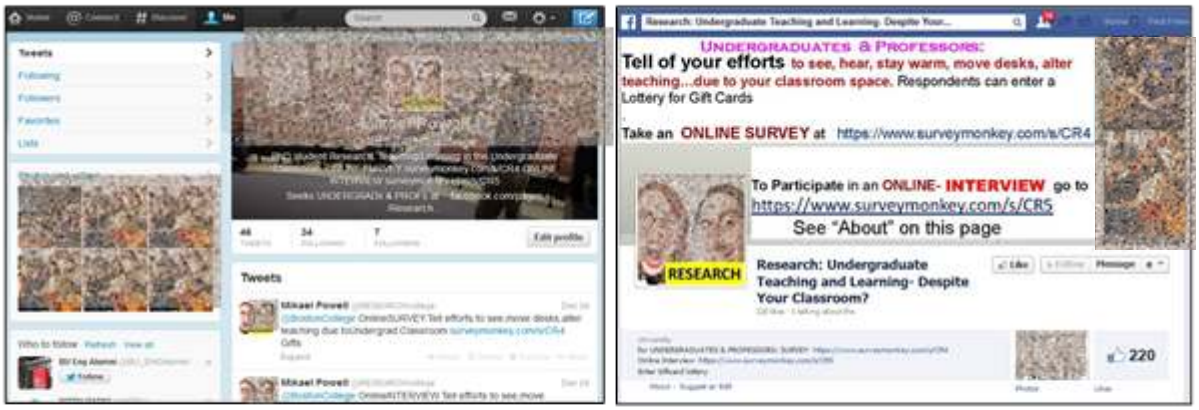


Figure 7. Twitter research home page (left) showing tweet to Boston College; Facebook research home page (right). Images from this public media are obscured to maintain copyright requirements.

eight classes.

As an incentive to view and complete the survey I included a gift card lottery for participation in this research (Wright, 2005), based partly upon my experience as a busy, underfinanced college student. I offered each respondent the chance to enter the drawing for one of three randomly selected prizes, by listing an email address for each mode of one's participation (that is, online survey, classroom observation). Prizes were an Apple gift card in the amount to purchase one iPod Shuffle 2 gigabytes (which seemed more inviting than simply saying a gift card for $50.00), an EBay gift card for $25.00 or an Amazon gift card for $15.00. After data collection for this research was completed, an independent party randomly selected three numbers from 1 through 83 (the total number of respondents) as first, second and third place lottery prize winners. Counting forward from the first date of participation, then by alphanumeric survey identifier, I sent the gift card codes to the email addresses of those winners (see Figure A3, in Appendix A for a variety of online advertisements).

The analysis of experiential data involved importing data from SurveyMonkey (an online surveying and analysis product), reviewing the responses to develop an understanding of content, analyzing and coding the texts and structures, and summarizing them. I identified key themes and issues by looking at relationships between the themes to develop theories on how or if the information can be useful, how it related to existing knowledge, or whether it can be applied to future studies and designs for evaluating learning environments (Creswell, 1998). Chapter Four discusses the analysis of the survey data.

The hard-copy experiential survey (see Appendix C for an example of the form) directly informed the development of the classroom case study. I labeled each survey form with an alphanumeric code based upon classroom chair layout to link each person on-camera to the survey he or she completed. Surveys were placed underneath each desk chair before class time, and I prompted students to open and manually complete the forms during the last ten minutes of class. The survey included images of conditions in which corrective actions have or might occur (Figure 8 contains an excerpt of the survey form) and asked about similar conditions and remedial actions performed during the observation, or any time during the course (questions 1 and 2 inquiries). Throughout all research methods, images shown to participants were balanced, in that in half of the pictures, student and teacher photography subjects are smiling; this research does not label performing remedial actions as either a positive opportunity or hindrance. On the hard-copy survey, I also asked participants how much their corrective actions influenced their overall learning experience (question 4 inquiries). Additionally, I inquired if they had performed corrective actions in other courses. Each question included a supplementary area for participants to explain their answers. At the end of the survey, I solicited demographic information about the participants.

After the classroom observation and my review of the completed hard-copy experiential survey, I created an online supplementary survey to solicit additional information from the observed participants, as well as the other class in the course from the teacher who had declined my request for observation. I incorporated data from this survey into the case study. This survey was similar to the online experiential survey, except skip logic allowed members of the observed class to bypass questions previously answered in the hard-copy survey. In addition, I asked all participants to list the major components of their learning, and to note the locations that those experiences took place (question 3 inquiries). I also asked participants about the relative importance of what happens in the classroom during class time to their total experience of learning in the course.

3b2. Observation.

Another data collection tool I utilized to develop the case study was face-to-face

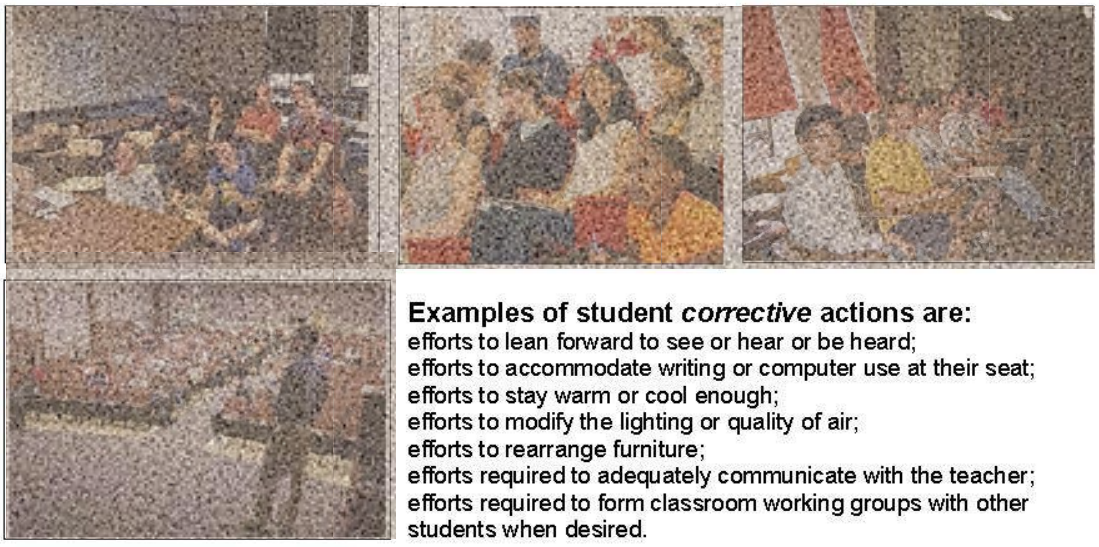


Figure 8. Excerpt from hard-copy experiential survey with pictorial and description of student corrective actions. Images are obscured to maintain copyright requirements.

observation, which enabled me to personally experience the context of the case (Berg, 2001) and

explore existing conditions (question 1 inquiries), what remedial actions are being performed (question 2 inquiries) and how those actions appear to be affecting class time (question 4 inquiries). As a non-participant observer, I sat in the far rear of the room as an " 'outsider'…. to watch and record the phenomenon under study" (Creswell, 2012, p. 215). In addition to ensuring that the audiovisual system was operating, I watched for major events in the class, jotting down in field notes important actions concerning the artifacts of place, which are the concrete carriers, concrete conveyers, inscriptions, texts, virtual artifacts and ambient artifacts (Carter-Ching, Levin & Parisi, 2004) discussed in Chapter Two (see the classroom observation log in Appendix I). In observing the classroom activity, I was cognizant that this generation desires Internet and virtual access (Coomes, 2004) and I looked to see how the classroom environment supported or hindered that value. Pursuant to research on typical generational attitudes, I reviewed the class activity with regard to whether the educational space seemed to allow for meaningful work in class (DeBard, 2004), or if students were constantly moving chairs and equipment, or reconfiguring the learning environment to facilitate classroom activities.

Unlike participant solicitation for the online surveys and interviews, in which the advertisement was broadcast online to cast wide exposure for the public to select involvement, the strategy to choose courses and their classes for observation was an exercise of the researcher narrowing the pool of suitable options. I began by thoroughly reviewing each university's class schedule to look for instances where the same undergraduate course was taught in at least two different buildings on campus by the same teacher, and each class had approximately the same number of students. After identifying appropriate classes, I reviewed the prospective rooms in person to ensure that classroom typology varied (i.e., loose tables and chairs or, fixed seminar style or, fixed auditorium style). Then, I secured university approvals to contact the teachers to

obtain their approval to observe their class. Upon each teacher's approval, I met with the class in person to describe the research, answer questions and distribute the assent forms with mailers for students under 18 years of age, and consent forms (Lesley University, 2014) to be completed during my visit.

3b3. Document review.

I also employed document analysis as a data collection tool to support the findings of the case study. I reviewed the course syllabus for the observed class to explore the professor's epistemological stance to better comprehend conditions as they were intended to be in the class (question 1 inquiries) and to understand the phenomenon of performing remedial actions in "the context within which research participants operate" (Bowen, 2009, p. 29). I carefully reviewed the documents to determine values and goals, developed emerging themes and compared them to data from the teacher interview, observation and visual data analysis. I paid particular attention to educational theories and pedagogical strategies revealed in the syllabus.

3b4. Visual data analysis.

Closely related to the observation data collection tool, was video-based fieldwork, which involved "the collection of naturally occurring data using video cameras" (Jewitt, 2012, p. 4) and the subsequent analysis of that data. This tool supported the development of the case study, documenting and providing the basis for interpretation through the exploration of existing conditions, corrective actions and their effects (questions 1, 2, and 4 inquiries). Before class, on the day of the observation, I temporarily installed a three-camera wireless remote audio video system to document classroom activities and temperature in the room for the duration of the 100-minute class period. I utilized small stationary cameras (each about 3¾inches high by 1½ inches wide) so that surveillance would be less obtrusive and, therefore, reduce the possibility of the

Hawthorne effect, which is a behavioral change due to the observation (Homan, 1965). Later, I analyzed the videotaped observation by carefully reviewing the tape several times, and by focusing on one individual for the duration, listing activities onto a sheet using the timestamp on the tape. I coded the data and looked for common themes by counting the number of times specific kinds of actions taken during the class time, devised activity codes, and social structure codes in a computer analysis program. I looked for correlations within and beyond the observed classroom. This method offered the opportunity to observe in the field and substantiate the self-reported responses in the online survey and interviews.

3b5. Unstructured online interview.

The unstructured individual interview was a data collection tool that allowed me the opportunity to document teachers' experiences and priorities. Furthermore, it highlighted items that the teachers deemed relevant and facilitated the probing of issues for which I needed more clarity (Punch, 1998). I conducted all interviews using SKYPE (a web-based Internet conferencing program, utilizing its videoconferencing and shared screen functions); I audiotaped each interview. I listened to participants to hear their descriptions of existing conditions, the mechanics of their behaviors, the sensory experience of performing remedial actions, and their feelings, opinions and beliefs about the subject (Britten, 1995).

I began the interview by showing the interviewee illustrations and general written descriptions about remedial actions (see Appendix D). In clarification, I stated that that the instructor in the pictures had to modify teaching in each classroom situation to be an effective teacher. Then, I asked how the participant felt about this issue. I listened. If he or she had not discussed the overall teaching experience in the course (question 3), I then asked, "What components make up your teaching experience?" If the teacher had not shared the value of

performing corrective actions (question 4), I then asked, “How important is what happens in class during class-time to the total course experience?” In addition, if not previously disclosed, I then asked, “What would be lost, gained, or stay the same if remedial responses were reported to someone of authority?” Solicitation for interview participants was through a web-based survey program; I recruited participants for the online interviews in conjunction with the online experimental survey, often utilizing one ad with both online links. I used similar consent forms for both the online surveys as well as the online interviews; I utilized an electronic signature format for the signing of both types of consents. For the interview related consents, I asked respondents to list their video-conferencing address so that I could connect with them to schedule the interview and conduct it.

I transcribed and coded the data and performed thematic analyses and other discourse examinations (Saldaña, 2011) utilizing *Atlas.ti* qualitative data and research software (Contreras, 2012). I then developed multiple graphic network views in *Atlas.ti* with the questions (codes), memo themes, and quotations, subsequently converting the data and relationships into tables and figures. My analysis is detailed in Chapter Four.

3c. Response to Solicitation

The effectiveness of the measures taken to recruit participants for this case study is described in the following discussion. In general, I found that response activity for the online experiential survey and the online interview was tepid despite important amounts of money spent on social media advertising. In addition, when the advertisements ceased, so did all participant activity. To spur action, I identified classes from college catalogs and telephoned teachers of specific courses for permission to send them an email with links to my research to distribute to their classes. Also, I learned that there was generally more response from a social media ad if it

asked a question (Getting started with Twitter, n.d.), so I revised my advertisements to include a query, for instance, “Seeking students? YES, Undergraduates are needed….” Due to a lack of response to my recruitment efforts through my Facebook account, I shifted more money to Twitter, and focused the advertising campaign on shared interests (hashtags).

Regarding low response to the recruitment of participants for the online experiential survey, I added a few questions in the beginning of the survey, so that I could collect *some* data from those who declined to participate after reaching the consent form section. Initially, I began this research soliciting for online focus groups of students and teachers. Unfortunately, I could not convene the minimum of 6 participants required to have a viable focus group (Kitzinger, 1995) despite two attempts to schedule it. Therefore, I subsequently revised the research to be based on individual interviews.

Likewise, I was only able to secure one classroom for the case study and perform one classroom observation. After I identified prospective courses, only one teacher allowed me to visit his classes to propose the classroom observation. I created the permission documents in two colors for the audio-visually recorded observation and distributed them in perforated envelopes so I could see if the dissent form was executed as the envelopes were returned. If so, I could quickly distribute a second packet for consent to a face-to-face observation with no video capture. If in picking up that form, there were still any objections, I could simply leave a flyer with general information and the two online links if students wish to participate in an online experiential survey or online interview. One class consented to the recorded observation; three students, or about two percent, of the other class, did not want to be videoed, or visually observed. Therefore, as it was not unanimous, I left the general participation flyers for that class, and several weeks later, the teacher distributed an online link to them for the online

supplementary survey (see Appendix E for participation handout [flyer]; see Appendix G for Class Observation consent form; see Appendix F for online supplementary survey). At the conclusion of my data gathering efforts, I had observed one class of thirty-one students and received thirty-one hard-copy surveys, eleven completed online experiential surveys and nine completed supplementary surveys, interviewed two teachers but no students (see Table A3, in Appendix A which outlines my solicitations and responses).

DeBard (2004) cites the Millennial generation as being strongly favorable to authority, and Winograd (2013), a columnist for the *Christian Science Monitor*, reported that in an April, 2013 New York Times/CBS poll, 66% of Millennials favor increased camera surveillance out-of-doors to thwart terrorist attracts. Despite this popular belief about this age group's sentiment toward surveillance and reverence for the institution, the other class would not consent to either videotaping or simple visual observation of their class time. However, the teacher of that class remarked that he did not expect me to receive consent because that class has more problems than the other class with maintaining groups and class cohesion.

Lastly, while my response numbers on the interview and online experimental surveys are very low for the ad coverage I generated, Resnick (2012) cites typical online survey response rates ranges as low as a 0.75% return. SurveyMonkey also concurs that rates can be very low. Although my response rate was .0013% for the online experiential survey and 9% to the links distributed by teachers to their classes, it is important to remember that the majority of participants in this study find this issue inconsequential; so, it is possible that other respondents may have simply not been willing to participate because they did not think this was an important issue. Additionally, the standard for qualitative research is not a statistically important sample

size, but rather, large enough to continually solicit the same types of responses (Patton, 1990), which I achieved. There is more discussion on these issues in Chapter Four and Chapter Five.

3d. Trustworthiness

To support trustworthiness of the research that I outlined in the previous sections, I employed several measures. Lincoln and Guba (1985) assert value when research demonstrates credibility, transferability, dependability, and confirmability. Credibility is defined as the assurance that the research "measures or tests what is actually intended" (Shenton, 2004, p. 64). I utilized member checking, which is a technique to verify the accuracy of the research (Lincoln & Guba, 1985). After I transcribed and analyzed the interviews, I sent the transcripts and summary of themes and salient points to interviewees giving them the opportunity to make corrections, challenge interpretations, and provide additional information that may come from this review process. Each one responded. My research documentation included the use of audio-visual and audio capture, which allows for interviews and observations to be rechecked. I conducted the expression of control coding without reference to the participant. I used standard methods to provide the coding of responses and I have included the survey forms, solicitations, advertising, and session guides in the Appendices. I have referenced representative responses within the body of the dissertation and examined deviant cases that arose in each method and indicated how I incorporated those findings into my understanding. This study required a repository for all raw data, notes, forms, reductionist data and a systematic method for producing the items, which I provided through a password-secure online service. I utilized my senior advisor to review and comment on my process. In addition, I employed triangulation, which is "the use of different methods in concert [which] compensates for their individual limitations and exploits their respective benefits" (Shenton, 2004, p. 65). This research incorporates the data

collection methods of survey, observation, document analysis, audiovisual analysis, and interview.

Another tenet of trustworthiness is confirmability, which aims to "ensure as far as possible that the work's findings are the result of the experiences and ideas of the informants, rather than the characteristics and preferences of the researcher" (Shenton, 2004, p. 72). There again, my triangulation process supports trustworthiness because each research method employed one or more of the four basic questions that permeate this study. In addition, the use of open-ended survey questions and unstructured interviews (Punch, 1998) support confirmability of the research process.

Transferability in interpretivist qualitative research is a determination of the reader, so the researcher must provide enough context to enable those assumptions (Baxter & Jack, 2008; Lincoln & Guba, 1985; Shenton, 2004). My detailed exploration of the phenomena of performing remedial actions and their effects, in Chapter Four, provide a foundation to support transferability.

Lastly, trustworthiness is bolstered by dependability, which ensures that "if the work were repeated, in the same context, with the same methods and with the same participants, similar results would be obtained" (Shenton, 2004, p. 71). Chapter Three and Chapter Five offer my appraisals of the research, reflections on the study and outline limitations that I perceive.

3e. Summary

In this Chapter, I outlined my procedures for inquiry of corrective measures, and how those actions influence the learning experiences of students, and teaching experience of teachers, in undergraduate classrooms. This interpretivist research offers a case study approach with a qualitative research methodology. The research methods include survey, interview, document

review, visual data analysis, and observation. The data collection methods and instruments include an online experiential online survey, a hard-copy survey, an online supplementary survey, face-to-face observations, document review, unstructured online interviews, and visual data analysis. The participants in this study are undergraduate students and their teachers at the eight largest universities in the Boston metropolitan areas, and include two instructors, a class of over thirty students and several surveys collected from students and teachers. Lastly, I concluded with a discussion of research trustworthiness. In earlier chapters, I discussed the research concerning remedial responses in the undergraduate classroom. In Chapter Four, I analyze the qualitative data collected to illuminate this phenomenon.

Chapter Four: Analysis of Data

4a. Introduction

In Chapter One, I observed that the effects of performing corrective measures were largely overlooked by designers, educators and university administration, and were mostly undocumented in research. Therefore, I present and analyze the data from my research on remedial responses in this chapter to clarify and illuminate their scope and significance. I begin with explaining how my interpretivist paradigm led me to develop this work and the way my *emic* view, or rather, personal perspective as a researcher (Creswell, 2007) informs my interpretation. I discuss the User's Environmental Interaction Framework (UEIF) theoretical model with which I framed the data analysis, and provide information on how I conducted the analysis. I present a narrative interpretation, and then depict each theme with examples and data

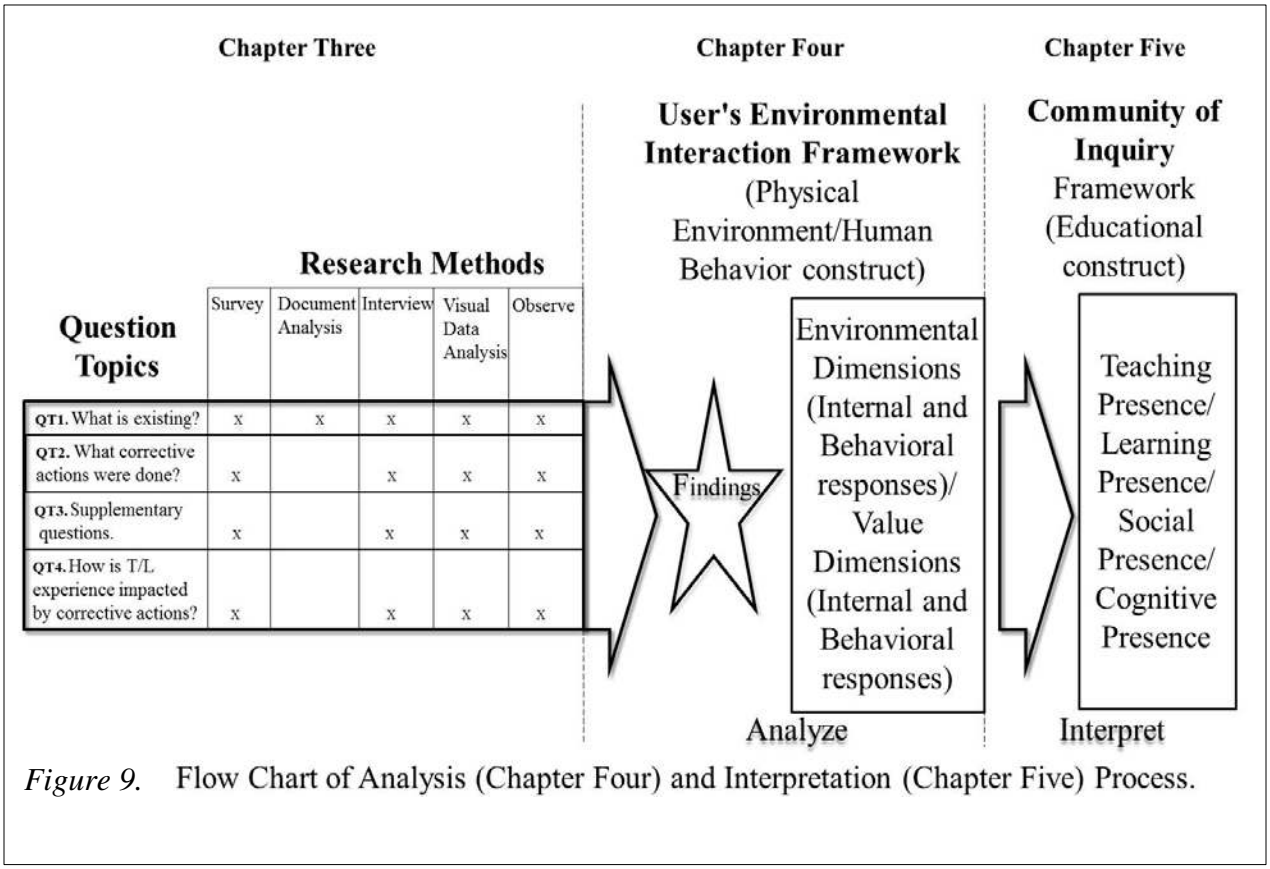


Figure 9. Flow Chart of Analysis (Chapter Four) and Interpretation (Chapter Five) Process.

excerpts indicating how information from the various collection instruments supported it. Lastly, I summarize the analysis of the data and preview my interpretation of findings for Chapter Five (see Figure 9 which illustrates the process from research inquiry in Chapter Three, through analysis to findings in Chapter Four, to interpretation in Chapter Five).

My interpretivist paradigm was the foundation of my research analysis and it influenced how I categorized data because it valued information from the various participants associated with the phenomena of performing remedial actions, from both the teacher and learner perspective. I employed a relativist ontology, which accepted reality as built from interpretations derived from relationships in society and through the personal experience of corrective measures (Pickard, 2013). Therefore, I explored the attitudes, beliefs, values, and actions of participants, and power relationships within the social environment. In addition, research within my interpretivist paradigm was enriched by a transactional/subjectivist epistemology which expressed that "all knowledge we acquire is a product of the interaction between the known and the knower; the researcher and the subject are both 'changed' by the experience, and knowledge is a result of this interaction…." (Pickard, 2013, p. 12).

I have a professional architectural background with over 20 years of experience working with university facilities that shapes my attitudes on the importance of the built environment in education, and a perspective as a former professor, which informs my stand on the value of undergraduate teaching. Furthermore, I was cognizant of my views on the learning process as a doctoral student.

In addition to my inherent theoretical framework, an environment-behavioral model shaped this research analysis. Chapter One introduced the User's Environmental Interaction Framework (UEIF) which I used to categorize personal feelings about a space (Scott-Webber et

al., 2000), and it served as a tool for understanding and displaying the corrective actions I recorded. For that reason, I presented data within the conceptual environment-behavior framework of UEIF, which was an ideal construct to review remedial actions, which *are* acts responding to the physical environment. The UEIF provided "researchers with four essential elements supporting an understanding of user environmental needs" (Scott-Webber et al., p. 33), which are comprised of environment and value dimensions, and internal and behavioral responses.

The UEIF divides relations with the physical space into the two categories of *environmental dimensions* and *value dimensions*. The former includes those interactions prompted by the built area, and my research deals with subcomponents of *space layout and function*, and *ambient conditions*. Space layout and function concerns the type and arrangement of physical elements and their utility. Ambient conditions are human reactions prompted by lighting, temperature, density and other similar room attributes. Value dimensions are those cultural elements held as important by a group, and my research focused on subcategories of *corporate values* (values of the university), and the *personal values* of students and teachers.

Individual responses within environmental dimensions and value dimensions were categorized into two areas - *internal responses* and *behavioral responses*. For instance, Scott-Webber et al. (2000) describes an internal response as follows:

> …(I)n an environment that is stressful due to negative environmental or value-related conditions, the body will react with this automatic response [physiological reaction to stress]. Environmental stress may include a lack of perceived harmony between a particular task and the equipment provided….For example, a student who is large trying

> to squeeze into a tablet-armed chair and take lecture notes experiences a disharmony between task and equipment. (p. 22)

Behavioral responses are those physical actions that one does because of the built environment or reaction to values of the space or individual. In the previous example of the tablet-arm chair, standing through class instead of sitting, and rocking in the chair to get comfortable are illustrative of behavioral responses. The acts of my colleague in the seminar at the beginning of Chapter One depicted behavioral responses to the classroom environment.

Response analyses within the UEIF framework was largely accomplished using the *Atlas.ti* qualitative data software package (Contreras, 2012). To answer my research queries, I collected a body of information: I observed and audio-visually recorded one class of an undergraduate social science course of 1½-hour duration, reviewed the course syllabus, and distributed surveys for student responses. I received further information from the observed class through an online survey and collected responses from another class taking the same course taught by the same teacher. I solicited information in an online experience survey to undergraduate students and teachers of the universities in my study, and, finally, I interviewed undergraduate teachers. I utilized *Atlas.ti* to "facilitate the process of analysis and interpretation of data…to allow for…interpretations grounded in the evidence" (Contreras, 2012, pp. 3–4). Therefore, I transcribed field notes from the observation and uploaded the document to the data software package to analyze, categorize, and sort information into the total project data. I used the software as a depository for video images and behavior mapping derived from video analyses to illustrate themes and further code data. I annotated the redacted syllabus document and interview transcripts in the *Atlas.ti* software, and imported survey data directly from the online survey program. *Atlas.ti* enabled me to query the various data codes, determine themes, and

create network views of data illustrating relationships between themes and various quotations (Stanford University, 2011). I highlighted findings from these analyses in the subsequent interpretive narrative, and my detailed support of the findings based upon the collected data follows thereafter.

4b. Interpretive Narrative

> Jamieson, Fisher, Gilding, Taylor, and Trevitt (2000) wrote the following:
>
> Space envelops the user, including the impact of colour and texture, the acoustic and thermal qualities, the way natural light enters the space, and how one area relates to another. Each built space on the university campus presents itself to teachers and students in these multiple ways. In turn, each of these ways will be experienced variously by different individuals and, significantly, has the capacity to affect the attitude and performance of any inhabitant. Decisions about any aspect of the design and layout of a specific space…represent a particular viewpoint about how that facility is to be experienced by the users. (pp. 121–122)

Such emphasis on context is appropriate, especially regarding classroom *R4*. It is on the campus of one of the larger universities in this study and its building dedication in 1938 was surely well-received. While the university awarded a commission for design of the building through a national competition, the administration was unable to start construction due to financial constraints.

However, when the university lost its accreditation due to existing "cramped classrooms and inadequate laboratory facilities" (Serenyi, 1998, p. 25), not surprisingly, it acquired the funds to construct the edifice, which was the first one built on the new campus. The exterior was "characterized by Beaux-Arts classicism: axial, symmetrical… reminiscent of

Welles Bosworth's Massachusetts Institute of Technology campus of 1913" (Serenyi, 1998, p. 25), mentioned in Chapter One. In similar fashion to MIT, the interior was contemporary, utilitarian, and efficient. On the day of the opening in 1938, the university president, (whose name is withheld to maintain the institutional anonymity provided by the researcher to participants) said, "The dedication of this building marks a new era in the life of the University, an era in which what has been created will be rendered permanent and enduring" (as cited in Serenyi, 1998, p. 25).

Except for a major renovation in the early 1990s, the building remains much the same. Classroom *R4* is the largest in the building and has tiered flooring (and a high ceiling to accommodate the rise of almost 36 inches from the front to rear), and large, long windows on two sides. Each window has a long drab shade curled at the edges due to the length. In 1938, the windows were cited as "essential characteristics of the façade…defined by alternating the vertical windows (voids) with vertical walls (solids)" (Serenyi, 1998, p. 25), but now the windows and shades serve as a distraction, scattering light through the room with the movement of air being blown in through vents for heating or cooling purposes. There are seven continuous rows of 14 fixed hard wood pivoting-seats, with access from flanking aisles, and two rows of nine seats at the rear with entrance provided at one side. All the walls are cement block, painted whitish-neutral, except the front, which was brownish to match the vintage wood doors. Filling much of the front wall is a large three-segmented, sliding green chalkboard with a 12 foot-wide projection screen pulled down to the chalk-rail. The browns, green, and off-whites of the classroom are reminiscent of the 20th century and blend with the patina of the putty and terracotta-colored flooring. The floor is polished, but it is unclear if it is clean. Along two of the windows are low radiators and the ceiling is a lay-in acoustical tile with air supply and return

registers. The room is about 35 feet wide by 45 feet long. The fold down tablet arm is wedge-shaped and minimally sized. Remarkably, there are only two electrical outlets in the front of the room along either side of the chalkboard and one electrical outlet in the rear wall of the room (see Figure A4, in Appendix A for a floor plan illustration of the room layout). There is intermittent wireless Internet connectivity. The teacher and students enter the classroom through the door in the front. In the following narrative, I offer an interpretive excerpt of the classroom observation to illustrate the student survey responses, to provide indication of the pervasiveness of remedial responses performed, and to present a phenomenological exploration of the actions (see Figure 10 for illustrations of narrative excerpt and note that I obscured images for anonymity).

At 2:51PM, it was warm throughout classroom *R4*, but not intolerable, for a brisk autumn day when the outside air was 53 degrees Fahrenheit. Juan (pseudonyms are used throughout) entered the auditorium and intently strolled to the seat at the end of the fifth row from the front, adjacent to the windows. There, he was close enough to view activities at the front of the room, and less likely to "fool around" (as he would later denounce) because he knew that his efforts were important and if he concentrated on the coursework, he would succeed (Juan, survey response, October 30, 2013). Therefore, Juan established *his* area: He took off his backpack and placed it on the floor in the aisle next to his desk chair, then unzipped his hooded jacket and draped it atop the backpack, repositioning the load until it balanced without touching the smudgy flooring. Juan reached into the backpack pocket, retrieved a spiral pad, and placed it on the tablet arm of the empty desk chair adjacent to his. This secured space on either side of his desk chair. In similar manner, Scott, Steve, Paula, Farah, Cho Hee, and B'shara repeated that

Figure 10. Upper left shows illegibility of images on the screen; *Upper right* encircled in red is Cho Hee, B'shara, Adam and Dao (in the row behind) in group meeting. Encircled in yellow is another group; *Middle left* is Tanner climbing over seats with belongings in hand; *Middle right* is Wu, Ikuya, Tanner, Bradley, and Rick, and the Professor (seated) in a group meeting; *Lower left* is Noah with his assignment on his leg, typing at his laptop on the tablet arm of the empty seat beside him, and drinking coffee; *Lower right* is Adam rolling up his sleeves after having taken off his sweater, while Ying is eyeing her laptop which is open on the floor.

classroom ritual, whereby students maintained an empty seat next to them for placement of their backpack contents, and garments (and drinks to hydrate or sustain the occupants through the varying classroom climate). Like Juan, B'shara did not remove her laptop from her backpack, which was on the floor in front of an empty seat beside her. Instead, she perched languidly with her purse in her lap and a tablet and pen on the tiny desktop surface, habitually twirling her hair. When asked about her remedial actions, she complained that there was "no space for laptops," and that she "fall[s] behind in lecture while setting up." Surprisingly, she reported that she expended significant efforts trying to "accommodate writing and her computer at her seat" (B'shara, survey responses, October 30, 2013). Most of her cohort agreed with those sentiments, and all the students in class said that they performed some remedial actions in class that day.

Soon, all the students were seated, although two-thirds of the desks were empty. After all had settled, the professor addressed the students to introduce the first group presentation, and then he extinguished all overhead lighting. Madison retrieved the handouts for distribution, while Farrah and Kaitlyn stood at the podium and projection screen in the front, cueing the PowerPoint program. The tall window shades were pulled down, nevertheless, light infiltrated along the sides of the window jamb and windowsill, illuminating a large part of the screen, and rendering a great swath of the projection illegible. Resigned, Madison trudged up the ramp and through the aisles distributing packets of supplementary information while her group members waited restlessly to start the presentation. She methodically began in the front row, then proceeded up the side aisle by the windows, and sidled across each row to distribute the papers to students, before heading back to the podium. Xavier, having no space convenient to place his handout, took the papers, loosely crossed his leg, and then balanced the packet on his knee.

Kaitlyn began the class presentation without commenting on the screen projection quality, although she knew that it was "difficult to see the screen with the bad lighting" (Kaitlyn, survey response, October 30, 2013). Other students subsequently remarked that they had to view the presentation online after class. However, those who did attempt to follow along relayed that they were always leaning forward to see or hear. Olivia shifted forward, crossed her arms, rested her chin on her fist, and bent toward the podium. At the end of class, Olivia acknowledged that she had to lean in to see. When questioned three weeks later, she acquiesced, "The classroom is older so [you] cannot see the projector screen" (Olivia, survey response, November 20, 2013). Likewise, Ikuya rocked back and forth, eventually settling against the seat back in front of him. He said, "When I try to learn during class by leaning forward I could remember more material" (survey response, October 30, 2013). Throughout the presentation, Noah awkwardly shifted back and forth, with one elbow on the little writing surface and the other on the empty armrest adjacent to him, hands clasped, alternating between resting his chin on his knuckles, or in the palm of his left hand.

Around 3:00 PM, it quickly became noticeably hotter at the right front side of the classroom. Adam, who was sitting less than three feet from an overhead heat supply duct, automatically took off his sweater, folded it, put it on his lap, and then unbuttoned his sleeves and rolled them up to his elbows. Within minutes, the air was even hotter at the rear of the room, but remained more comfortable by the windows. Nonetheless, Quentin, who sat adjacent to the windows, took out his handout and for the next two minutes, fanned himself and then Madison sitting next to him. Later, neither of them remarked about room temperature when asked about deficiencies in the classroom. However, Whitney was exasperated. She said that she "was drinking coffee to warm up and then took off [her] scarf because it was too hot" (survey

response, October 30, 2013).

At 3:17 PM, the student presentation ended, and the professor turned on the overhead lights, walked to the front of the room, stood centered on the projection screen, and addressed the class. Somewhat reluctantly, he reiterated students' problems with intermittent wireless Internet in the room and suggested that students groups use their "smart phones." The professor was resigned to the fact that he would have to continue to utilize the classroom amid growing efforts to mitigate problems. He walked from side to side as he spoke and directed comments to the back of the room to keep students engaged in the meagerly occupied lecture room. "Being able to work with the room I guess is part of the skill of being an educator," he would say later (interview, November 25, 2013). However, this class today was an important test, because he knew for the remainder of the course, group work is required during each class session. At the beginning of the semester, he tried to move the course to another classroom and he had shared information about those unsuccessful efforts with his students. Therefore, now he was anxious to see how effective group work could be accomplished here. He announced that the students should meet with their project teammates and that he would visit each group.

Several students took all of their belongings and moved to another group location in the classroom. After gathering his backpack, Ian routinely climbed over a row of fixed chairs to reach the destination where his group met. Similarly, Ethan and Tanner scaled chairs in another area of the room. Whitney, Ying, Farrah, Emily, and Claire became a group, with the two former students sitting in front of the latter three to converse. Annoyed, Whitney twisted around to relate to her peers behind her and turned forward to use her laptop, while Ying mostly attended to her laptop in front of her. At the end of class, Ying responded that she had undertaken "important efforts" to form groups (survey response, October 30, 2013). Most of her

classmates agreed. At the end of class, Emily reported that the "chairs [were] uncomfortable and [made] it difficult to meet in groups" and that it was "hard to pay attention when you're not comfortable" (Emily, survey responses, October 30, 2013). Instead of trying to talk while sitting, Wu, Ikuya, and Tanner decided to relate to their group while standing in the aisle.

Adam stayed where he was, and B'shara moved over to sit next to him. Cho Hee brought her possessions and sat along the front row with her group members. Dao sat behind them to complete the group. Adam and B'shara conferred and used their cell phones to access the Internet instead of trying to do so with their laptops as the course syllabus had directed. Dao leaned forward in his seat to relate to them. Cho Hee was bending their way also, leaning over her book bag and backpack at the floor between her and the adjacent group member. B'shara wrote in the notebook on her lap, then B'shara, Cho Hee, and Dao looked at the laptop on Cho Hee's desktop while Adam looked on.

The Professor first met with Wu, Ikuya, Tanner, Bradley, and Rick in the back of the room. He sat down in a row and some members of the group stood in the aisle or sat in the row in front of him, with their heads turned back to the Professor as he addressed and interacted with the students. While he was with them, they seemed wholly engaged in the interaction. Confidently, he shouted reminders about group project requirements to the entire class, as he rose and sauntered to the group in the front of the room. There, he crouched on the floor facing Adam, B'Shara, Cho Hee and Dao, seated in their desks. The Professor's interactions with each cohort gathering in the room seemed effective. But, after he left the group, Adam began to attend to his cell phone, only occasionally glancing toward the rest of his group as they talked. However, nobody prompted Adam to engage further with the group. Adam did not think that the actions he took that day to make-up for shortcomings in the classroom environment were very

important, or that he had much power over how well he did in the course, anyway. "Students are just tired and can't pay full attention for that long," he would say. When asked later about the corrective measures that he performed, Adam remarked, "I am not aware of what I do; why are you trying to make me feel self-conscious?"(Adam, survey responses, October 30, 2013).

This research revealed three key themes, illuminated experiences of performing corrective actions and, identified how those attempted remedies affected teaching and learning. I found that a student's expression of control over their learning experience influenced how he or she rated the importance of making corrective measures. I noted the value that students placed upon maintaining attention in their learning regimen and, I outlined how teachers addressed adaptation within the teaching experience. In addition, I analyzed participant data to give substance to the phenomena of remedial responses. In the following sections, I present my findings supported with student and teacher data, and provide summary remarks.

4c. Value Placed Upon *Focus* in the Learning Experience of Students

Overwhelmingly, students stated that staying attentive is the main reason for performing remedial actions. That response was more prevalent than typical components of effective undergraduate student learning, like note-taking or student preparation before class time (Jerz, 2014). Student participants listed mitigating distractions from their concentration as the impetus for taking remedial actions. Students valued maintaining focus as the way to comprehend at a higher level and become more efficient in their learning. They indicated their belief that discomfort hindered focus. Students specified that they felt it their responsibility to contribute in an active manner to make the classroom environment conducive to learning. Lastly, students valued working effectively with members of their cohort in the learning process (see Table A4, in Appendix A, which has student responses in emergent thematic categories).

Findings which highlighted undergraduate intuition on the value of focus, may have some confirmation in research, albeit in secondary education. When examining concentration test results of junior and senior high school students, Steinmayr, Ziegler and Träuble (2010) found domain-specific differences (language arts and mathematics courses) between the correlation of academic achievement and sustained attention. However, parsing overall quality of focusing ability from quantity of correct responses on their attentiveness survey, they determined that "only the quality of performance score incrementally contributed to the prediction of school performance above and beyond intelligence" (p.14). This means that the type of student able to "maintain attention on a specific stimulus to a high degree (concentration) over a long time period" (p. 15) showed academic achievement, notwithstanding GPA, in some domains of study. Furthermore, the researchers said, "a high level of sustained attention provides necessary resources for all steps of a complex processing plan… especially relevant in the school context because complex problem solving is an important prerequisite for school performance" (p.15).

As I noted, students selected *focusing* as the way to learn more in the classroom environment. In many responses, they stated that disrupting this concentration, whether because of personal conditions like being drowsy or bored, or through their actions by "fooling around" had a direct connection to their learning and course grades (Juan, survey response, October 30, 2013). Moreover, students recognized the value of focus through engagement as a tenet of effective learning, even to the point of pretending to focus to induce positive teacher behaviors.

Therefore, when students explained their answers as to how remedial actions influenced their learning experience, overwhelmingly students remarked that their actions were to alleviate distractions. Student participants believed that discomfort in the classroom caused loss of concentration, which was detrimental to learning. In line with this notion, leaning forward to see

or hear, difficulty using laptops, moving around to say warm or cool enough, and struggles to interact effectively, all constituted a distraction.

Some student participants believed that it was their *responsibility* to remedy shortcomings in their learning environment (to note-take or view the board better), when possible. A participant said, "Discomfort can be distracting from learning so it's necessary to 'correct' it" (Jian-heng, survey response, October 30, 2013). Other students indicated that they valued group work in their learning experience. They cited actions to more effectively work with other students as the reason for their remedial actions. A typical remark was, "collaboration …in regards [*sic*] to a group project …was key to the course" (Ian, survey response, October 30, 2013). Taking actions to remediate the classroom in order to facilitate group learning and collaborative processes can be interpreted as demonstrating a sense of responsibility or obligation to contribute to improving their own learning experiences.

Moreover, I found that in the class that I observed, students who highly valued their corrective actions to remedy classroom deficiencies also indicated the importance of focus in learning (or at least for academic assessment). I utilized versus coding of classroom survey responses (labeling data within the dichotomy of X versus Y) that identified "the conflict, struggles, and power issues observed in social action…as an X VS. Y code" (Saldaña, 2011, p. 107), and found that this group, exclusively, represented the dichotomy: "sleep in class/not pay attention vs. good grades" (see Table A5, in Appendix A, for versus coding in the "a lot" group). Although individuals rarely exist in absolute polarity, as this type of coding reflects, this technique is useful to "show humans in tension with others, themselves, or ideologies" (Saldaña, 2011, p. 107).

4d. Students' Expression of Personal Control of their Learning Experience and the Importance of Their Remedial Actions

From reviewing the data, I found that I could identify a characteristic of an individual who labeled their remedial responses important by how they perceived who was responsible for their learning. Students who expressed their perception that they were personally in control of their learning experience, generally rated their corrective measures important, while students who proclaimed that things other than themselves were responsible for their learning usually said their remedial actions were unimportant. The path to this finding began with an examination of classroom *R4* data.

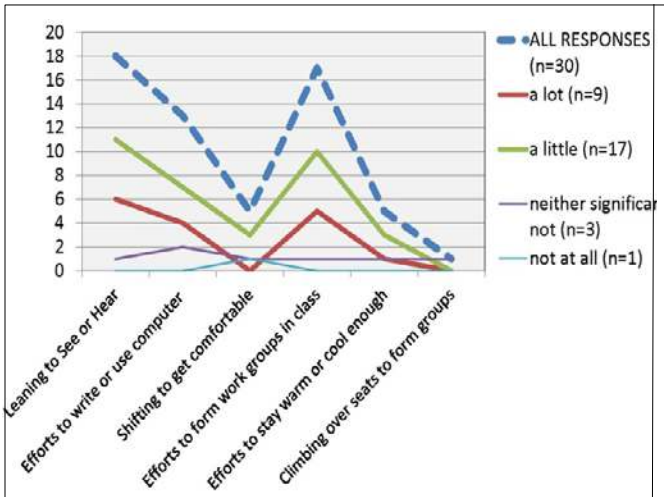
In the classroom observation, all 32 students surveyed responded that they were performing remedial actions in that class on that day and all said they did them other days as well. General categories of corrective actions presented to participants were

- leaning forward or sideways to see or hear;
- efforts to accommodate writing or the computer at their seat;
- shifting to get comfortable;
- efforts to move through the classroom to work in groups; and
- efforts to stay warm or cool enough.

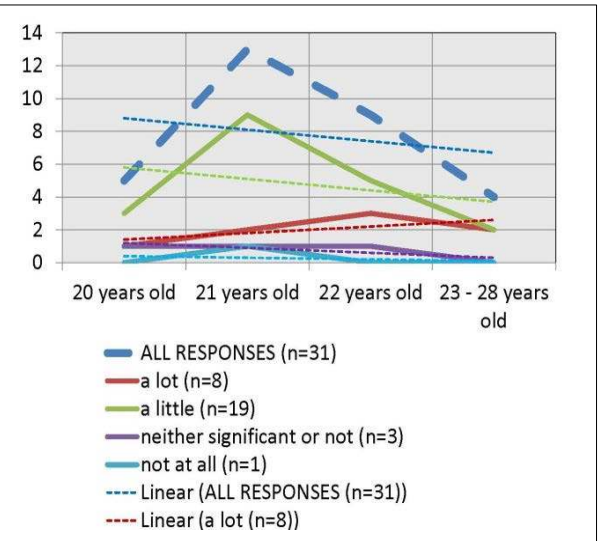
Most students labeled their corrective measures as unimportant. When asked how much their overall learning in that course was influenced by their remedial responses (question 4 inquiries, from Chapter Three), the majority of them attributed little if any importance to such responses. Specifically, only 26.5% said that their learning experience was influenced a lot by their remedial responses to the classroom environment. The remaining 73.5% of the

students reported that their actions were neutral to not important (this includes 10% neither important nor not important; 60% a little important, and 3.5% not at all important).

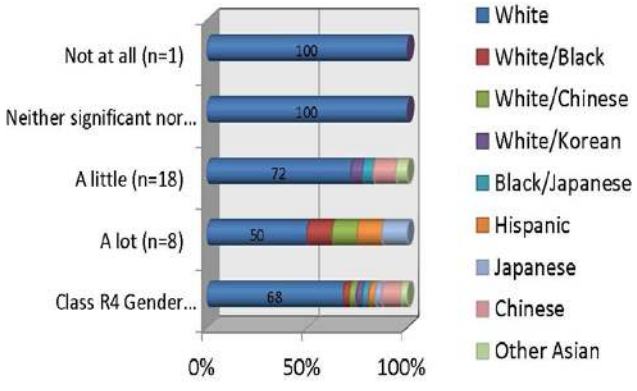
However, since 100% of respondents reported performing remedial actions, I analyzed the data to differentiate characteristics between class members concerning the perceived importance of their actions. In classroom *R4*, thirty students responded with their personal level of importance of their remedial actions, which included seventeen students reporting that they were "a little" important, nine students saying they were "a lot" important, three



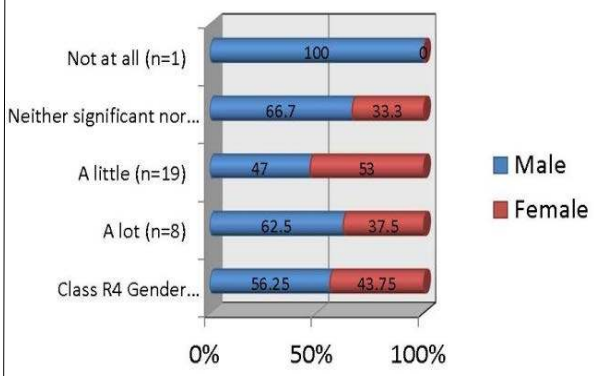
Frequency, type of remedial actions, and level of significance of actions.



Frequency, distribution of student age, and level of significance of actions. Linear trendlines are shown dotted.



Race, ethnicity, and level of significance of actions.



Gender and level of significance of actions.

Figure 11. Comparison of the characteristics of students in classroom *R4* and the importance of their remedial actions.

all" important (see Figure 11 for comparisons of characteristics of these groups).

The largest groups of students had very similar traits. The students who described their responses as being "a little" or "a lot" important, mirrored the overall class responses with the types of corrective measures undertaken and proportional quantity of each type to their total actions. Likewise, concerning race and ethnicity, the "a lot" group makeup, by percentage, was similar to the overall class and the "a little" group, with over 50% White (when one considers that a quarter of the "a lot" group listed White in their multicultural heritage). However, the "a lot" group was distinguished from the others because it was nearly two-thirds male as opposed to about 56% for the overall group (The "neither important nor not" group was two-thirds male as well, but it numbered only three members). More markedly, however, the overall class and each of the significance of corrective measures groups skewed younger than the "a lot" students. Computing a linear trend line for each group revealed the "a lot" group as the only students with a positive slope toward an older composition. This means that the group of students that rated their corrective actions important had more male students and was older than students that were neutral or said their actions were unimportant. However, nothing else seemed to foretell which students would perceive their remedial responses as being important.

In Chapter Two, I discussed the role of classroom design in reinforcing the institutional culture of control (Freire, 1970; Graetz & Goliber, 2002; Hebdige, 1979). Therefore, pursuant to those theories, I compared responses from students who stated that their remedial actions influenced their learning experience "a lot," to the rest of the class (see Table 5 which shows responses from participants in classroom *R4* observation reviewed for thematic categories). Saldaña (2011) described an *attitude* as "an evaluative way we think and feel about ourselves

and others, things or ideas. A belief is what we feel is true and necessary based on our personal experience…" (p. 105). For the "a lot" group, I found that the most prevalent attitude was that "nothing can be done about existing issues" (Paula, survey response, October 30, 2013). A belief that was exclusive to this group was that if there is a problem, you must do remedial actions for better learning. In other words, this group felt that physical conditions in the room were unchangeable, therefore, they must act to improve the learning experience. I used versus coding to conceptualize responses in dichotomy as an aid to illuminate the essence of responses. Again, only this group identified with the coding "sleep in class/not pay attention vs. good grades." Furthermore, within the UEIF framework (which is discussed in detail later in this Chapter), a student behavioral response to the value dimensions of the university was described as acting as if they were engaged in the educational process, which highlighted control issues and the misalignment of student and faculty mores.

Those findings, which largely characterized student power in the learning process, led me to question the issue of control, so I reviewed all class responses for statements relating to control over one's learning experience, sorting them by "Controller – Participant" (student), "Controller – Other," or "Indeterminate." I found that while every student in the class was performing remedial actions, and about one-quarter of the class said their actions were very important to their learning experience, at least half of that group definitively expressed personal control over impediments in their learning (classroom shortcomings). Only one person in this subgroup specifically stated that the classroom environment controlled her learning (see Figure 12, which illustrates expression of control and the importance of remedial actions).

The remaining (approximately) three-quarters of the class, who rated their remedial

actions as neutral or "not at all" important to their learning, included one student who definitively expressed that he was in control of the impediments to his learning. This group had a large number of students reporting elements other than themselves as governing their learning experience, which I interpreted as experiencing a degree of powerlessness, or in opposition to a self-directed learning process "in which individuals take … responsibility for, and control of, their own learning" (Towle & Cottrell, 1996, p. 357; Knowles, 1988). These researchers tout this ability as an important component between undergraduate and graduate education for scholastic achievement. Also, refer to Figure A5, in Appendix A, which indicates participants, corrective actions reported, response to how much their overall course experience was influenced by the remedial responses they performed in the course, and personal expression of control over their learning experience. Red and blue text within a participant tag indicates variance to the typical class relationship of influence of remedial actions and expressed control of learning. Therefore, in classroom *R4*, a student's outlook on the importance of his or her actions to make the classroom more effective for learning is

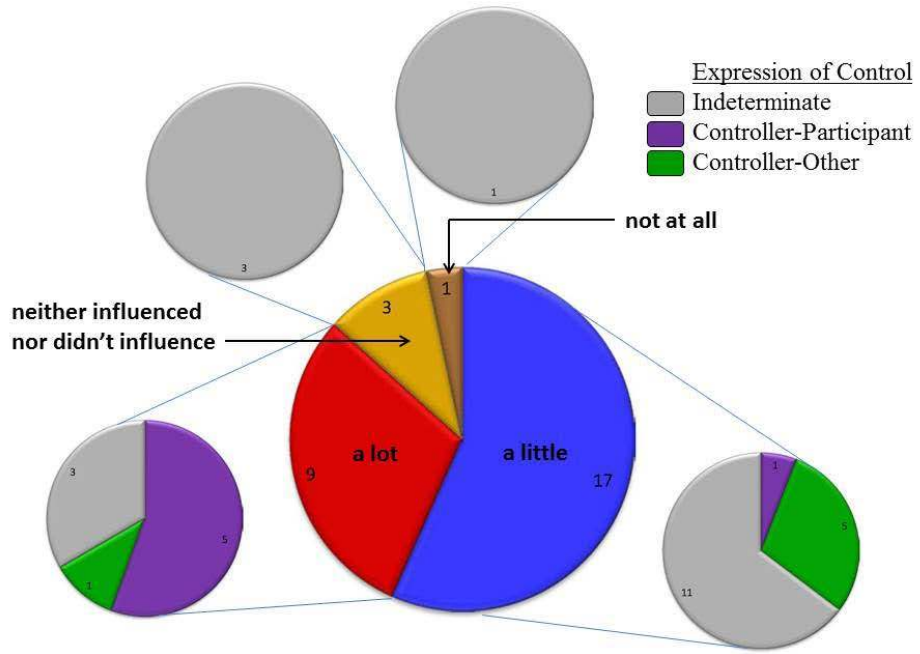


Figure 12. Students in classroom *R4* who rated the importance of their remedial actions and their expression of personal control over the learning experience.

generally aligned with their perspective on who most controls their learning in the course. This connection is more congruous than what remedial actions they performed, how often, or how many.

As I mentioned previously, there were two outliers who contradicted the trend that when a preference is expressed, those with an personal sense of empowerment over their learning rated their corrective measures important, and those who reported other persons and issues as controlling their learning evaluated their own actions to be of little to no significance.

In this class, which largely equated focus with learning, Olivia reported on the hard-copy survey that it was hard for her to concentrate in class because her seating did not allow her to use her computer. Indeed, three weeks later in the follow-up online survey, Olivia responded that because the classroom was outdated the projection screen was illegible from some positions in the room. Unlike Olivia, other students in this class who expressed supplementary issues like those as affecting their ability to learn, also said that their actions to shift, relocate and note-take manually, were of little consequence to their overall learning experience. However, twice Olivia responded that her corrective measure influenced her overall learning "a lot".

Olivia is an atypical member of the "a lot" group, being younger than most of that cohort, her gender is in the minority of that group, and those students had the smallest percentage of members of her race. Additionally, when asked how important class time was to her total experience of learning in the course, she responded that it is "neither important nor not important" because, "a lot of work is done outside of the classroom." (Olivia, survey response, November 20, 2013). Perhaps those factors influenced her contrary responses.

Alternately, Noah expressed control of his learning, by assessing that "since we cannot move the seats in class when we work in groups, we must position ourselves as best we can to work effectively with each other" and because of the seating conditions in the class "I usually am forced to bring my laptop. I tend to do better when I write my notes out. It helps me to remember what I learn" (Noah, survey response, October 30, 2013). Other students who reported similar sentiments valued their personal actions to make their environment more conducive to learning; however, Noah listed that his efforts were only a little important to his overall learning experience in the course. Despite the variance, Noah did seem more attuned to the "a little" group. He was the mode age of that cohort (younger than most "a lots"), and his race was in the overwhelming majority of the "a little" group. Perhaps these similarities with that group began to explain his responses to the finding.

So, generally, I contend that those students who situated the control of their learning in the class closer to themselves are those who said that their actions to remedy the environment represent an important and real effort. Those that put control of their learning farther from themselves are those who said that their measures to correct the room are unimportant to their learning.

In this research, I interrogated the data for expressions of control over the impediments to the learning experience. Further research can organize my queries into power issues within the classroom with the construct of *locus of control* (LOC), which is defined as follows:

> (A) generalized expectancy for internal or external control of reinforcements. 'Internal control' refers to an individual's belief that an event or outcome is contingent on his or her own behavior or … ability. The belief that an event is caused by factors beyond the

> individual's control… has been labeled 'external control.' (Stipek & Weisz, 1981, p.102)

It is a construct of the social learning theory of personality, and there have been many studies over the last 50 years concerning LOC and achievement in higher education (Aspelmeier, Love, McGill, Elliott, & Pierce, 2012; Krampen & Wieberg, 1981; Stipec & Weisz, 1981; Curtis & Trice, 2013). Anderson, Hattie and Hamilton (2005) warn of the dangers of dividing "the world into externals and internals, typically equating internal with good and external with bad" (p. 518). I, too, was careful not to denigrate any groups in my study. Of course, how one considered his or her personal control over impediments in learning is not polemic, and differs by course. In the recommendations and future research section of Chapter Five, I suggest ways to move forward based upon this new finding, while respecting an individual's personality. Also, it is important to consider that this analysis was from participant responses to various environmental questions, not targeted, measured psychological inquiry into aspects of LOC, using, for example, Rotter's Generalized I–E test (Rotter, 1966). Nevertheless, the general idea of personal influence over educational outcomes is a manifestation of the concept of locus of control of learning.

4e. How Adaptation Shapes Teaching.

Not surprisingly, the most prevalent issue indicated within the data collected from instructors was how adapting to the assigned classroom shaped their teaching experience. Firstly, I found that when considering adaptation, teachers reconciled the need to perform remedial actions with the frequency and magnitude of the effort that they were willing to expend. Secondly, teachers believed that an essential responsibility of their jobs was to modify teaching methods and/or materials to work in any assigned classroom. Lastly, I documented

that, in asking the students to perform corrective measures, faculty exposed class and teacher values, which sometimes generated an expression of feelings from all constituents (see Table A6, in Appendix A, which indicates emergent thematic categories about adaptation, and includes responses from participants).

First, teachers overwhelmingly reported that when they consider making adaptations to their lesson plan or pedagogical practices due to the classroom, they had to reconcile the extra effort that would require, with completing their regular professorial duties. The need for the teacher to have an environment that did not necessitate excessive corrective measures and the necessity for the university to assign that particular classroom, represented a conflict of interests. (Later in this chapter, I present examples of teacher behavioral reactions concerning the classroom, especially those due to an acknowledgment of differences between faculty and institutional values). Versus coding (Saldaña, 2011) illuminated the dissonance between the values of teacher and institution. Actions in the process of room assignments, viewed as opposing forces, highlighted the essence of a frequent response reported by teachers in this study. That was, the difficulties faculty encountered in working with administration to provide a classroom space deemed appropriate by the teacher. On the one side was the instructor, trying to work within the system to change or reserve classrooms, and on the other was the registrar or an administrator who often lamented the lack of classroom resources.

In addition, teachers reported various ways that they reduced their efforts of performing corrective actions to mitigate the consequences of using an inadequate classroom. These measures included designing course materials for the worst classroom and using it throughout the other classes and classrooms in a course. Other efforts included talking with the registrar at the beginning of the year to educate her or him on a more appropriate space for a course. Also

reported were teachers' endeavors to notify the registrar for specific days that, due to the teaching method planned for a particular day, a different classroom was needed. Some of these remedial actions were not successful or only temporary.

In lieu of a change in venue, sometimes teachers resigned themselves to making minimal adaptations, like revising classroom rapport to use more humor during audiovisual presentations and projecting jokes toward the back of the room to keep the attention of students who are sitting in the dark and unable to read the screen due to glare from the windows. One teacher reported opening and closing windows for better comfort or to damper noise from outside. However, other times corrective measures were overt actions in the classroom. During class time a teacher reported, "Running up and down the aisle to go from one side of a row to another since you can't move through the middle" (T2-5740, survey response, October 16, 2013). Likewise, due to the fixed seating in classroom *R4*, the teacher had to visit each cluster of students in the lecture theater during group work time, and relate to them in an awkward manner. Sometimes he crouched to be at their eye level, stood in the aisle leaning into their row, or sat in a seat and students stood or bent toward him (see Figure 13, which includes a behavioral map of the teacher's locations during the observed class, derived from the video analysis). Teachers reported performing remedial actions both prior to class time and during class. To compensate for the assigned room, teachers took action even before the class began. They changed the instruction method, dedicating one class for solely for lecturing, and another class for group work (instead of switching back and forth during a single class period). They modified the educational material to allow for a change in pedagogical practice, and scheduled class in a different venue on occasion to coordinate with the lesson plan. Other times, after considering their options and previous experience with remedial actions, teachers have elected *not* to remedy

Figure 13. Classroom *R4* Behavior mapping during the observed class (from 2:55 p.m. – 4:30 p. m.), compiled from Video Analyses. Left is the path of the teacher (indicated in red); Center is the path of a typical student (the movements of Scott is indicated in blue); Right is path of group presentation students Farrah, Kaitlyn and Madison (indicated in teal, blue, and green respectively).

the classroom to meet their pedagogical needs. One teacher remarked, "So after two semesters of trying to get the computer room accommodations, this last semester I finally said forget it" (Professor 02, interview, January 20, 2014). She changed the emphasis of the course to answering questions to aid the homework. Another class time ended early because existing classroom conditions did not support the teaching methods for that day. I interpreted this resignation and acceptance of less than optimal conditions for teaching as recognition of the irreconcilable differences between teacher pedagogical perspectives and institutional priorities.

The professors who did adapt their teaching to the assigned classroom said that the remedial actions they took made this teaching experience more personalized, and provided an opportunity to be more novel, but it produced their best *corrective* teaching (instead of best teaching), and constituted more effort. The latter issue was especially problematic when a teacher was in a professional advancement system that valued and required scholarship in

addition to teaching. They also noted that taking these actions required more thought, reduced the opportunity for teacher-student interactions, provided for more alignment with preferred teaching method, and reduced distractions. Notably, teachers said that taking these remedial actions substantiated an understanding of the relationship between teacher and institution. Instructors noted that performing the remedial actions in themselves transmitted to the students the importance of class time, student attention, and participation. One instructor said, "Moving tables and chairs is not much, but it sets a tone in the class" (T0402, survey response, December 3, 2013). Thus, although teachers constantly weighed the need for corrective measures with the effort to perform them, sometimes simply the act of *acting* relayed positive messages to students.

Secondly, notwithstanding issues with the efforts of adapting to the classroom (or not), an essential part of the adaptation issue was a widely held belief that the teacher had the responsibility and obligation to modify teaching methods and materials to mitigate inadequacies in the assigned classroom. It was also a belief of teacher participants that remedial actions did not have to be completely effective to be worthwhile; one respondent said, "I guess it depends on how you define effective. They [remedial actions] certainly made the situation better, but not as good as it should be" (T5740, survey response, October 16, 2013). While an acceptable physical environment for teaching, perhaps, rested in individual preference and pedagogical practice, these teachers perceived a duty to creating an effective learning environment.

Lastly, besides issues with teacher efforts to take corrective measures, or perceptions of personal responsibility to do so, I noted that students actually performed many adaptations to accommodate the desired experience in the classroom at the behest of the teacher. On occasion, the teacher interviewees had directed students where to sit in the room, asked the class to acknowledge when they had difficulty hearing the instructor, requested students to rearrange the

tables and chairs, and to bring desks from another room to accommodate the teaching methods planned for that day in the classroom. Also, in preparation for class time, teachers asked students to bring personal laptops when there were not enough computer laboratory stations in the assigned room. In reviewing student data, I found that some students felt that asking teachers to modify teaching methods to fit the classroom, thus eliminating students having to take remedial actions themselves, probably would not be effective because "the teacher, while entertaining and approachable, was kind of explosive and asking him to change his tactics might not have worked much" (S1182, survey response, December 15, 2013). So, in consideration of adaptation, I found that by asking students to perform remedial actions, teachers exposed class and teacher values, which sometimes generated emotional and attitudinal responses that impacted the classroom environment.

When students refused to perform corrective measures, it affected the mood in the class. One teacher remarked that, "We would adjust the blinds as necessary for the glare (interestingly, as many times as I told the students they could do this themselves they would always wait for me, squinting and shielding their eyes until I would fix it)." The teacher said that this was one of the issues that was, "always present, and had to be rectified [during] each class" (T5740, survey responses, October 16, 2013). Teachers remarked that the class culture of engagement influenced student compliance with requests to perform remedial actions. I experienced that culture in meeting with a prospective class for inclusion in this study: The teacher in classrooms *R4* and *D1* had suspected that students in *D1* would not consent to a classroom observation (either video-captured or simply observed). He said those students were less participatory in class, and had more uncooperative student groups, than *R4*. Therefore, when teachers ask students to perform corrective measures due to shortcomings in the classroom, tensions may

spring from the intersection of class and teacher cultures that create an anticipatory, confrontational, disruptive learning environment.

I obtained data concerning teacher adaptation issues from individual interviews with two undergraduate professors in an unstructured format for about thirty minutes each. One of the professors was the instructor of the social science course in classroom *R4* and classroom *D1* that I had surveyed. I also advertised an online experiential survey to undergraduate teachers of the universities in my study, and received seven responses.

The interviewee who was the teacher of the observed class is in his early thirties and listed his nationality as Chinese. He was very accommodating to work with, and agreed right away to let me visit his classes, and felt badly when one class rejected my request for research. He was collegial and anxious to answer my questions, wanting to talk in generalities about shortcomings in classroom and remedial actions, and I often had to redirect him to what has happened to *him* over the last year. He spoke ardently about advancement and research, opining that good teaching was at opposition to the research and scholarship demands of academia, which he felt was the key to advancement for faculty. The other interviewee was a female about the same age who was teaching at more than one college. She has had dealings with smaller institutions where adequate accommodations were hard to secure consistently, and she was very happy that this research was being conducted. Both interviewees consented to audio recording only.

The purpose of the online experiential survey was to gather information on the phenomena of reacting to the classroom design and to develop a more thorough knowledge of this experience and its impact on teaching. Thirteen participants attempted the online survey, which culminated in seven completed experiential responses.

4f. The Scope of Remedial Actions.

In addition to the findings discussed above, teachers and students experienced the phenomena of corrective measures to compensate for inadequacies in the classroom environment, in various obvious and subtle ways. In my initial dealings with prospective participants, I presented typical examples of what constitute remedial actions. However, through my research, I documented and interpreted actual student remedial responses identified from surveys, video and document analyses, and classroom observation.

The undergraduate course is of a blended/hybrid nature in that it is managed through an online platform, and substantial content is delivered both online and accessed during class time (see Table 1, in Chapter Two). In classroom *R4*, thirty-two students attended class on the morning of the observation. One student left class midway and was not administered the written survey. Several days later, I offered an online survey to those students, to develop a deeper and detailed understanding of the experience. Six participants attempted the online survey, which culminated in three experiential responses. In addition, I administered an online survey to another class taking the same course with the same professor as that of the observed class. That classroom was on a flat floor with loose chairs and tables, rather than the fixed-seat auditorium style of the observed class. There were 35 students in that class and I received three responses. In the following, I present the scope of corrective measures framed by responses from the basic inquiries that permeated the research listed in Chapter Three.

Students responded to research question 1 (inquiring about existing classroom conditions) by describing the physical characteristics of the classroom, saying that *R4* was "set up horribly, moving around is a pain, seat [sic] are uncomfortable, terrible pop up mini writing surface" (Ethan, survey response, October 30, 2013). In another classroom, the teacher persisted in

writing on part of the board that many students could not see without leaving their desks. Yet other students relayed information about atmospheric conditions in classrooms that were too hot or too cold for weeks at a time. While specific environmental comfort requirements are a personal preference, some entities set standards for temperature ranges in classrooms. In America, there is no specific building code requirement that mandates the range of temperatures expressly for public and private post-secondary classrooms. However, in the United Kingdom, the approved code of practice sets the minimum temperature, and World Health Association regulations recommend the maximum temperature (Association of Teachers and Lecturers, 2015). That range is 64.4 degrees Fahrenheit to 75.2 degrees Fahrenheit for university classrooms. Although for secondary school students, Brian Hadfield (2015) reports, on the University of Scranton website, that the optimum temperature for a high school classroom is 72 degrees Fahrenheit, wherein students achieved the highest test score on average in the study. The environmental conditions in classroom *R4* were not static. During the course of the class session I observed, two-thirds of the room was cooling down while one third was getting hotter (see Figure 14, which indicates the recorded temperatures of classroom *R4* and time). The front left of the room was within the comfort zone throughout the period, but was slightly higher than optimum temperature at the start of class, and then cooled to 72 degrees Fahrenheit by the end of class. However, the front right of the room began the class period exceeding the comfort zone by two degrees and quickly rose to 79 degrees Fahrenheit before cooling down to the high end of the comfort zone. The rear of the room maintained a temperature at the high end of the comfort zone throughout most of class time. Yet, despite these variances of comfort throughout the classroom, only a few students remarked about the temperature in the room on the day of the observation.

Students responded to research question 2, which inquired about specific corrective measures done. They described excessive movements at their desk to see the teacher and communicate with their cohort, and travels through the room for group work (see Figure 13 that is a map of classroom *R4* student behavior during the observed class time). In the observation, students tended to sit with their student group members so most did not have to change locations to meet for their group project discussion; however, students that presented their assignment to the entire class were more active throughout the classroom, especially when distributing handouts. Students also listed efforts to utilize the school Internet and electricity, and writing issues at their desk. In addition, they discussed efforts to stay warm or cool enough.

I did not ask questions 3 and 5 in the original in-class observation survey. The former asked for the components and major events that comprised the student learning experience for a

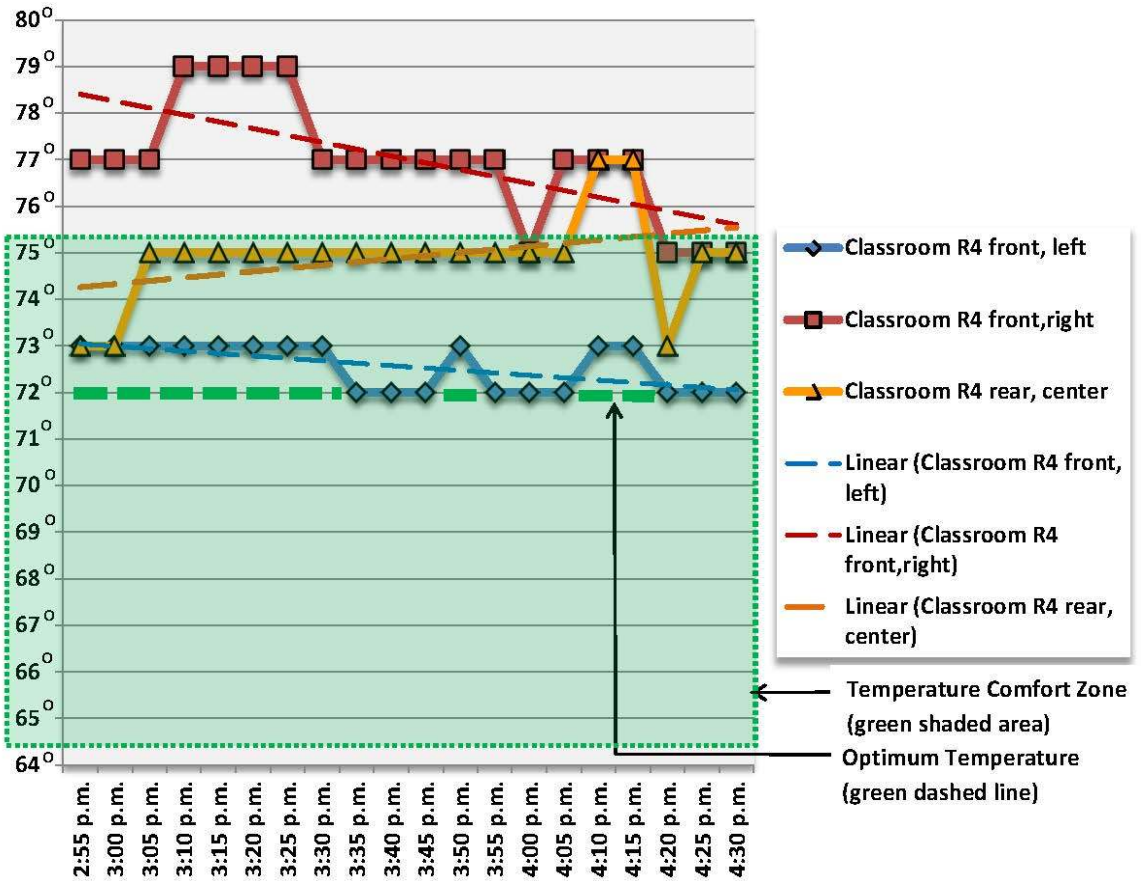


Figure 14. Temperatures (in degrees Fahrenheit) in Classroom *R4* during class time recorded from front left, front right, and rear center sensors and optimal temperature comfort range.

course. Students said studying in apartment and library, and going to class. Question 5 asked about the significance of class time to the whole experience of learning in that course, and responses generally ranged between "relatively important" to "very important." Students said that they were given important information in class, but the majority of their work on the course was outside of class time.

Therefore, the scope of remedial actions for students varied due to the need to remedy issues caused by physical components of the room, environmental comfort, and the instructional style used by the teacher. Actual corrective measures ranged from shifting, and walking through the classroom, to efforts to access electricity and Internet actively in class. Students acknowledged that although class time provides only part of the learning experience for a course, it is important because some good information is given to them during that time.

Teacher responses to question 1 about existing classroom conditions revealed a deeper knowledge of problematic issues with the room, than students had. For instance, teachers responded that some classrooms were inherently ill-designed or inadequately furnished to accommodate students for the course, or failed to adequately provide the technological tools needed, and wrote that the room layout opposed the teaching methods planned. Likewise, in describing classroom *R4*, the teacher additionally noted "there are very few outlets,… the projector bulb and projector was really old, [and] it's not very bright. The room doesn't have full lighting controls or some lights cannot be shut at all…" , and that there was "a 12 foot [sic] by 6 foot [sic] window that can't be shaded out" (interview, November 25, 2013). In addition, the layout of classroom *R4,* with 116 fixed seats, was in opposition to sustaining a cohort community for the 35 students enrolled in the course.

The researcher's observation log of classroom *R4* supported descriptions of that space and exposed the teacher and student commitments to utilize existing elements of the room, despite the acknowledgment that the room was inadequate. The log also reinforced the significance of classroom artifacts, which contributed to the sense of place, as discussed in Chapter Two (see Appendix I for a chronological progression of multiple representations of artifacts in classroom *R4*). *Place* for each inhabitant of a classroom is derived from perception of the room, including its personal meaning, the individual and shared experiences associated with the environment, and the artifacts employed within (Carter-Ching, et al., 2004). Observation of classroom *R4* revealed that despite acknowledged inadequacies with the audiovisual equipment (concrete conveyor artifact) in the room, it was an important tool for presenting information and engaging the group. Likewise, students utilized concrete carriers like the aisle ways and desks throughout class despite the inability for groups to sit face-to-face and the inconvenience of traveling the long ramped aisles. On occasion however, a speaker chose to have students pass supplementary material by hand through the audience, instead of walking the corridors and in-between rows him/herself, and students chose to stand in the aisles for cohort meetings instead of sitting. Again, although the teacher excoriated the room illumination, that *ambient* artifact was used to support *concrete conveyors*, like the projections system and handouts, to focus student attention towards the front of the room, to signal the start of discussion, and to enhance visibility for group work. The syllabus required students to bring laptops to class, but due to limitations in the Internet reception and lack of electrical access, some students brought cellphones (another *concrete conveyor*) and utilized their personal data plans. Therefore, artifacts in the room were actually used to support constructivist instruction even

though the immovable seating arrangement, fixed audiovisual equipment, and inconsistent Internet provided an inadequate foundation to achieve pedagogical goals.

I substantiated the teacher comment concerning the existing condition of classroom *R4*, which declared the space as incongruous with the teaching method planned, by examining the course syllabus. Such a document provides a blueprint of the "structure to the course…. This is all the more reason to select the syllabus as the target of an inquiry into the problems of course design and delivery because the syllabus is the instructional roadmap for the course; all other course functionalities are dependent upon it" (Richards, 2001, p. 1).

The teacher of this class characterized the course (see Appendix H for the course syllabus) as constructivist in nature. I reviewed the syllabus for evidence of compliance with six elements of constructivist teaching, namely, that the document "emphasizes the learner's role in the education process,….focuses student attention on pursuing questions or problems that occur to them [students],…focuses teacher attention on the creation of learning environments rich in 'construction materials,'….emphasizes activity-based or project-based learning," (King, 2001, exhibit 4, para. 3), promotes the construction of meaning in order to learn (Hein, 2002), and supports groups of students engaged in discussion (Graetz & Goliber, 2002). I found a preponderance of constructivist tenets espoused by the principles of the course syllabus (see Appendix A, Figure A6 for depiction of document quotations sorted within constructivist principles). The syllabus described the course as a vehicle to guide students to produce high quality marketing research, and encouraged them to bring their own views to interrogate the topic. The teacher created a learning environment that included not only the physical classroom, but online academic remedial help, technical software customer service resources, unbounded use of the Internet, and all classroom discussions from topics brought by students and teachers.

The culminating course deliverable was a marketing project developed and submitted by each student; however, a group project was also required so that students were assessed on their effectiveness in the team setting. Lastly, the syllabus promoted active learning, enabled by a combination of classroom activities and collaborative projects.

When asked question 3 about what comprised their teaching experience for the course, teachers generally responded that their actions were teaching, then meeting and corresponding with students, writing lesson plans and performing assessments. When asked where and when (other than class time) these actions took place, the response was, "Everywhere, on the train, at home, in the office…The students have an expectation that I am pretty much reachable all the time." This participant said that he usually responds to their email "within an hour if I am online or if not then no more than 12 to 24 hours… if it's a weekend et cetera" (Professor 01, interview, November 25, 2013). In addition, teachers mentioned preparation work during the summer, based upon what practices were effective in the previous course. Thus, teachers report involvement with the course and their students far beyond class time and the classroom.

Lastly, when asked about the importance of class time, teachers emphasized its significance. One professor said that it constitutes "95% to 100% of what's necessary … I think the classes should be sufficient and I see most actions outside of class, whether it's emailing or office hours are really quite remedial in that sense" (Professor 01, interview, November 25, 2013). Another remarked, "Well, it's very important because that was really where the students had the best opportunity to get the individualized instruction if they needed … So getting that one-on-one instruction in class was important" (Professor 02, interview, January 20, 2014).

Therefore, corrective measures by teachers were more elaborate than student actions. Teachers understood better the possibility of a classroom space to accommodate their method of

instruction (this is in line with the findings of Scott-Webber et al., 2000 discussed in Chapter One), but amid inadequacies, still attempted to create an effective learning environment using ineffective equipment within a flawed room layout or with inadequate technology. The teacher of classroom *R4* clearly proposed a constructivist course and conducted it in a space inappropriate for that epistemology. The teaching experience for a course extends far beyond class time; it includes summer preparation and daily email interactions with students. However, teachers deemed class time as the most important part of their teaching experience.

4g. Framing the Findings Within UEIF

The findings, and the understanding, of how corrective actions were actually experienced for students and teachers, are best interpreted in an environment/behavior context within the User's Environmental Interaction Framework (UEIF) introduced in Chapter One (see Figure 1 in that section) developed for that purpose. I reviewed data utilizing gerund coding (Saldaña, 2011) to expose actions, which I situated into the environmental framework. In this coding technique I created gerunds (which are nouns constructed from verbs words by providing "ing") from the data, to categorize ideas, because this procedure "moves the researcher out of static descriptions and categories and into a more process oriented way of thinking …to focus on actions, which set the stage for seeing sequences and connections among codes" (Parker, 2008, p. 79). This revealed an educational environment that was not static, and concurred with remedial actions documented by the audio-visual recording of classroom *R4*. The UEIF format illuminated student behaviors to maintain focus and compensate for an inadequate classroom. It also revealed what that environment represented to students regarding power and control. In addition, the framework made evident the teacher's adaptations for the classroom, both prior and during class time.

Figure 15. Word cloud of student responses listing major corrective measure action verbs (with font size indicating frequency). Blue text in upper case is in-class actions while red text in lower case is in preparation for class.

Student behavioral responses to the environmental dimensions of space layout and function included leaning forward to see or hear the professor and audiovisual presentation, and positioning oneself in a felicitous seat to view the blackboard/projection screen (see Figure 15 for an illustration of student activity in response to the classroom design). One student said, "As far as the dry erase board, when I sit on the left (too close to it) I just have to deal with a crick in my neck. When I sit on the far right, I have to squint to read the print when the markers don't work well" (S6630, survey response, March 7, 2014). Other positioning included stabilizing personal items like a coat, backpack, or books on the desk seat and tablet arm. Indeed, Kaitlyn responded that it is "Hard to balance notebook and computer on desk" (survey response, October 30, 2013). Behavioral responses to ambient conditions included squinting or focusing and, bringing comfortable garments due to the hard seating and the room temperature. The latter actions occurred outside of the classroom in preparation of class time. Students also reported moving through the classroom frequently for group work. An internal response to classroom space layout and function, and ambient conditions, was one offered by Cho Hee. She replied,

"It's hard to use laptop in this class & see the powerpoint [*sic*] due to desks & bad lighting & it's always cold. [It] makes me feel tired" (survey response, October 30, 2013). The environmental-behavioral model also highlighted the issue of control in the classroom (described in section 4d above) in Adam's behavioral response to the value dimensions of institutional values. He admitted his belief that learning resulted from "teacher + effective engagement," but acknowledged that he feigned interest during class time because he felt compelled to show engagement. Adam said, "In reality students are just tired and can't pay full attention for that long. We just "act" as [if] we are physically responding to teacher" (survey responses, October 30, 2013).

The gerund coding of student responses emphasized active behaviors and perceptions (especially with regard to focus) and revealed a class in motion both physically and emotionally. Hung and Labroo (2011) stated, "The mind helps people attend…Emerging research, however, shows that this mind-to-body relationship is not as one-directional as once presumed. Because cognition is 'embodied,' the body exerts a powerful influence on shaping a person's thoughts" (p. 1047; and Weiss, 2001). Therefore, when students move around and lean to facilitate better audio or visual communication, the motion physiologically increases blood flow and oxygen to the brain (Hung & Labroo, 2011) allowing for better functioning. However, that movement is not always sufficient. One student responded as follows:

> I can almost guarantee that I have fallen asleep in every single art history class I have ever taken, at least once per class….I have tried everything…I have tried standing up in order to avoid falling asleep. I get coffee, I bring dinner. I make sure I'm getting enough sleep….None of this seems to help. Put a bunch of students in a warm, dark room with

> one person doing the talking for about 3 hours and watch how many nod off. (S6630, survey response, March 7, 2014)

There again, the educational process demonstrates its complexities, for student physical movements to attend are not simply initiated by location in the classroom, but, because cognition is time-pressured, the content, method and pace of the instruction influences whether and how the body is engaged to support the mind. "Sophisticated forms of real-time situated cognition can be seen in any activity that involves continuous updating … in response to rapidly changing conditions. Such changing conditions often involve the activity of another human … that must be reckoned with" (Wilson, 2002, p. 628). For instance, Lamar wrote that interesting information revealed by the teacher during class time "piqued his interest and made him lean forward to grasp it even better" (survey response, October 30, 2013). Likewise, Scott and B'shara both remarked that the pace of class discourse prompted physical actions to organize their immediate area to better attend. Therefore, acknowledging student remedial actions provides a fuller picture of the educational process, and its effects on both mind and body.

Alternately, teachers interacted with the physical classroom environment differently than students and in a way that promoted their instruction. Teachers performed substantial corrective measures outside of the classroom in preparation for class and their efforts were rooted in supplication to mitigate the effects of the inadequate learning space. Considering the classroom as the environmental dimension in the UEIF conceptual model, I interpreted the data from the interviews and surveys, utilizing gerund coding to illuminate teacher actions. Major teacher behavioral responses to space layout and function included (from most prevalent to least) asking students to sit in suggested seating, indicate when they cannot hear, bring personal laptops to computer labs, rearrange furniture and share computer workstations. Actions also included

requesting administrative personnel to relocate the class, and facilities workers to repair room-anchored equipment; adapting and adjusting teaching material, methods, and coursework to be suitable the assigned classroom; and rearranging tables and chairs (however, it was not verified that teachers actually performed this action themselves). Behavioral responses to the classroom's ambient conditions include adjusting lighting and blinds, and identifying the source of noise outside the room (see Figure 16 for depiction of responses).

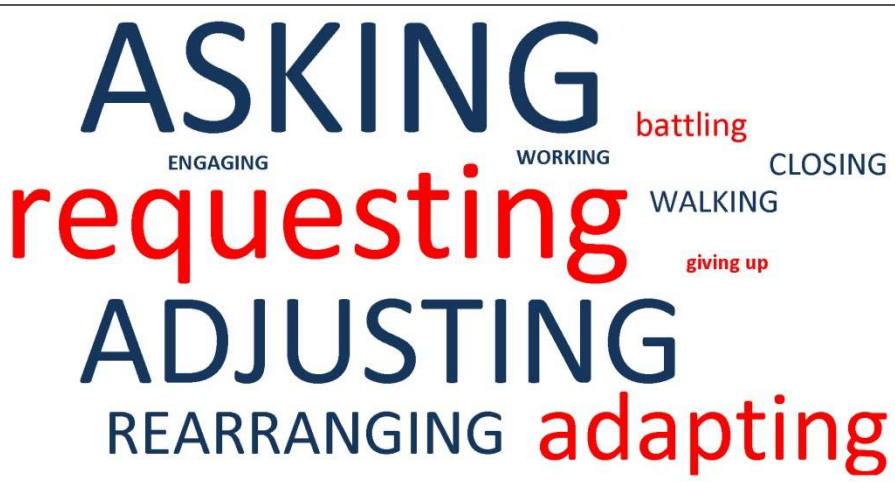


Figure 16. Word cloud of teacher responses listing corrective measure action verbs (with font size indicating frequency). Blue text in upper case are in-class actions while red text in lower case are those in preparation for class.

Besides reactions to the physicality of the classroom, teachers also took remedial actions because of a dissonance of values exposed by the assignment of the room itself. Behavioral reactions due to teacher and institution culture clashes, included those where teachers ended up adapting the curriculum because of the environment when their need for the room change was not satisfied; and when coursework was modified because the teacher was sympathetic to university's space constraints. There was little direct evidence of internal reactions to the classroom due to dissonance between teacher and institutional values in responses to interview questions or questionnaires. One participant did respond that the constant struggle with

university personnel was, “Like a mosquito in your bedroom. Not as bad as being eaten by an alligator but a mosquito is still pretty annoying” (T5740, survey response, October 16, 2013). However, several participants described the relationship as being, “quite a fight”, “such an effort,” and “I finally said forget it…because it was so much work,” without specifically labeling their internal feelings (survey responses). Teachers also relayed that values between teachers were exposed due to shortcomings in the classroom layout and the behavior of re-arranging furniture. One participant said that “there are sometimes *battles* among professors about, well if you rearrange the room, you’re responsible for putting it back as each one wants” (Professor 02, interview, January 20, 2014).

4h. Summary

In this chapter, I described the analysis and interpretation of the data to present my findings and elucidate the phenomena of performing corrective measures in response to an inadequate built learning environment. I showed how my interpretivist paradigm and view as a researcher informed my interpretation. I presented a 30-minute interpretive excerpt of class time in room *R4* which highlighted my findings and presentation of the range of remedial actions – all supported by participant data. I reported my findings concerning emphasis that students place on the ability to *focus* for learning to take place, their perception of their power to affect learning outcomes, the importance of their actions, and how adaptation affected teaching. In Chapter Two, I discussed the inadequacies of utilizing a strictly architectural, environmental-behaviorist, or education case study model to assess the built learning environment for impact on the teaching and learning experience. In this Chapter, I framed my findings within the User’s Environmental Interaction Framework to discern and elucidate the physical classroom environment and resulting participant behaviors (both internal and external reactions). In Chapter Five, I directly

map physical cause and behavioral responses derived from the UEIF to show how it impacts the educational experience, utilizing the Community of Inquiry educational model that I adapted to address environment and human behavior issues for teaching and learning within the context of the classroom design. In addition, I recommend future research and policy implications from the findings of this study.

Chapter Five: Interpretation and Implications

5a. Introduction to a Modified Community of Inquiry Framework

In Chapter Four, I described the use of the UEIF conceptual model to analyze data concerning environment-behavior aspects of corrective actions to remedy shortcomings in the built learning environment due to classroom design. In my view, current disciplinary-based methods for evaluating the built environment for learning are not expansive enough to meet the needs of architects and designers, educators, administrators and behaviorists. In this Chapter, I will analyze the impact of these remedial actions within an educational model, known as the Community of Inquiry Framework, to reveal their influence on teaching and learning. I will also discuss the importance of the findings noted in Chapter Four, offer suggestions for further research and improved evaluation methods, and provide concluding remarks.

Garrison, Anderson, and Archer (2000) first developed the Community of Inquiry (CoI) framework to analyze the general educational online experience using terms consistent with traditional educational methods. Although this is just one of several models describing the educational process, I chose this specific framework to explore the impact of behaviors on the educational experience for several reasons. Firstly, the model is a reliable, simple construct on which to base research and analyze data in educational settings. The CoI has "provided a parsimonious structure and understanding of a complex phenomenon…. A decade of research has provided empirical findings to describe the nature of the interactions among the elements as well as the dynamic balance of the CoI system over time" (Garrison, 2011, p. 28). In addition, the coursework in classroom *R4* professed a constructivist epistemology and the CoI framework "represents a process of creating a deep and meaningful (collaborative constructivist) learning experience" (p. 22). Lastly, I chose this educational framework because it can also apply to

blended instruction and traditional classroom delivery (Garrison, 2011) although, "Pure face-to-face courses without some form of e-learning experience are rapidly becoming an anomaly" (p. 132).

The CoI was derived from a qualitative research analysis of higher education online course, computer-conferencing transcripts, and it depicts the educational experience in three basic interdependent elements - teaching presence, cognitive presence and social presence (Garrison, 2011). A presence is a "sense of being or identity" (p 22) within the classroom environment. Generally stated, teaching presence is the course structure, instruction, and facilitation; cognitive presence is the learning process, as evidenced by constructing new knowledge; and social presence is student discourse and collaboration. Areas of overlap can be found in the practices, or indicators that support discourse (between the social and cognitive presence), select content (between the cognitive and teaching presence), and set climate (between the teaching and social presence). Indicators are tasks that suggest the existence of teaching, cognitive, or social attributes, which altogether define an excellent teaching/learning encounter (Garrison, 2011).

The CoI model, in principle, is aligned with some of the fundamental principles of John Dewey (1938), who believed "education is essentially a social process. This quality is realized in the degree to which individuals form a community group" (p. 58). However, since the beginning of the 21st century, researchers have reviewed and modified Garrison et al.'s (2000) original educational model. Shea and Bidjerano (2010) created a notable revision of the CoI framework through analysis using mixed survey methods to determine how each element acted upon the other. They showed that "learning represented by the cognitive presence factor could be predicted by the quality of teaching presence and social presence reported by learners in

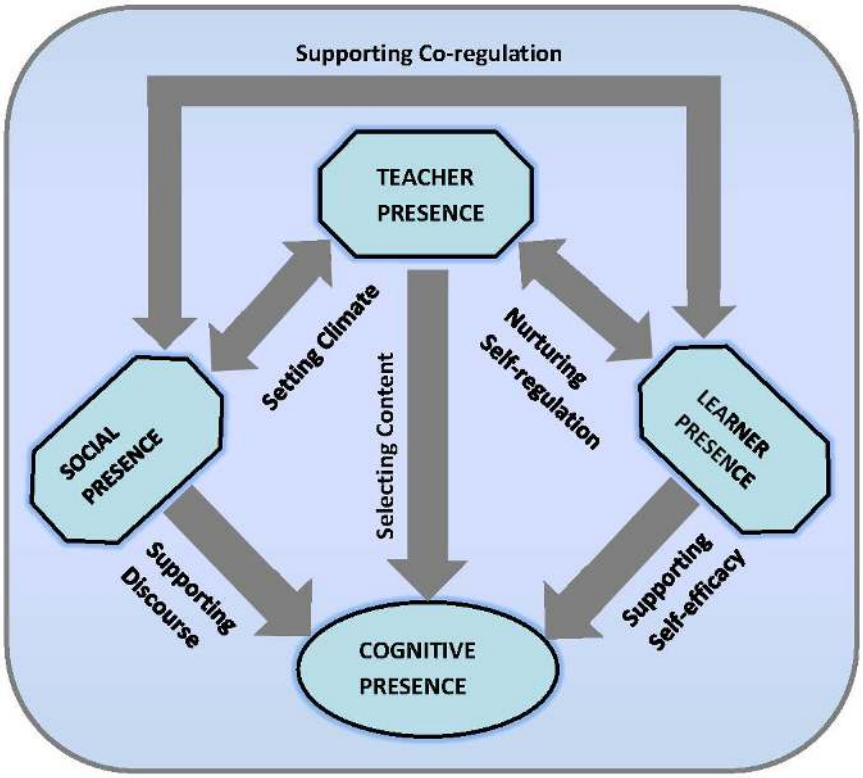


Figure 2. Revised Community of Inquiry model including "learner presence." I added indicators, which are associated with the arrows. Adapted from "Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments, by P. Shea and T. Bidjerano, 2010, *Computers & Education, 55*(4), p. 1721–1731.

online courses" (p. 1722), and their research described a learner presence as encompassing " a wide variety of issues including metacognitive, motivational, and behavioral traits and activities that are under the control of successful online courses" (p. 1722). Their findings specified that students engage in direct discourse separate from group-speak through learner presence. Within the learner presence construct, the researchers listed self-regulation, that is personal actions to control and schedule course effort, and self-efficacy, which "emphasizes the interface between learner motivation and cognition" as important issues (Shea & Bidjerano, 2010, p.1723). See Figure 2 above, for an illustration of the modified educational model. I revised Shea and Bidjerano's (2010) framework illustration to incorporate the indicators from the Garrison et al.

(2000) model. In addition, I included three new indicators related to my work, which were "nurturing self-regulation," "supporting self-efficacy" and "supporting co-regulation to illustrate intermediate processes for the new learner presence. Shea and Bidjerano cited co-regulation, for example, a group's division of responsibility, as an important task between the learner and social presences.

Although each presence has defined attributes, each individual in the constructivist educational experience assumes various degrees of each role as the learning progresses to a higher level, dependent upon their abilities, and the course activity (Garrison, 2011; Shea, Hayes et al., 2014). The objective is for learners to undertake "more teaching presence and become increasingly self-directed....Students will assume increasing cognitive and metacognitive responsibility as they become more competent and confident. In addition, students will likely learn to facilitate discourse as social presence grows through trust, communication and cohesion" (Garrison, 2011, pp. 26–27).

5b. Major Findings and Significance

This research revealed key themes concerning actions to mitigate problems in an inadequate built learning environment. I utilized gerund coding within the UEIF model to analyze behavioral responses and I referenced them to the modified CoI framework to determine the importance of their effects on the educational experience. Firstly, inappropriate room assignment, poor equipment, and disagreeable ambient conditions, evoked behavioral responses in students that impacted the relationship between student and teacher. These responses also affected the effort to achieve consequential learning for individual students and the class as a whole. Those classroom conditions also fostered internal student responses that undermined students' processes of constructing substantial knowledge. Second, that same classroom

environment for teachers induced behavioral responses that were apparent in the relationship between the teacher and student, between the teacher and the class as a whole. These responses also affected the process to develop the course to be an exceptional educational opportunity. Responses to inappropriate classrooms precipitated internal teacher reactions that led to re-designing and re-structuring the coursework. Lastly, I found that a student's expression of control over the learning experience (which extends to and affects how he or she rates their corrective measures) is an important indicator of their potential to achieve important learning in the course. In the following, I provide detailed interpretations of my findings in relation to their significance in the educational experience.

Students performed many of their corrective actions to concentrate better in class because they valued maintaining attention in their learning process. See Figure 17, which illustrates the influence of the physical classroom (in a constructivist educational process) for learners, drawn by correlating the UIEF and COI frameworks. In Chapter Four, I utilized the UEIF to analyze actual student remedial responses concerning focus due to the classroom. Here, I take that research and evaluate its effect on the educational process using the CoI model. I present this integrated method as a way to relate components of the classroom experience directly to the educational process. For students, inappropriate room layout, poor projection quality, and uncomfortable room temperatures, resulted in behavioral responses of leaning, positioning bringing, and adjusting clothing, to help maintain the focus that they desired. In the normal process of learning in a constructivist environment, each student (learner presence) must determine, organize and maintain his or her level of engagement with the teacher and coursework (teacher presence) for a successful outcome (cognitive presence).

In addition to this self-regulation, some students in classroom *R4* had to administrate

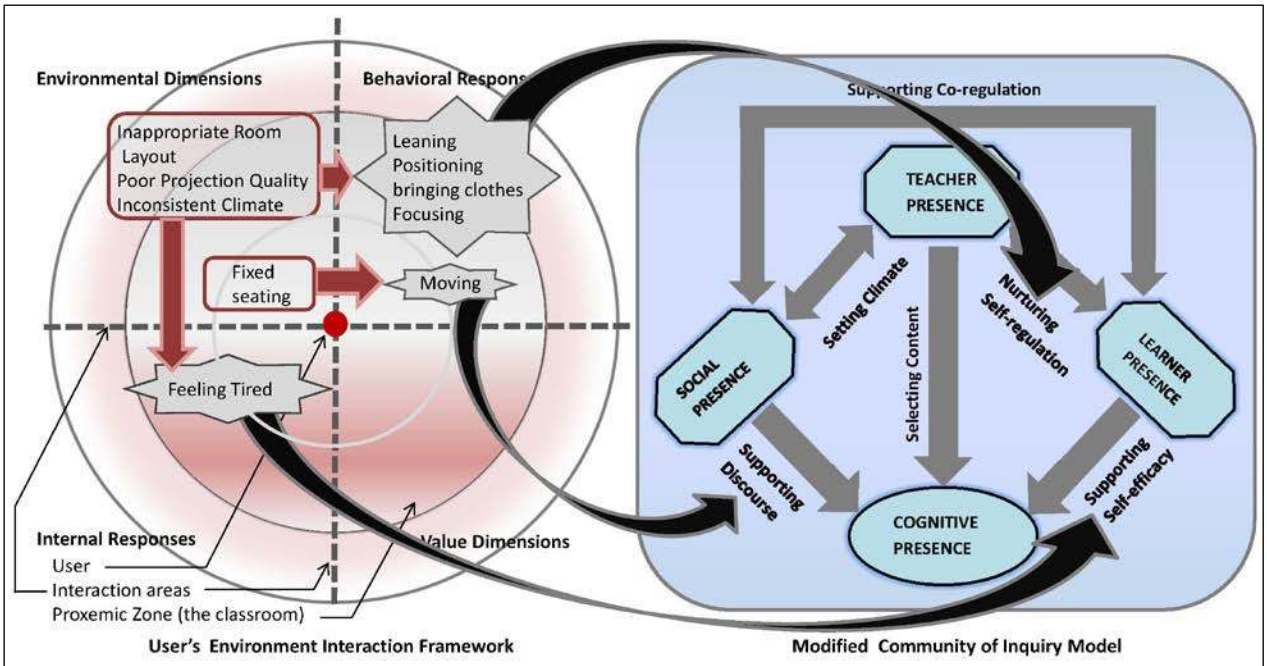


Figure 17. Diagram describing how an inadequate classroom environment leads to student responses (shown on the UEIF) that append the normal educational processes (indicated on the modified CoI framework) for persons seeking important learning. Adapted from "Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments, by P. Shea and T. Bidjerano, 2010, *Computers & Education, 55*(4), p. 1721–1731, and adapted from "Higher Education Classrooms Fail to Meet Needs of Faculty and Students" by L. Scott-Webber, L., J. Abraham, J., & M. Marini, (2000). *Journal of Interior Design, 26*(2), 16–34.

personal efforts to mitigate problems due to the inadequacies of the classroom in order to alleviate impediments in the learning process. Social presence is a part of that educational process as well. Due to fixed seating in the room, the class responded with extraordinary efforts to move to various locations and into groupings throughout the room to support cohort activities designed to learn the disciplinary discourse and course content (cognitive presence). Lastly, the inappropriate classroom evoked an internal response in one learner that notably affected her ability to succeed scholastically. In Chapter Four, I reported that Cho Hee replied, "It's hard to use laptop in this class & see the [*sic*] due to desks & bad lighting & it's always cold. [It] makes

me feel tired" (survey response, October 30, 2013). That personal sentiment influenced the relationship between this learner and the level of significant learning achievable, because the conditions reduced her vitality in the course and thereby diminished her self-efficacy, her expectations and belief that she could reach the learning goals in the course. I will return to self-efficacy later in this Chapter.

Inappropriate room assignment, inadequate equipment, or inconsistent room climate educed adaptive responses from teachers to provide an effective educational experience. See Figure 18, which illustrates the influence of the physical classroom (in a constructivist educational process) on teachers. In addition to his normal method of teaching, the professors

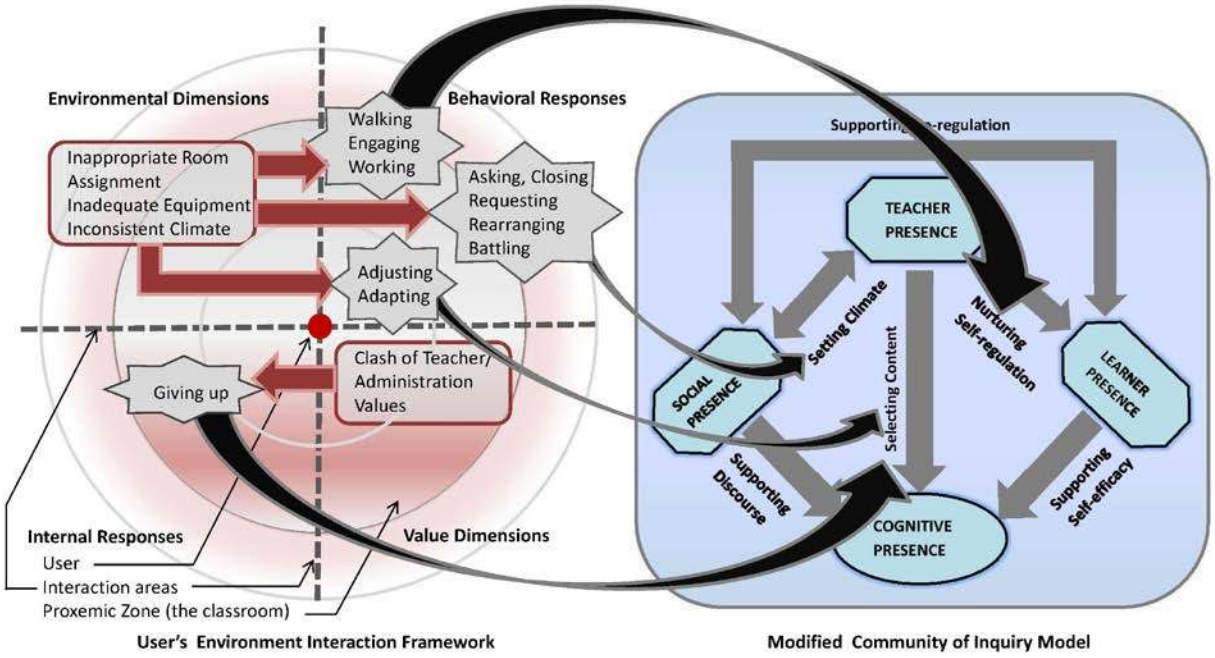


Figure 18. How an inadequate classroom environment leads to teacher responses (shown on the UEIF) that append the normal educational processes (indicated on the modified CoI framework) between entities seeking important learning. Adapted from "Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments, by P. Shea and T. Bidjerano, 2010, *Computers & Education, 55*(4), p. 1721–1731, and adapted from "Higher Education Classrooms Fail to Meet Needs of Faculty and Students" by L. Scott-Webber, L., J. Abraham, J., & M. Marini, (2000). *Journal of Interior Design, 26*(2), 16–34.

who participated in this study made special efforts to walk through the classroom to engage students who were unable to see or hear the presentation well, or participate fully in classroom discussions, because of the layout of the classroom or fixed equipment. At times during each class period, the teacher had to determine what additional actions were needed, justify the extra effort required, do them, and monitor their reception. This teacher self-regulation governed how the teacher responded to each student individually (learner presence), however the teacher made distinct efforts to provide an effective learning environment for the class as a whole (social presence). The teacher's struggles in trying to relocate the course to a more conducive space, as well as repeatedly adjusting lighting to mitigate projection problems, all comprised the teacher's process for setting the climate for learning in the class, and constituted further burdens to the normal process of learning in a social constructivist epistemology. In order to offer the opportunity to reach higher level thinking in the course (cognitive presence), the teacher also modified the normal course content, making adaptations to fit the inadequacies of classroom *R4,* then teaching with those revised materials in with other students in other classrooms for the same course. An inadequate classroom also affected another teacher in an internal way, because actions to reassign a classroom revealed dissonance between the teacher and administration. She reported ending her struggles with the registrar to relocate the course (or schedule temporary locations for specific classroom activities), after recognizing that the importance she attached to suitable classroom space were not shared. She redesigned the course so that students would produce more work at home, but still have the opportunity to achieve that high level of learning that the teacher valued and the administration expected.

The finding concerning personal control of learning and the perceived importance of one's remedial responses, as it relates to the educational process in a constructivist course, can be

seen between learner presence and cognitive presence on the modified CoI model. Expressions of control from the research participants, the construct of locus of control popularized in personality psychology, and the theory of self-efficacy in a constructivist setting, all embody the same concept: "the strength of conviction of possessing the ability….of influencing an outcome and executing the behaviors leading to a particular outcome" (Shea & Bidjerano, 2010, p. 1724). Self-efficacy is important in supporting the learning process because it aids self-regulation by providing inspirational drive (Winne, 2005) and tenacity (Zimmernan & Schunk, 2001). Based on research, it is a demonstrated positive factor in forecasting scholastic outcomes (Robbins et al., 2004). The later attribute to self-efficacy is significant because the CoI framework describes a *process* to achieve significant learning, which includes the components, their relationship to each other, and the construction of consequential knowledge. This framework categorically does not prescribe *outcomes* (Rourke & Kanuka, 2009). As Akyol, Arbaugh, et al. (2009) write, "the seminal CoI work does not exclude the consideration of intended learning outcomes, the focus has been consistently on the nature of the educational transaction" (p. 123). However, research on self-efficacy, a core indicator of learner presence, has linked that trait with academic achievement.

In Chapter Four, I presented self-efficacy simply as a general predictor of how students rate the significance of their corrective actions. I stated a neutral stance in which an individual ranged on the continuum between internal or external locus of control for a course, derived from my emic perspective as an architect and designer with a degree in psychology. Indeed, both psychologists and space planners seek to understand people and their behaviors "as they are," to analyze and design for them. However, in this Chapter, I interpret the impact of the research findings as an educator and look at the process and outcomes of the teaching and learning

experience. Within a constructivist epistemology, the promotion of self-efficacy enhances the entire process toward achieving consequential learning, and it is supported for the learner by an effective teacher and affirmative social pressures (Shea & Bidjerano, 2010). Moreover, hindering the development of self-efficacy due to the strain and hassle of poor classroom design (for instance in the case of Cho Hee) reduces the opportunity for high-order learning (Shea, Hayes et. al, 2014). To that point, Shea and Bidjerano stated, "Negative states, such as stress and anxiety eventuate….in loss of sense of control, and diminished self-efficacy beliefs" (p. 1724). Thus, the integration of the UEIF and CoI framework for analysis enhances interpretation and provides for the interdisciplinary case study method for constructivist epistemologies requested in Chapter Two, and the agency to better understand the toll that corrective measures take on the education experience, as discussed in Chapter One. Utilizing this approach, the following is a summary of the findings on the impact of corrective measures (because of a bad classroom), on the constructivist educational experience, for stakeholders in this issue:

- Students' continual remedial efforts to pay attention in class are based on the value they place upon focus for learning. Student actions affect learning in a significant way because they either detract from or add to the normal interrelating educative process that takes place between teacher and learner. Remedial actions require additional attention from students to determine what will be useful, assess the effectiveness, and continue the corrective measures, thereby reducing the opportunity to reach higher level learning in the course. Teachers, design professionals, and university administrators could find this information useful in redesigning a course and determining an alternative strategy for delivering blended/hybrid courses, to compensate for an inadequate classroom. This information would also be useful for evaluating the effectiveness of a built learning

environment, developing new spaces for learning, and shaping university policy concerning room assignment, and the priority of maintaining adequate facilities for education.

- Post-occupancy evaluations of classroom spaces, to document and determine their present effectiveness, must take into account that students' appraisals of their additional efforts to maintain an environment for learning are generally dependent upon their sense of control of their learning in the course and not the amount, or type, or frequency of the extra efforts that they are performing. Design professionals and university administrators could benefit by understanding that data from student POEs must not be interpreted as a computative absolute that assumes that all students approach the classroom in the same way.
- Assignment of a classroom deemed "inadequate" or "inappropriate" by the teacher exposes the misalignment between faculty and administrative culture. Teacher adaptations to accommodate unsuitable venues can result in an educational experience for students that provide less potential to reach high-level learning in the course. University administrators with a deeper understanding of the impact of the built environment on student learning may be more sympathetic to faculty concerns about this issue and, therefore, might improve policies for space allocation and develop greater communication and reinforce shared goals within the university.
- The added stress from inhabiting an inadequate classroom could reduce a student's sense of control over their learning experience and lower their personal feelings of adequacy, thereby leading to lower academic achievement. Teachers', design professionals', university administrators', and students' awareness of the relationship between the design

of the built environment and learning could affect decisions across the spectrum of education.

- Corrective measures performed by teachers and students to mitigate classroom problems can encumber the learner-teacher and learner-cohort relationships, resulting in a constraint on student progress to high-level learning. Teachers, design professionals, university administrators, and students, who recognize that teacher engagement and social cohesion in the classroom encourage relationships that foster learning, might make choices to value classroom design. In addition, based on this finding, teachers and students could better understand their role in the teaching/learning process to utilize existing spaces more effectively to lessen constraints to learning, and use this knowledge to advocate for improved facilities. Design professionals might better comprehend existing conditions as a guide for designing new environments for learning, and university administrators might reconsider priorities for capital improvements.

In the preceding discussion, I summarized the findings on the impact of actions to make up for shortcomings in the physical undergraduate classroom and noted how those actions shaped, and could reshape, teaching and learning experiences. As noted above, little research exists exploring these remedial actions, and in Chapter Two, I remarked that existing post occupancy evaluations and case studies were not suited to document and determine the benefit and toll these actions place on teachers and students. Not one disciplinary case study has previously included the concerns of all stakeholders with regard to education, architecture/interior design, and environment-behavior issues. Indeed, for classroom *R4*, certainly an environmental-behaviorist case study would have identified cultural and control

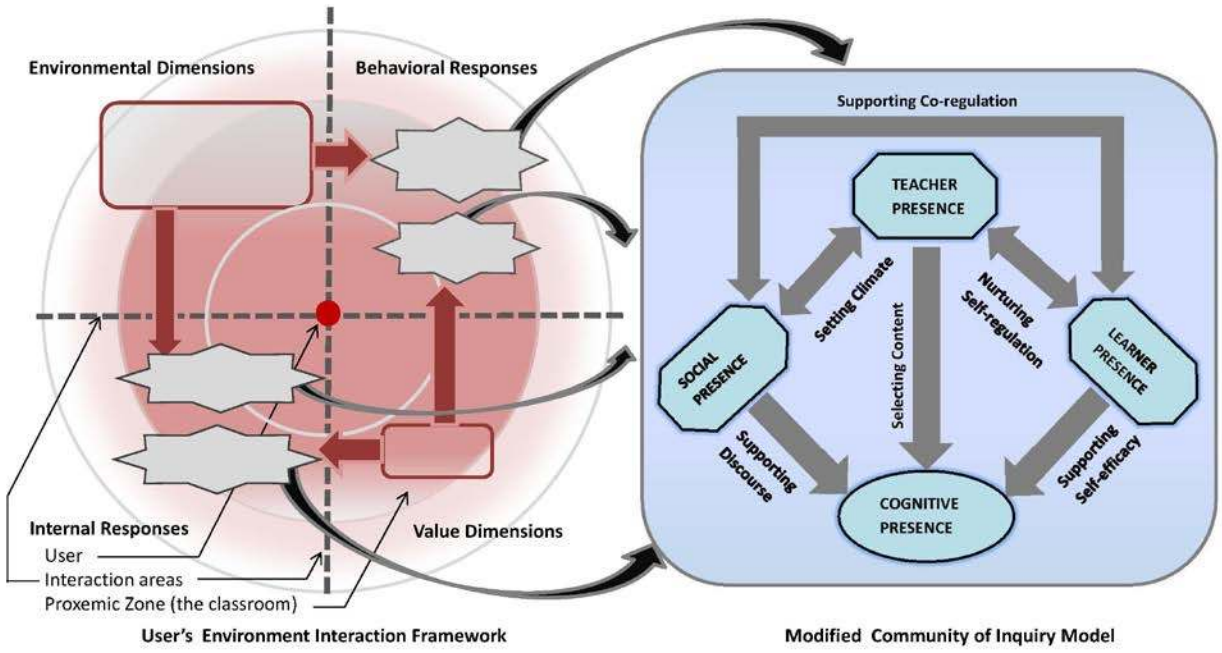


Figure 19. Proposed method to assess the influence of the built learning environment on the educational process in social constructivist instruction (using the UEIF and modified CoI models). Adapted from "Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments, by P. Shea and T. Bidjerano, 2010, *Computers & Education, 55*(4), p. 1721–1731, and adapted from "Higher Education Classrooms Fail to Meet Needs of Faculty and Students" by L. Scott-Webber, L., J. Abraham, J., & M. Marini, (2000). *Journal of Interior Design, 26*(2), 16–34.

issues; an educational case study would have reviewed classroom support of the learning process; and, an architectural case study would have documented many of the teacher's adaptation issues, to allow the designer to discern the functionally of existing spaces.

However, in Chapter Five, I presented an integrated UEIF and modified CoI approach that, combined with a phenomenological case study, identified and analyzed behaviors and actions prompted by the classroom concerning impact on the learning process. This integrated approach serves as the construct of this research and for future case studies of physical environments for constructivist instruction comprising face-to-face and hybrid delivery models

(see Figure 19 for an example of the modified method).

I am a designer, so a physical representation of a social extraction or relationship helps me to understand these processes and their interrelations. It can also be helpful to others. This proposed model is appropriate for administrators who want to assess the dynamics of classroom space and its impact on the constructivist teaching and learning process. This method critically examines the built environment, discerns the behaviors in response to that setting, and aligns those behaviors with indicators to situate them within the constructivist educational process while assessing the impact on the relationship between each presence. In itself, the UEIF does not address educational issues, nor does the modified CoI evaluate the cause of behavior and feelings due to the physical environment.

To utilize the integrated model, the survey overseer might do the following:

(1) Ask the four questions of students and the teacher included in the qualitative phenomenological questioning of this research: “What is existing? What actions were taken or attempted? What comprises your learning (or teaching) experience for this course? How is the learning (or teaching) experience in the course influenced by the corrective actions that you took (or continue to take)?” ;

(2) Review the replies to categorize them into environmental or value dimensions on the UEIF;

(3) Review the replies to determine behavioral or internal responses (gerund coding is effective to highlight actions);

(4) Evaluate the responses on the modified CoI framework with regard to the indicator that they are associated with and assess the contribution or hindrance that they provide to relationships between the presences.

Likewise, in Chapter Two, I noted that standard post-occupancy evaluations were also lacking. They, too, could include the four qualitative phenomenological questions of this research. Those responses could be reviewed by utilizing the integrated UEIF and modified CoI approach. This method, derived from the research, constitutes the improvement to the standard post-occupancy evaluation that I described in Chapter Two. Additionally, a modified POE would give university administrators, in conjunction with design professionals, the opportunity to develop a POE which includes documentation and consideration of remedial actions in their rating of existing spaces, and the ability to produce a cost/benefit ratio analysis on the responses to understand the toll of the existing facility in added dollars, lost productivity, and aggravation.

5c Corroborating and Further Research, and Improved methods

The results of this study are corroborated by previous research. For example, other researchers have noted the importance of student focus in learning. The high number of responses from students in this research concerning their valuation of sustained focus is substantiated by the research of Steinmayr, Ziegler and Träuble (2010). Although these researchers studied junior and senior high school students (the mean age was near 17 years), their results indicated that there as a positive correlation (albeit a weak one) between sustained attention and academic performance.

Conversely, much research has been conducted about the divided attention of Millennial undergraduates in college through their multitasking habits, including students who partake in social medial communication during class time self-report lower grade expectations (Fox, Rosen & Crawford, 2009) and student attention span during lectures vary individually (Bunce, Flens, & Neiles, 2010; Wilson & Korn, 2007). Multitasking in the classroom is a reality on most campuses, but research is varied and parsed concerning its overall effects on learning (Kraushaar

& Novak, 2010; Paul, 2013). It is sufficient to remark that student participants in this study said that they largely valued sustained focus, and they performed remedial actions to alleviate distractions.

One teacher decried the process of having to move furniture at the beginning of class, and then having to put it back to the same layout by the end, as North (2002) describes in her research on faculty disagreements with classroom furniture layouts. Lastly, my work concurs with Ching et al. (2004), who was amazed "that characteristics of sound, temperature and lighting featured so prominently in the discussion" (p. 228) about inadequate existing spaces.

I recommend future inquiry into several areas relating to corrective measures taken in classroom spaces, and their impact on teaching and learning. Firstly, further research on remedial actions and the locus of control should consider utilizing a standardized evaluation like the 13–item questionnaire developed by Rotter (1966) to discern attributes of locus of control beyond that which participants casually expressed in this research. Such a directed study might reveal variables that would explain the few cases in my research where a participant rated the significance of his or her remedial actions contrary to others in her group. Likewise, the CoI survey instrument developed by Arbaugh et al. (2008), to analyze the effectiveness of the learning process and relationships between the presences could be an appropriate tool to explore differences in the educational experience between various classroom types within the same course taught by the same teacher. Secondly, through a more appropriate understanding of the experience of the space, this research may contribute to the design of a classroom architectural prototype ideally suited for constructivist instruction. Thirdly, even though I noted that the prevalence of hybrid and online courses are a significant and growing trend, future research could be conducted to ascertain the reasons for continued reliance on predominantly face-to-face

instruction at institutions that have limited options with regard to classroom space. Lastly, one result of this research was that students who expressed internal control of their learning (and consequentially, felt their remedial actions were significant) tended to be the older students in the class. Research that explores the age of students and the importance they give to place and academic achievement could be of value.

Besides future areas of research, I suggest improved methods for those conducting a similar study:

- Researchers utilizing social media should code all surveys to indicate where respondents accessed the instrument so that the researchers can allocate resources towards a more effective advertising campaign that optimizes the type, frequency and duration of the outreach efforts.
- The actual effectiveness of my social media campaign may have been diminished because I "broadcasted" the survey and interview announcements on social media, in a one-way relationship, for others to notice and respond (which is a very 20th century concept). Future researchers utilizing social media should consider "networking" the information, which may be much more effective and aligned with contemporary culture. This could be done by forming chat groups with respondents and inviting their friends, posting topics about the research daily to encourage research participation and ongoing mutual correspondence with "friends" and their network of "friends" (instead of posting "one-way" static pictures and text) and encouraging others to do the same on social media recruiting sites. This proposed method creates several questions to resolve:
    - How does the banter affect responses from the participants who will fill out the online surveys and interview participation forms?

- Does this method skew the population?
- Does this method endorse or influence a position explored in the survey or interview?
- What effort is required to monitor so that others do not propagate incorrect survey or participation information on the social media site?
- How can negative, misleading, or erroneous commentary about my research, be stopped or removed from a respondent's social media site?

- After review of DeBard's (2004) research on Millennial students, and reflection upon my activities to secure their participation in research, it is clear that a post-occupancy evaluation to solicit information about the likes and dislikes of the facility, and that considers students, should inquire about matters that students value (refer to generational characteristics in Table 2, Chapter Three). The following are common student value questions for the *researcher* to consider before creating a unique POE survey instrument:
  - Do the common spaces promote community building?
  - Does the classroom support a level of trust for the institution (Is the layout straightforward or misleading)?
  - Does the educational space allow students to do *meaningful work* in class, or are they constantly moving chairs and equipment, or reconfiguring the learning environment to facilitate classroom activities?
  - Are there Internet and virtual classroom capabilities?
  - Does the classroom contribute to a student's sense of being in control of his or her educational outcomes?

  - Does the classroom and its layout project institutional control (Are areas positioned to monitor participants in spaces)?
  - Is there a hierarchy of accoutrements or amenities that serves to indicate the 'nicer' parts of the building and label by classroom assignment, a student's position in the institution?
  - Will the post-occupancy evaluation be administered in a way that allows access to answer 24 hours a day/ 7 days a week, online, within a determined evaluation period?
  - Does the classroom have integrity (Is the design trying to project an image that it is not)?

- Academic leaders, with design professionals, should develop a pre-evaluation discussion plan prior to administering the POE as a way for students, faculty, and administrators to acknowledge existing conditions and initiate the process to empower users of the space. A POE that considers the culture of each group as well as power and authority issues, is useful in two ways. First, an effective pre-assessment discussion plan will give the users skills to review their environment critically, while providing a vehicle for reflection and a dialogue with faculty and administration. This exchange has the potential to be transformative (Freire, 1970). Secondly, incorporating tenets of a critical pedagogy into the evaluation criteria may provide questions and answers that enable all to become more fully human, for I contend that inhabiting school facilities that are knowingly inadequate, is dehumanizing; a dialogical airing of issues can be liberating for all constituents. This pre-evaluation discussion plan may be the first step towards encouraging students and teachers to embrace their power to shape learning experiences through their input in a

POE. For example, the discussion plan could be developed in line with the theories of Paulo Freire (1970) in *Pedagogy of the Oppressed,* to train the users of the space to be more critically sensitive to the issues created by teaching and learning in an inadequate physical environment. Freire wrote that the oppressed (students and/or faculty) must be engaged in a dialog with the oppressor (faculty and/or administration) which illustrates historical conditions (the existing classroom and other situations with inadequate spaces) so as to evoke each participant to critically view the world, recognize causes of oppression, and discover themselves as hosts of the oppressors. This new insight can aid users to objectify and create new possibilities through reflective participation in the discussion plan that subsequently evokes transforming actions enabling the oppressed to strive to be fully vital and human (in Chapter One I reviewed humanization as part of a taxonomy of place in online teaching and hybrid coursework; in Chapter Four I discussed the role of self-efficacy in constructivist instruction). This research has shown a level of powerlessness in the class by students and teachers who expressed that they did not control their educational experience.

In conclusion, this research explored the phenomena of students and teachers taking actions to make up for shortcomings in the physical undergraduate classroom and how those measures shaped their teaching and learning experiences. I identified my background and the need for conducting this research, included relevant literature on this topic, and outlined my research paradigm and methodology. I presented three themes, derived from the research, that concerned a student's expression of control over the learning experience and how that extends to his or her rating of the importance of remedial actions (and the role of self-efficacy in constructivist instruction); students value of "maintaining focus" in their learning experience;

and the influence of teacher adaptation on the teaching experience and classroom climate. I summarized the findings and presented their impact on teaching and learning, and proposed a "toll tool" for design professionals and administrators to assess the influence of remedial actions in the classroom to the educational process in constructivist instruction.

5d. Summary

I toured a number of potential classrooms for observation at several universities to conduct this research, and noticed varying degrees of potential obstructions to the educational process within the physical environments. One significant comment that I received from several participants within the research responses was that the very act of trying to mitigate problems, even though actions did not completely alleviate the issue, was beneficial.

Rhatigan and Schuh (2003) describe how even small interactions with students where faculty and administration extended themselves to support, encourage, or make the environment better for students, have the potential to make great changes in students' lives. They describe these opportunities as *small wins*, and say that "when small wins accumulate, people begin to take the view that larger-scale, complex problems can be solved" (p. 18). A post-occupancy evaluation can be a diminutive way to give students some control of their environment and demonstrate that their opinion is valued. Part of asking about their likes and dislikes of the facility, is considering the issues that they value which faculty or administration may not share. Thus, little opportunities to be included in a process can be empowering! The act of opening and closing blinds or turning on and off the heating or lighting system, whether performed by the teacher or as a teacher-student activity, or by students to prepare the space for learning, can serve as subtle ways to acknowledge the role of the physical space in the teaching and learning process, while setting the mood in class and letting students know that the time with them is

important. Increasing the font size to make a presentation more legible in a room is, in itself, a modest gesture, but it contributes to small wins. Rhatigan and Schuh state that:

> Small wins can produce results that are electrifying and, in some cases, life changing….Our small efforts can produce good outcomes. The good that each one of us does lives on. Faculty and administrators do not want to be among those who limit themselves by lacking imagination, energy, and effort in the small room in the world that has been entrusted to our care (pp. 19–22).

What little steps can we take now toward creating an effective environment in which students can learn?

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Appendix A

Table A1.

Subject Population

8 largest Boston regional universities	Entire Student Population	Under-graduate Population	Student/ Professorial Faculty ratio	*Undergraduate Professorial Faculty Population
1. Boston University	32,603	18,306	13:1	1,408
2. Harvard University	28,147	10,564	7:1	1,509
3. Northeastern University	27,694	16,640	13:1	1,280
4. UMass Boston	15,874	12,124	16:1	758
5. Boston College	14,605	9,837	14:1	703
6. MIT	11,189	4,503	8:1	563
7. Suffolk University	9,018	5,770	12:1	481
8. Lesley University	5,944	1,984	12:1	165
Total		79,728		6,867

Notes. *The undergraduate professor population is derived from the student/professorial faculty ratio to undergraduate population. This research includes adjunct and teaching assistants for undergraduate students, therefore the actual subject population is larger. The ranking and numerical information is derived from university statistics from the National Center for Education Statistics, College Navigator website at http://nces.ed.gov/collegenavigator/

Table A2.

Undergraduate Subject Population -Gender, Racial Composition, and Age

8 largest Boston regional universities	Undergraduate Population	# of Male/ # of Female Undergraduates	# White/ # non-White Undergraduates	Age ≤24 yrs./ ≥25 yrs./ Unknown
1. Boston University	18,306	7,322 / 10,983	8,786 / 9,519	16,129 / 549 / 1,648
2. Harvard University	10,564	5,176 / 5,387	5,070 / 5,493	6,972 / 423 / 3,169
3. Northeastern U.	16,640	8,153 / 8,486	8,153 / 8,486	14,643 / 1,997 / 0
4. UMass Boston	12,124	5,334 / 6,789	5,334 / 6,789	7,881 / 4,243 / 0
5. Boston College	9,837	4,623 / 5,213	5,705 / 4,131	9,542 / 295 / 0
6. MIT	4,503	2, 476 / 2,026	1,666 / 2,836	4,458 / 45 / 0
7. Suffolk University	5,770	2,538 / 3,231	2,423 / 3,346	5,366 / 404 / 0
8. Lesley University	1,984	436 / 1,547	1,388 / 595	1,567 / 377 / 20
Total	79,728	36,058 / 43,670 or 45% Male/ 55% Female	38,525 / 41,203 or 48% White/ 52% non-White	66,558 /8,333/ 4,837 or 83.5% ≤24 yrs. / 10.5% ≥25 yrs./ 6% Unknown

Note. The undergraduate gender, racial composition, and age statistics are derived from the university statistics of the National Center for Education Statistics, College Navigator website at http://nces.ed.gov/collegenavigator/

Table A3. *Solicitations and Response*

Research Method	Solicitation	Population contacted	Solicitation Acceptance	Final acceptance
Class Observation & written Survey	Phone calls/emails	3 courses, consisting of 12 classes. Total Professors contacted:7 Total students in their classes: 559.	1 course, 2 classes	**1 class: 31 students/1 professor** (1 class: 40 students declined consent)
Phenomenological Survey	Directed email to PhD students & professors – 289; LU - 220, NEU - 250; Twitter to the 8 universities - 5,843; Facebook to the 8 universities - 93,341; LinkedIn to the 8 universities - 45,331. Total =145,274 (although there may be overlap)	144,515 social media impressions (times shown on a website); Directed email is 759.	19 Started survey	**11completed surveys** (4 students, 7 teachers)
Class Observation Online Survey[MKT 2401]	Directed Email to Observation class and other class in another building with that same professor	75 students in Class Observation class and other class in course by the same Professor	9 participated in survey – 6 from Class Observation class and 3 from other class.	**9 completed surveys**
Directed Class Survey [S2014]	Directed emails to courses with classes in at least two different buildings	Selected 3 courses in two universities and contacted their 8 professors with a total of 449 students.	2 courses responding with two classes each, for a total of 140 possible subjects	13 students started survey; **12 students completed surveys**
Online Interviews/Online Focus Groups	Directed Emails to PhD students & professors – 289; LU - 220, NEU - 250; Twitter to the 8 universities - 5,843; Facebook to the 8 universities - 93,341; LinkedIn to the 8 universities - 45,331. Total =145,274 (although there may be overlap)	144,515 social media impressions (times shown on a website); Directed email is 759.	20 started consent form.	3 professors and 2 students consented, but I ultimately conducted **2 professor interviews** (1 professor and 2 students were non-responsive)

Table A4.

Responses from student participants reviewed for emergent thematic categories.

Theme	Values Coding	Characteristic Response
1. Students value maintaining focus as the way to learn more.	Value: Paying attention will lead to better grades.	"When I sleep in class, I tend to do bad in the final grade. Also, when I fool around and don't pay attention."
	Value: Teacher plus effective engagement equals learning.	"teacher + effective engagement means [learning], but in reality students are just tired and can't pay full attention for that long."
2. Students believe that discomfort causes distraction from focus.	Value: Student comfort equals better attention.	"When I am comfortable in my seat lessons/lecture are easier to absorb. Certain discoveries pique my interest and make me lean forward to grasp it even better."
	Value: Student comfort equals better learning.	"The seats are so uncomfortable. I am constantly moving around. ..I constantly adjust to be a better listener"
3. Students believe that it is their responsibility to find ways to make up for the deficiencies of their classroom.	Belief: Students must do Remedial Actions in order to take notes.	"There is not enough room to write and take notes comfortably so I usually am forced to bring my laptop."
	Belief: Students must position themselves as best as they can.	"On occasion I switched desks back and forth, stood up in the aisles, or strained in my seat to see the bottom of the board."
	Belief: If there are problems, you must do remedial actions for better learning.	"Discomfort can be distracting from learning so it's necessary to 'correct' it."
4. Students value working effectively with cohort.	Value: It is important to work effectively with cohort	"collaboration was in regards to a group project that was key to the course."

Table A5.

Responses from participants in R4 classroom observation about the course, reviewed for emergent thematic categories.

Response Category: How much is your overall learning in this course influenced by the corrective actions that you did (or continue to do)?	Thematic category for each group: Expression of control over one's impediments in the learning experience (Controller - Participant, Controller - Other, or Indeterminate)/ Characteristic Response	Thematic category: Versus Coding (for "A lot" group, then major categories for all other groups combined)	Thematic category: Expressed Attitudes Coding (for "A lot" group, then major categories for all other groups combined)	Thematic category: Expressed Beliefs Coding (for "A lot" group, then major categories for all other groups combined)
Entirely *n*=0	-	-	-	-
A lot *n*=8	4 qty. CP/ "when I try to learn during class by leaning forward, I could remember more material"	sleep in class/not pay attention vs. good grades (exclusive to this group)	nothing can be done about existing issues	if there is a problem, you must do remedial actions for better learning (exclusive to this group)
	1 qty. CO/ "seating does not accommodate computer use so it [sic] hard to concentrate"	doing no remedial actions vs. learning (most prevalent response)		in general, I pay attention when class is interesting (exclusive to this group)
	3 qty. Indeterminate/ "This room is rough"	classroom vs. actual needs in class		many classrooms have problems
Neither Influenced nor did not influence *n*=3	3 qty. –Indeterminate/ "never really thought about it before"			
A little *n*=18	2 qty. CP/ "Difficult to see screen with bad lighting…I've had to use my laptop and pull up the professors [sic]slides online so I can see them"; 6 qty. CO/ "leaning forward to see or hear helps but nothing can be done…"; 10 qty. Indeterminate/ "sometimes rooms have been very hot or cold".	doing no remedial action vs. not learning (most prevalent response of entire class) sit anywhere I want vs. being able to see the professor/board	nothing can be done about existing issues (most prevalent response of entire class) shortcomings in the classroom (students individually shared these attitudes)	if something seems important I will do remedial actions doing remedial actions is trivial issue remedial actions help some
Not at all *n*=1	1-Indeterminate/ "More for comfort than class performance".			seating is not comfortable

Table A6.

Responses from participants reviewed for emergent thematic categories about teacher Adaption.

Theme	Values Coding	Characteristic Response
1. Teachers reconcile the need to perform remedial actions with the effort.	Teacher versus: University's appropriate space deficit vs. teachers need of appropriate classroom	"There's nothing I could do, though there have been many things I wish I could do. I have held three of the classes in [another space] instead of the classroom in order to have a more flexible environment. This is not ideal, because I give up projection unless I set up my own. So I'm stuck between a rock and a hard place, have flexibility of space usage...or be stuck in the classroom that has A/V but does not allow for a convivial…discussion."
	Teacher belief: There are ways to mitigate efforts to perform remedial actions.	So in terms of having to compensate for the different styles of the room, I have actively adjusted my slides to account for the bad room, *Classroom R4*. But then, because I adapt the slides for *Classroom R4,* I am also using them for going to *Classroom D1,* as well.
	Teacher belief: Sometimes the effort is not worth the benefit.	"I frequently called someone from technology support to fix the projector before class… I let class out early twice and told them to watch the planned movies as homework, since the projector didn't work."
2. An essential responsibility of a teacher is to adequately modify teaching methods and materials to work in the assigned classroom.	Teacher belief: It is a teacher responsibility to be able to adapt to the classroom, if needed.	"So being able to work with the room I guess is part of the skill of being an educator."
	Teacher belief: Partially effective remedial actions are still beneficial to the educational process.	"Even if the corrective action doesn't really remove the distraction, it sends the message to the students that their attention and participation is important. …even if the distraction continues they actively engage because they understand that it is necessary."
3. In asking the students to perform remedial actions, teachers expose class and teacher values which can generate feelings	Teacher attitude: When students refuse to perform remedial actions it can affect the mood in the class.	"The students were not motivated to move the tables, and ended up leaving them in place and simply turning their chairs inward for discussion. It worked, but it felt awkward."
	Teacher belief: Student compliance with the teacher's request to perform remedial actions is influenced by the class culture of engagement	"One class was gung-ho, one class really didn't want to participate at all…And that's clear to me it's not the room, it's just the profile of the students."
	Teacher Versus: Teachers request vs. Students non-action	"So they couldn't see very well, sometimes, the projector slides. And I would have to move them forward for that. I would tell them if you can't see move forward. It doesn't mean they want to, of course but I try to get them to."
	Student Belief: Student action to ask teacher to change teaching method probably would not be effective.	"It might have been nice to get the teacher not to use the bottom of the board, [so I wouldn't have to change desks to see it] but the teacher, while entertaining and approachable, was kind of explosive and asking him to change his tactics might not have worked much."

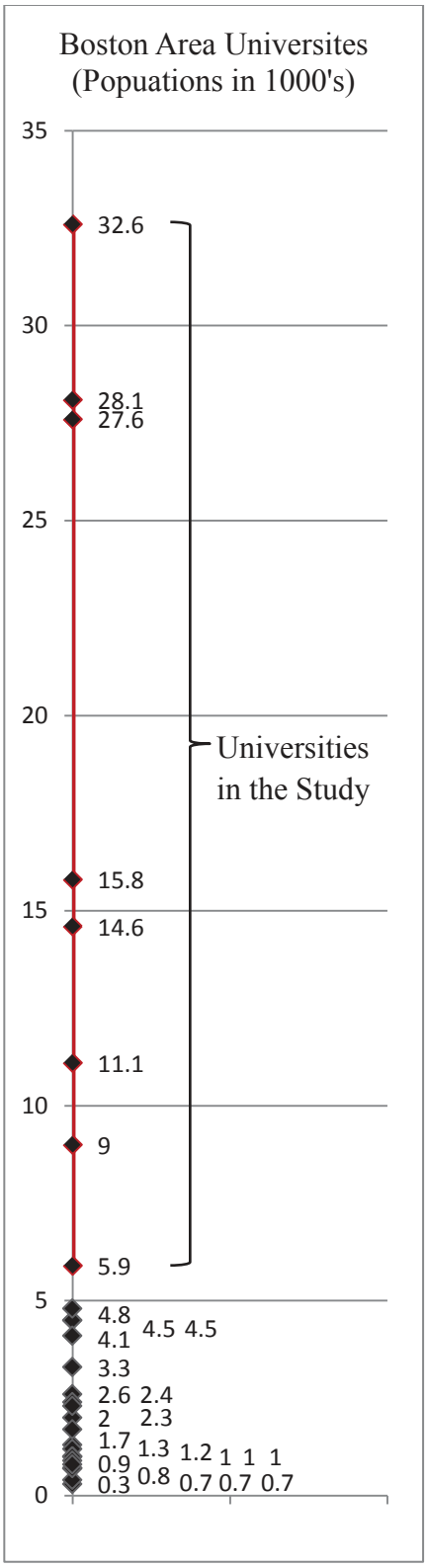
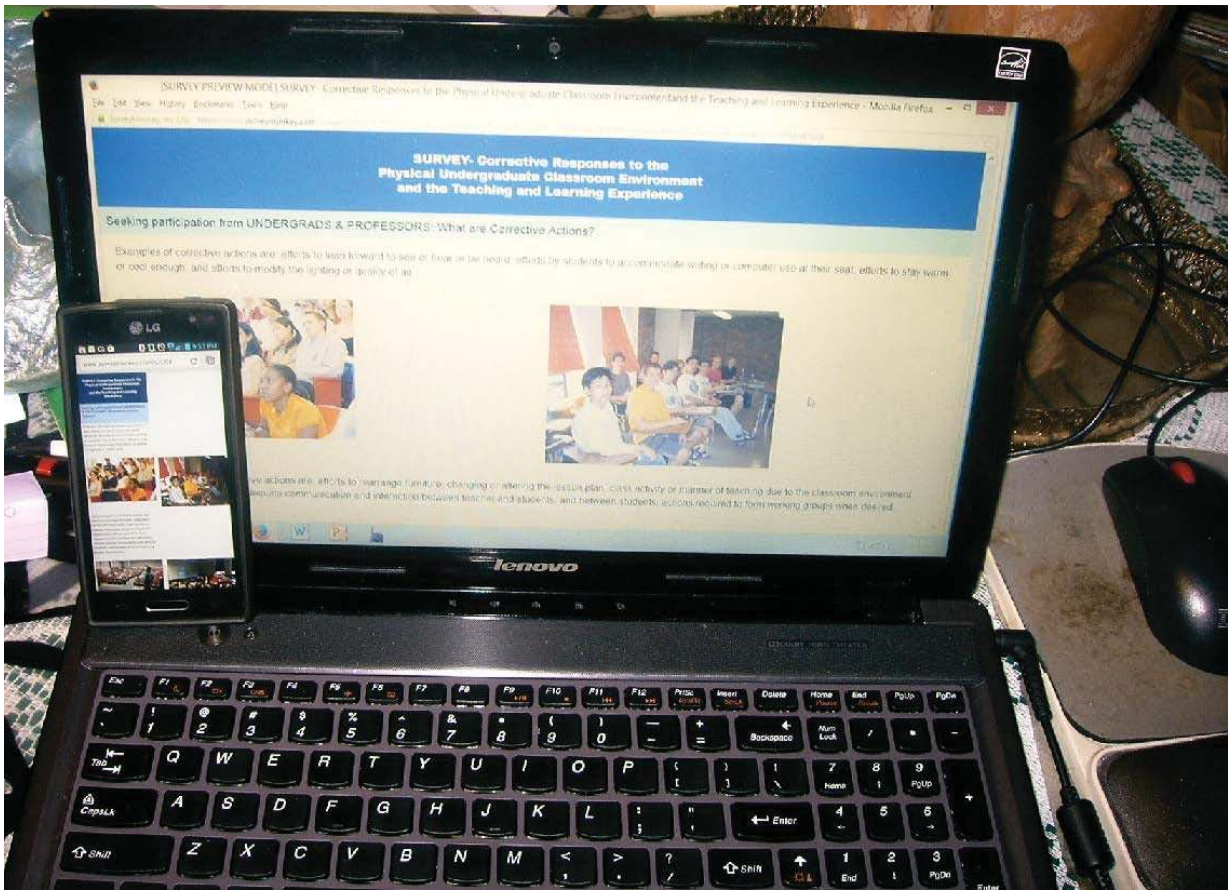


Figure A1. The 29 Universities within 5 miles of Boston center (zipcode 02118) not devoted entirely to medical training. *Note.* The population information is derived the National Center for Education Statistics, College Navigator website at http://nces.ed.gov/collegenavigator/

Figure A2. Accessibility- Computer and Mobile Device



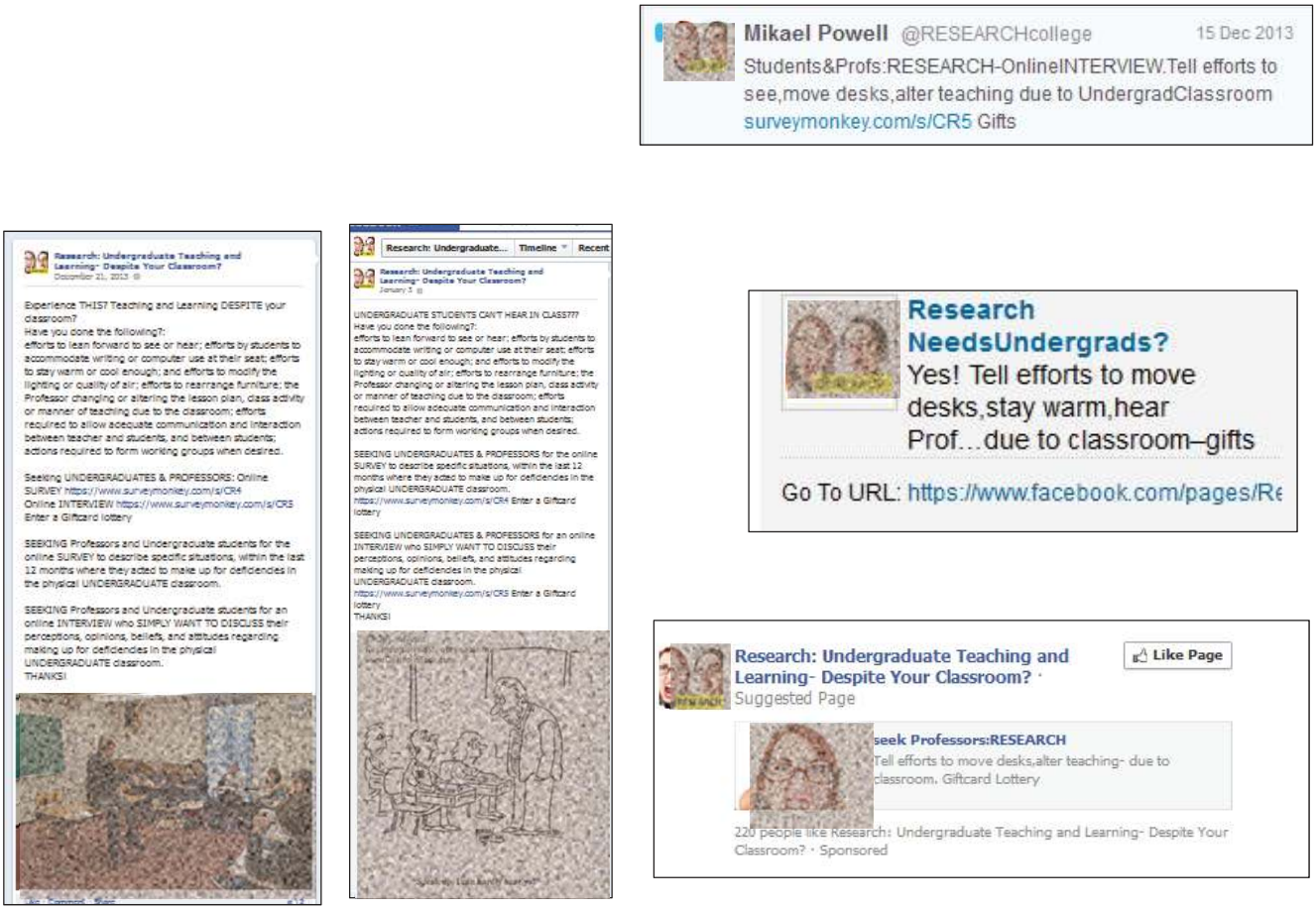


Figure A3. Horizontally on the left and center are Facebook front page post ads and timeline. On the right from top to bottom are LinkedIn paid ad, and two Facebook paid ads.
Note: Images are obscured to protect copyright requirements of public media.

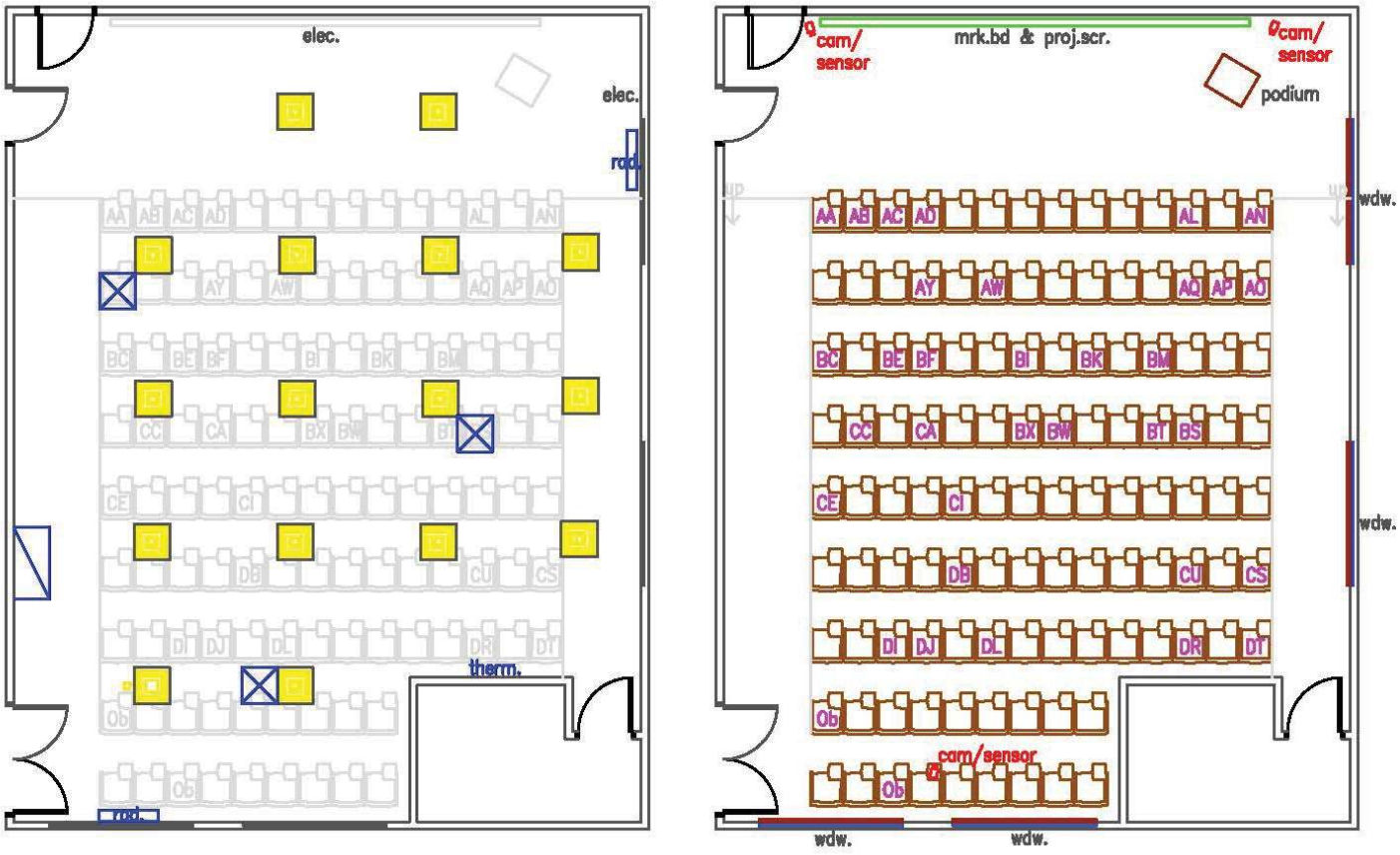


Figure A4. *Classroom R4 General Layout.*
Left is ceiling and utility plan showing overhead lighting layout (yellow square), ceiling heat distribution (square with "X"), ceiling air exhaust (rectangle with "/") and placement of the two electrical wall outlets (elec.) in the room, thermostat (therm.) and radiators (rad.);
Right is the classroom seating layout at the conclusion of class with key artifacts and surveillance equipment indicated. The student legend: AA is Adam; AB is B'shara; AC is Cho Hee; AD is Dao; AL is Lamar; AN is Noah; AO is Olivia; AP is Paula; AQ is Quentin; AW is Whitney; AY is Ying; BC is Claire; BE is Emily; BF is Farrah; BI is Ian; BK is Kaitlyn; BM is Madison; BS is Scott; BT is Tanner; BW is Wu; BX is Xiong; CA is Amy; CC is Carly; CE is Ethan; CI is Ikuya; CS is Steve; CU is Umeko; DB is Bradley; DI is Jian-heng; DJ is Juan; DL is Lynne; DR is Rick; DT is Tanner; Ob are observers.

Figure A5. Panoramic view compiled from front cameras with participant, remedial action reported, response to how much their overall course experience is influenced by the remedial actions they did in this course, and expression of control over one's impediments in the learning experience. I obscured the image for anonymity.

LEGEND:
My Actions:
A. Leaning to see or hear
B. Efforts to accommodate writing/computer at seat
C. Leaning to get comfortable
D. Efforts to move through classroom to form working groups
E. Efforts to stay warm or cool enough
F. Climbing over seats to get into groups
Note: The person in the front row in the white shirt left before the survey.

NOT PICTURED:

[Claire]My actions: B, D, E
Influence: a little
Control: External

[Emily]My actions: A, C, D, E
Influence: a little
Control: External

[Lamar] My actions: D
Influence: a little
Control: External

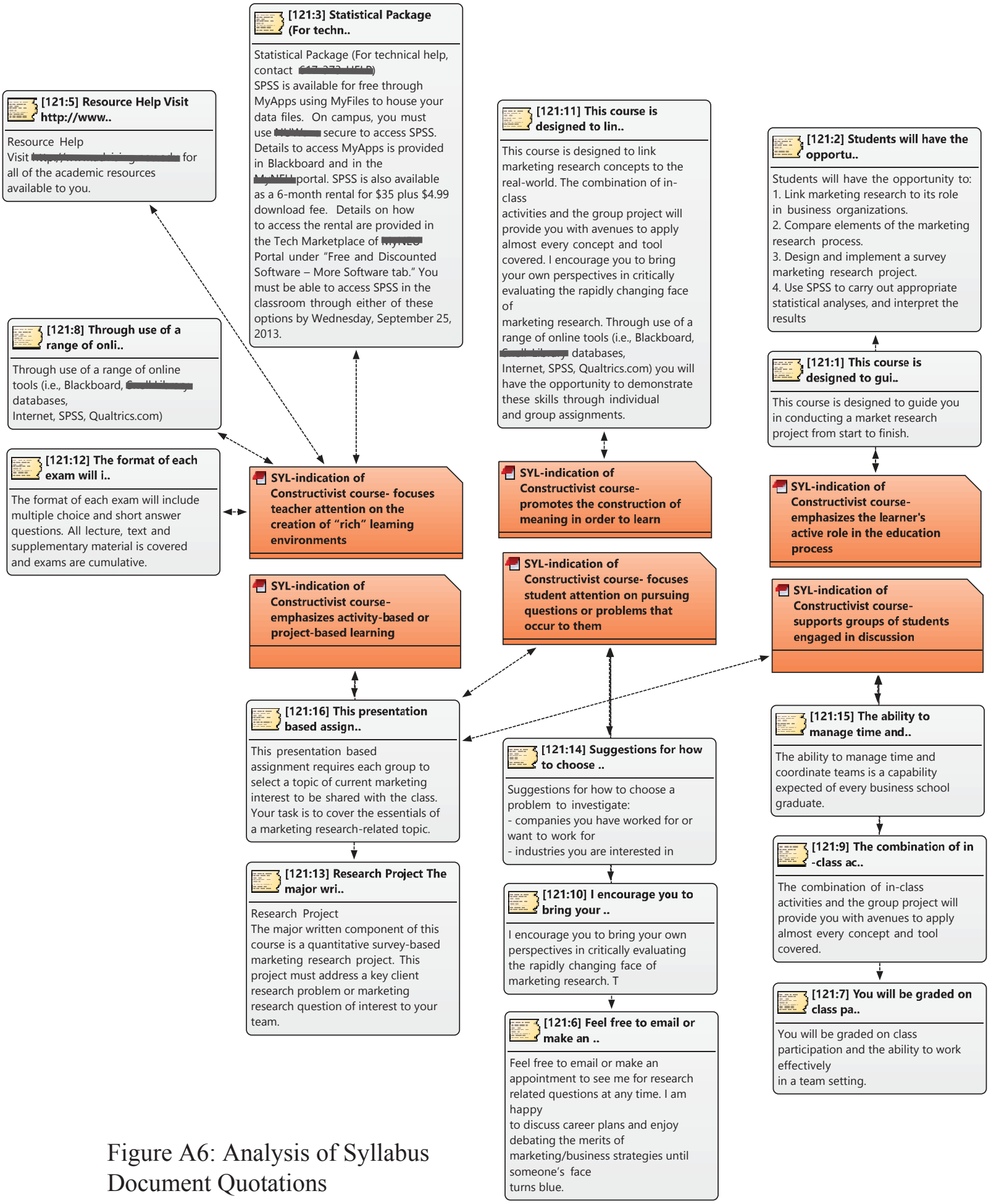
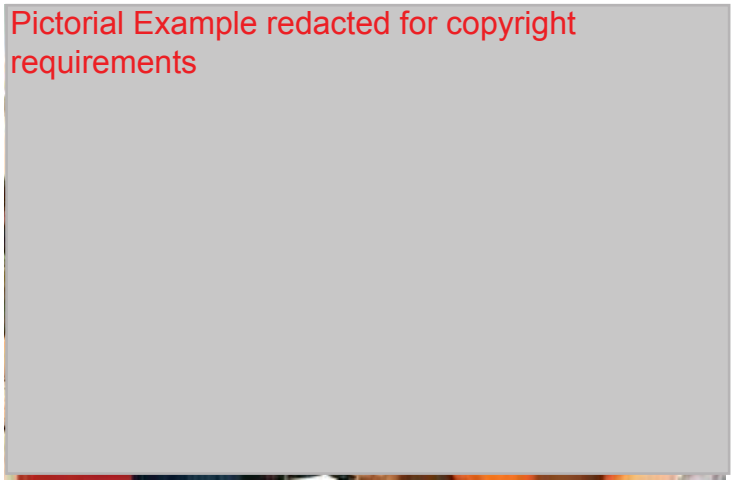


Figure A6: Analysis of Syllabus Document Quotations

Seeking participation from UNDERGRADS & PROFESSORS: What ...

Examples of corrective actions are: efforts to lean forward to see or hear or be heard; efforts by students to accommodate writing or computer use at their seat; efforts to stay warm or cool enough; and efforts to modify the lighting or quality of air.



...are Corrective Actions?(This print format truncates the title).

Note: The online survey is developed to skip questions, based upon previous survey answers.

Other examples of corrective actions are: efforts to rearrange furniture; changing or altering the lesson plan, class activity or manner of teaching due to the classroom environment; efforts required to allow adequate communication and interaction between teacher and students, and between students; actions required to form working groups when desired.

This survey solicits specific experiences, within the last 12 months, of actions performed by students and teachers to correct shortcomings in the physical classroom of undergraduate students. The goal is to understand the impact of these actions on the experience of teaching and learning. We hope that results of this study will help to improve the university classroom environment.

This survey asks you to describe specific situations where you acted to make up for deficiencies in the physical classroom environment. Please know that your responses will be edited and coded so that NO INFORMATION WILL BE PUBLISHED THAT WILL IDENTIFY YOU, YOUR ASSOCIATES, ANY LOCATION, ANY INSTITUTION OR PERSON.

Consent to Participate in a Research Study

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Mikael Powell, a student at Lesley University, Graduate School of Education, invites you be part of a research project that he will conduct in order to complete requirements for a doctoral degree. Gene Diaz, Ph.D. supervises him. The purpose of the study is to look at corrective actions undertaken to make up for deficiencies in the physical classroom and how they might affect the overall classroom experience. The researcher funds the study internally. We are asking you to participate because you are at least 18 years old, have read the preceding page or an advertisement for this research and within the last year you have been associated with undergraduate classroom teaching or learning. If you know others that are appropriate to participate, please forward the online link. The survey link will be active for the next few months.

DESCRIPTION OF YOUR INVOLVEMENT

If you agree to be part of the research study, we will ask you to describe your experiences (within the last year) of corrective responses to the physical classroom environment. The survey asks for your descriptions of the actions performed and how they might have affected the overall class experience. The survey should take 15 – 20 minutes to complete.

BENEFITS

While you may not receive a direct benefit from participating in this research, some people find sharing their stories to be a valuable experience. We hope that this study will contribute to the improvement of classroom environments.

RISKS AND DISCOMFORTS

Answering questions about your experiences can be difficult. You may choose not to answer any question and you can stop your participation in the survey at any time. Should you personally need support after relaying your experiences, please contact your healthcare provider for the appropriate services.

COMPENSATION

Those who participate in the survey can choose whether to enter the drawing at the end of the survey for one of three randomly selected prizes: An Apple gift card in the amount to purchase one IPOD Shuffle 2 gigabytes, an EBay gift card for $25.00 or an Amazon gift card for $15.00. If randomly chosen, the gift card code will be sent to the email address provided. Your eligibility is not affected if you choose not to answer certain questions.

CONFIDENTIALITY

We plan to publish the results of this study, BUT WILL NOT INCLUDE ANY INFORMATION THAT WILL IDENTIFY YOU, YOUR ASSOCIATES, ANY LOCATION, ANY INSTITUTION OR PERSON. To protect privacy, your responses will be edited and coded to avoid recognition; that revised document will be used as the foundation for research.

There are some reasons why people other than the researchers may need to see information you provided as part of the study. This includes organizations responsible for making sure the research is done safely and properly, including Lesley University Institutional Review Board. Also, if you tell us something that makes us believe that you or others have been or may be physically harmed, we may report that information to the appropriate agencies.

VOLUNTARY NATURE OF THIS STUDY

Participating in this study is completely voluntary. You may change your mind and stop at any time. You may choose not to answer a question for any reason or enter "No answer" in a text box. You may ask questions about this research at any time.

CONTACT INFORMATION

If you have questions about this research, including questions about the optional drawing, you can contact Mikael Powell of Lesley University, P.O. Box #2821, Pawtucket, RI 02861, mpowell5@lesley.edu phone 508.399.7343. You can also contact his faculty advisor, Gene Diaz, Ph.D., Lesley University, 29 Everett Street, Cambridge, MA 02138 phone 617.349.8426.

If you have any questions about your rights as a research participant, please contact Lesley University Institutional Review Board, Robyn Cruz, 29 Everett Street, Cambridge, MA, phone (617) 349-8518 rcruz@lesley.edu .

CONSENT

Please print this page for your reference and be sure that questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

If you do not finish the survey in one sitting, you may come back to it as many times as necessary until you select "DONE".

*** 1.**

- ◯ Yes, I agree to participate
- ◯ No, I do not wish to participate

*** 2. Within the last 12 months have you acted in order to make up for the shortcomings of a physical undergraduate classroom?**

- ◯ Yes
- ◯ No

*** 3. Please explain your answer.**

*** 4. What is your gender?**

- ◯ Female
- ◯ Male
- ◯ Other (please specify)

*** 5. Please indicate your age today.**

- ◯ 18 years old
- ◯ 19 years old
- ◯ 20 years old
- ◯ 21 years old
- ◯ 22 years old
- ◯ 23 years old - 27 years old
- ◯ 28 years old - 32 years old
- ◯ 33 years old - 37 years old
- ◯ 38 years old - 42 years old
- ◯ 43 years old - 47 years old
- ◯ 48 years old - 52 years old
- ◯ 53 years old - 57 years old
- ◯ 58 years old - 62 years old
- ◯ 63 years old or older
- ◯ Other (please specify)

* 6. Please indicate your race (mark one or more boxes).

- [ ] White
- [ ] Black, African American, or Negro
- [ ] Hispanic, Latino, or Spanish
- [ ] American Indian or Alaska Native
- [ ] Asia Indian
- [ ] Chinese
- [ ] Filipino
- [ ] Japanese
- [ ] Korean
- [ ] Vietnamese
- [ ] Other Asian, not listed
- [ ] Native Hawaiian
- [ ] Guamanian or Chamorro
- [ ] Samoan
- [ ] Other Pacific Islander, not listed

Other (please specify)

*** 7. In the situation you will describe, please select your status in the class**

- ◯ student
- ◯ teacher

* 8. What is your gender?

- ◯ Female
- ◯ Male
- ◯ Other (please specify)

* 9. Please indicate your age today.

- ◯ 18 years old
- ◯ 19 years old
- ◯ 20 years old
- ◯ 21 years old
- ◯ 22 years old
- ◯ 23 years old - 27 years old
- ◯ 28 years old - 32 years old
- ◯ 33 years old - 37 years old
- ◯ 38 years old - 42 years old
- ◯ 43 years old - 47 years old
- ◯ 48 years old - 52 years old
- ◯ 53 years old - 57 years old
- ◯ 58 years old - 62 years old
- ◯ 63 years old or older
- ◯ Other (please specify)

* 10. Please indicate your race (mark one or more boxes).

- [ ] White
- [ ] Black, African American, or Negro
- [ ] Hispanic, Latino, or Spanish
- [ ] American Indian or Alaska Native
- [ ] Asia Indian
- [ ] Chinese
- [ ] Filipino
- [ ] Japanese
- [ ] Korean
- [ ] Vietnamese
- [ ] Other Asian, not listed
- [ ] Native Hawaiian
- [ ] Guamanian or Chamorro
- [ ] Samoan
- [ ] Other Pacific Islander, not listed

Other (please specify)

11. What was your collegiate level at the time of the situation?

- ◯ Freshman
- ◯ Sophomore
- ◯ Junior
- ◯ Senior
- ◯ Other (please specify)

12. (Your next three answers are very important for understanding the physical environment, teaching, and learning.) Please describe, in vivid detail, the situation that provides the best example of a time in which you acted in response to the shortcomings of the physical classroom:

Describe the physical classroom environment and its deficiencies-

13. Describe your actions concerning that issue(s)-

14. Describe whether your actions were an effective remedy-

15. After the day you first acted, how often did you perform some actions in response to the shortcomings of that physical classroom concerning that issue(s)?

- ◯ not again
- ◯ rarely
- ◯ sometimes
- ◯ most of the time
- ◯ always

16. Please explain what influenced the frequency of your actions

17. Overall, how would you rate your experience of the entire course?

- ◯ one of my worst courses
- ◯ below average of my courses
- ◯ at the average of my courses
- ◯ above average of my courses
- ◯ one of my best courses

18. Why did you rate the course as you did?

19. Considering your entire learning experience in this course (for example, studying for exams, classtime, meeting with the Professor during office hours, study group meetings, etc...), how significant to you are the corrective actions that you did (or continue to do)?

- ◯ not at all significant
- ◯ a little significant
- ◯ neither significant nor insignificant
- ◯ a lot significant
- ◯ entirely significant

20. Why did you rate the level of significance of your corrective actions as you did?

21. Generally, how would you describe your level of motivation to do well in this course?

- ◯ Very low
- ◯ Low
- ◯ Moderate
- ◯ High
- ◯ Very high

*** 22. Can you describe another undergraduate classroom where you performed corrective actions in response to the physical classroom environment, within the last year?**

- ◯ yes
- ◯ no

23. What was your collegiate level at the time of the next situation you will describe?

- ◯ Freshman
- ◯ Sophomore
- ◯ Junior
- ◯ Senior
- ◯ Other (please specify)

24. (Your next three answers are very important for understanding the physical environment, teaching, and learning.) Please describe, in vivid detail, the situation that provides the best example of a time in which you acted in response to the shortcomings of the physical classroom:

Describe the physical classroom environment and its deficiencies-

25. Describe your actions concerning that issue(s)-

26. Describe whether your actions were an effective remedy-

27. After the day you first acted, how often did you perform some actions in response to the shortcomings of that physical classroom concerning that issue(s)?

- ◯ not again
- ◯ rarely
- ◯ sometimes
- ◯ most of the time
- ◯ always

28. Please explain what influenced the frequency of your actions

29. Overall, how would you rate your experience of the entire course?

- ◯ one of my worst courses
- ◯ below average of my courses
- ◯ at the average of my courses
- ◯ above average of my courses
- ◯ one of my best courses

30. Why did you rate the course as you did?

31. Considering your entire learning experience in this course (for example, studying for exams, classtime, meeting with the Professor during office hours, study group meetings, etc...), how significant to you are the corrective actions that you did (or continue to do)?

- ◯ not at all significant
- ◯ a little significant
- ◯ neither significant nor insignificant
- ◯ a lot significant
- ◯ entirely significant

32. Why did you rate the level of significance of your corrective actions as you did?

33. Generally, how would you describe your level of motivation to do well in this course?

- ◯ Very low
- ◯ Low
- ◯ Moderate
- ◯ High
- ◯ Very high

*** 34. Can you describe another undergraduate classroom where you performed corrective actions in response to the physical classroom environment, within the last year?**

- ◯ yes
- ◯ no

35. What was your collegiate level at the time of the final situation you will describe?

- ◯ Freshman
- ◯ Sophomore
- ◯ Junior
- ◯ Senior
- ◯ Other (please specify)

36. (Your next three answers are very important for understanding the physical environment, teaching, and learning.) Please describe, in vivid detail, the situation that provides the best example of a time in which you acted in response to the shortcomings of the physical classroom:

Describe the physical classroom environment and its deficiencies-

37. Describe your actions concerning that issue(s)-

38. Describe whether your actions were an effective remedy-

39. After the day you first acted, how often did you perform some actions in response to the shortcomings of that physical classroom concerning that issue(s)?

- ◯ not again
- ◯ rarely
- ◯ sometimes
- ◯ most of the time
- ◯ always

40. Please explain what influenced the frequency of your actions

41. Overall, how would you rate your experience of the entire course?

- ◯ one of my worst courses
- ◯ below average of my courses
- ◯ at the average of my courses
- ◯ above average of my courses
- ◯ one of my best courses

42. Why did you rate the course as you did?

43. Considering your entire learning experience in this course (for example, studying for exams, classtime, meeting with the Professor during office hours, study group meetings, etc...), how significant to you are the corrective actions that you did (or continue to do)?

- ◯ not at all significant
- ◯ a little significant
- ◯ neither significant nor insignificant
- ◯ a lot significant
- ◯ entirely significant

44. Why did you rate the level of significance of your corrective actions as you did?

45. Generally, how would you describe your level of motivation to do well in this course?

- ◯ Very low
- ◯ Low
- ◯ Moderate
- ◯ High
- ◯ Very high

* 46. What is your gender?

- ◯ Female
- ◯ Male
- ◯ Other (please specify)

* 47. Please indicate your age today.

- ◯ 18 years old
- ◯ 19 years old
- ◯ 20 years old
- ◯ 21 years old
- ◯ 22 years old
- ◯ 23 years old - 27 years old
- ◯ 28 years old - 32 years old
- ◯ 33 years old - 37 years old
- ◯ 38 years old - 42 years old
- ◯ 43 years old - 47 years old
- ◯ 48 years old - 52 years old
- ◯ 53 years old - 57 years old
- ◯ 58 years old - 62 years old
- ◯ 63 years old or older
- ◯ Other (please specify)

*** 48. Please indicate your race (mark one or more boxes).**

- [ ] White
- [ ] Black, African American, or Negro
- [ ] Hispanic, Latino, or Spanish
- [ ] American Indian or Alaska Native
- [ ] Asia Indian
- [ ] Chinese
- [ ] Filipino
- [ ] Japanese
- [ ] Korean
- [ ] Vietnamese
- [ ] Other Asian, not listed
- [ ] Native Hawaiian
- [ ] Guamanian or Chamorro
- [ ] Samoan
- [ ] Other Pacific Islander, not listed

Other (please specify)

49. At the time of the situation you will describe, what was your overall university undergraduate teaching experience?

- ◯ I had taught less than one complete course of classes
- ◯ I had taught from one and six complete courses
- ◯ I had taught from seven to twelve complete courses
- ◯ I had taught from thirteen to thirty complete courses
- ◯ I had taught over thirty complete courses
- ◯ Other (please specify)

50. At the time of the situation, how many times had you previously taught this particular course?

- ◯ This was my first time teaching this particular course.
- ◯ I had taught this particular course once
- ◯ I had taught this particular course more than once

51. (Your next three answers are very important for understanding the physical environment, teaching, and learning.) Please describe, in vivid detail, the situation that provides the best example of a time in which you acted in response to the shortcomings of the physical classroom:

Describe the physical classroom environment and its deficiencies-

52. Describe your actions concerning that issue(s)-

53. Describe whether your actions were an effective remedy-

54. After the day you first acted, how often did you perform some actions in response to the shortcomings of that physical classroom concerning that issue(s)?

- ◯ not again
- ◯ rarely
- ◯ sometimes
- ◯ most of the time
- ◯ always

55. Please explain what influenced the frequency of your actions

56. Overall, how would you rate your experience of the entire course?

- ◯ one of my worst courses
- ◯ below average of my courses
- ◯ at the average of my courses
- ◯ above average of my courses
- ◯ one of my best courses

57. Why did you rate the course as you did?

58. Considering your entire teaching experience for this course (for example, preparing your lesson plan, creating assessments, classtime, meeting with students during office hours, etc...), how significant to you are the corrective actions that you did (or continue to do)?

- ◯ not at all significant
- ◯ a little significant
- ◯ neither significant nor insignificant
- ◯ a lot significant
- ◯ entirely significant

59. Why did you rate the level of significance of your corrective actions as you did?

60. Generally, how would you describe your level of motivation to teach this course well?

- ◯ Very low
- ◯ Low
- ◯ Moderate
- ◯ High
- ◯ Very high

*** 61. Can you describe another undergraduate classroom where you performed corrective actions in response to the physical classroom environment, within the last year?**

- ◯ yes
- ◯ no

62. At the time of the next situation you will describe, what was your overall university undergraduate teaching experience?

- ◯ I had taught less than one complete course of classes
- ◯ I had taught from one and six complete courses
- ◯ I had taught from seven to twelve complete courses
- ◯ I had taught from thirteen to thirty complete courses
- ◯ I had taught over thirty complete courses
- ◯ Other (please specify)

63. At the time of the situation, how many times had you previously taught this particular course?

- ◯ This was my first time teaching this particular course.
- ◯ I had taught this particular course once
- ◯ I had taught this particular course more than once

64. (Your next three answers are very important for understanding the physical environment, teaching, and learning.) Please describe, in vivid detail, the situation that provides the best example of a time in which you acted in response to the shortcomings of the physical classroom:

Describe the physical classroom environment and its deficiencies-

65. Describe your actions concerning that issue(s)-

66. Describe whether your actions were an effective remedy-

67. After the day you first acted, how often did you perform some actions in response to the shortcomings of that physical classroom concerning that issue(s)?

- ◯ not again
- ◯ rarely
- ◯ sometimes
- ◯ most of the time
- ◯ always

68. Please explain what influenced the frequency of your actions

69. Overall, how would you rate your experience of the entire course?

- ◯ one of my worst courses
- ◯ below average of my courses
- ◯ at the average of my courses
- ◯ above average of my courses
- ◯ one of my best courses

70. Why did you rate the course as you did?

71. Considering your entire teaching experience for this course (for example, preparing your lesson plan, creating assessments, classtime, meeting with students during office hours, etc...), how significant to you are the corrective actions that you did (or continue to do)?

- ◯ not at all significant
- ◯ a little significant
- ◯ neither significant nor insignificant
- ◯ a lot significant
- ◯ entirely significant

72. Why did you rate the level of significance of your corrective actions as you did?

73. Generally, how would you describe your level of motivation to teach this course well?

- ◯ Very low
- ◯ Low
- ◯ Moderate
- ◯ High
- ◯ Very high

*** 74. Can you describe another undergraduate classroom where you performed corrective actions in response to the physical classroom environment, within the last year?**

- ◯ yes
- ◯ no

75. At the time of the final situation you will describe, what was your overall university undergraduate teaching experience?

- ◯ I had taught less than one complete course of classes
- ◯ I had taught from one and six complete courses
- ◯ I had taught from seven to twelve complete courses
- ◯ I had taught from thirteen to thirty complete courses
- ◯ I had taught over thirty complete courses
- ◯ Other (please specify)

76. At the time of the situation, how many times had you previously taught this particular course?

- ◯ This was my first time teaching this particular course.
- ◯ I had taught this particular course once
- ◯ I had taught this particular course more than once

77. (Your next three answers are very important for understanding the physical environment, teaching, and learning.) Please describe, in vivid detail, the situation that provides the best example of a time in which you acted in response to the shortcomings of the physical classroom:

Describe the physical classroom environment and its deficiencies-

78. Describe your actions concerning that issue(s)-

79. Describe whether your actions were an effective remedy-

80. After the day you first acted, how often did you perform some actions in response to the shortcomings of that physical classroom concerning that issue(s)?

- ◯ not again
- ◯ rarely
- ◯ sometimes
- ◯ most of the time
- ◯ always

81. Please explain what influenced the frequency of your actions

82. Overall, how would you rate your experience of the entire course?

- ◯ one of my worst courses
- ◯ below average of my courses
- ◯ at the average of my courses
- ◯ above average of my courses
- ◯ one of my best courses

83. Why did you rate the course as you did?

84. Considering your entire teaching experience for this course (for example, preparing your lesson plan, creating assessments, classtime, meeting with students during office hours, etc...), how significant to you are the corrective actions that you did (or continue to do)?

- ◯ not at all significant
- ◯ a little significant
- ◯ neither significant nor insignificant
- ◯ a lot significant
- ◯ entirely significant

85. Why did you rate the level of significance of your corrective actions as you did?

86. Generally, how would you describe your level of motivation to teach this course well?

- ◯ Very low
- ◯ Low
- ◯ Moderate
- ◯ High
- ◯ Very high

87. Do you currently attend or teach at Boston University, Harvard University, Massachusetts Institute of Technology, Boston College, Suffolk University, Lesley University, University of Massachusetts in Boston, or Northeastern University?

- ◯ Yes
- ◯ No

Other (please explain)

88. If you would like to enter the drawing for one of three randomly selected prizes (an Apple gift card in the amount to purchase one IPOD Shuffle 2 gigabytes, an EBay gift card for $25.00 or an Amazon gift card for $15.00) please list your email address below. If randomly chosen, the gift card code will be sent to the email address provided:

END OF THE SURVEY---- Thank you for your participation!

Please select “DONE” below to submit and exit.

This research is about *corrective* actions to remedy short-comings in the physical undergraduate classroom, and the student learning experience.

Examples of student *corrective* actions are:
efforts to lean forward to see or hear or be heard;
efforts to accommodate writing or computer use at their seat;
efforts to stay warm or cool enough;
efforts to modify the lighting or quality of air;
efforts to rearrange furniture;
efforts required to adequately communicate with the teacher;
efforts required to form classroom working groups with other students when desired.

Please know that your survey responses will be edited and coded so that no information will be published that will identify you, your associates, any location, any institution or person.

1. Did you do any actions like these today? [Please check one]

O Yes **O** No

a. Please explain your answer.

2. Have you done any actions like these before in this course? [Please check one]

O Yes **O** No

a. Please explain your answer.

3. If you answered 'Yes" to question 2 above, how much is your overall course experience influenced by the corrective actions that you did (or continue to do)? [Please check one]

O not at all
O a little
O neither influenced nor did not influence
O a lot
O entirely

a. Please explain your answer.

4. Within the last 12 months have you performed corrective actions in another course in order to make up for the shortcomings of a physical undergraduate classroom? [Please check one]

O Yes **O** No

a. Please explain your answer.

5. What is your gender?

O Female **O** Male

6. Please indicate your age today.[Please select one]

O 18 yrs. **O** 19 yrs. **O** 20 yrs. **O** 21 yrs. **O** 22 yrs. **O** 23 - 28 yrs. **O** over 28 yrs.

7. Please indicate your race. [mark one or more boxes]

O White **O** Black, African American, or Negro **O** Hispanic, Latino,or Spanish **O** Japanese
O Asia Indian **O** Chinese **O** Filipino **O** Amer. Indian or Alaska Native
O Korean **O** Vietnamese **O** Other Asian, not listed **O** Native Hawaiian
O Guamanian or Chamorro **O** Samoan **O** Others not listed

End- Thank you for your participation!

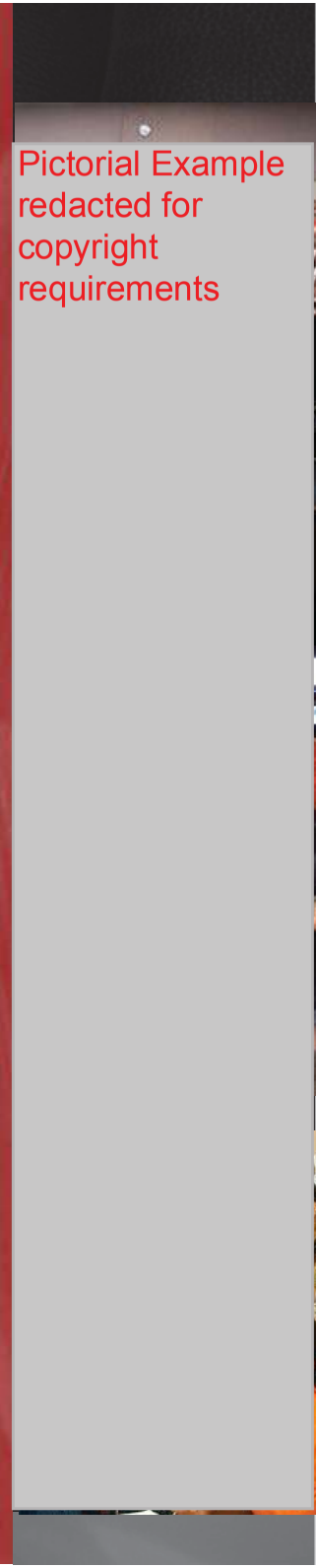
Appendix D

PROFESSOR - 02
Unstructured Interview - January 20, 2014 10AM - online

Remedial Responses to the Physical University Classroom and how they Shape Experiences

MIKAEL POWELL

PhD in Educational Studies, Interdisciplinary Studies
Lesley University, Registered Architect, Interior Designer



A. INTRODUCTION
B. CONSENT
C. VOLUNTARY NATURE
D. UNSTRUCTURED INTERVIEW – 30 MINUTES

   This is an open-ended or un-structured interview. The goal is to develop an understanding of the language and culture of the phenomenon. I look for your meaning, to see the world from your viewpoint, your attitudes and values.

E. ANY QUESTIONS?

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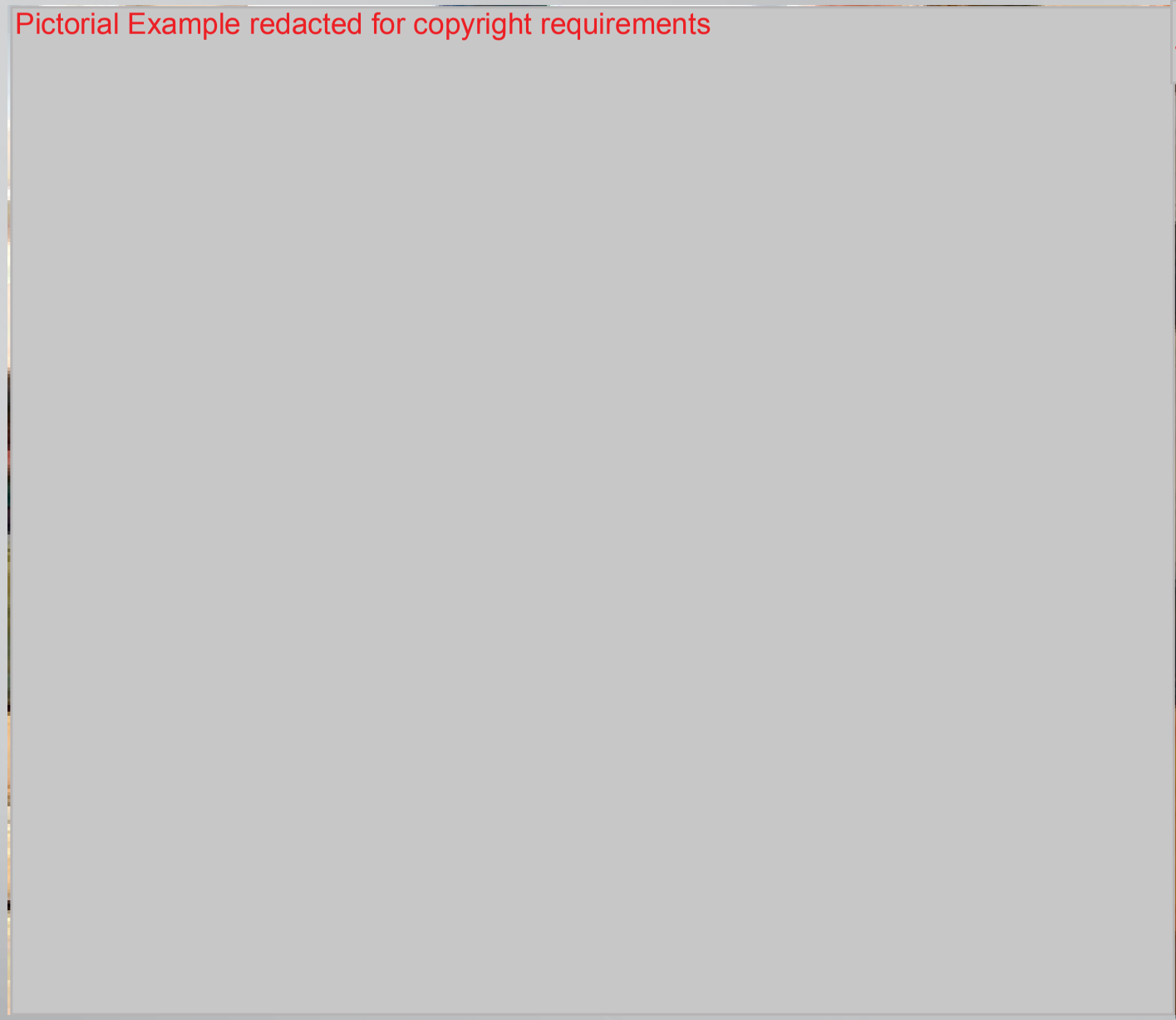
Remedial Responses to the Physical University Classroom and how they Shape Experiences

Pictorial Example redacted for copyright requirements

a. Remedial behaviors affecting the *Function* of undergraduate teaching. Those actions that seek to correct the constraint of teaching methods, the effective operation of teaching variables such as communication and interrelationships, the inadequacy of the technological tools employed in the space, and personal adaptive modifications.

b. Remedial behaviors affecting the *Mood* for undergraduate teaching. Those actions that seek to correct the adverse impression of classroom design, theme, density, environmental comfort, and the dissonance between the learning theory presented and the actualized.

Remedial Responses to the Physical University Classroom and how they Shape Experiences



Pictorial Example redacted for copyright requirements

EFFORTS BY THE PROFESSOR TO ADAPT LESSON PLAN OR TEACHING APPROACH DUE TO
TO LACK OF WRITING SURFACE OR ABILITY FOR NORMAL COMPUTER USE

Remedial Responses to the Physical University Classroom and how they Shape Experiences

Remedial Responses to the Physical University Classroom and how they Shape Experiences

MODIFICATIONS BY THE PROFESSOR TO CORRECT THE ENVIRONMENT TO SEE

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Pictorial Example redacted for copyright requirements

Remedial Responses to the Physical University Classroom and how they Shape Experiences

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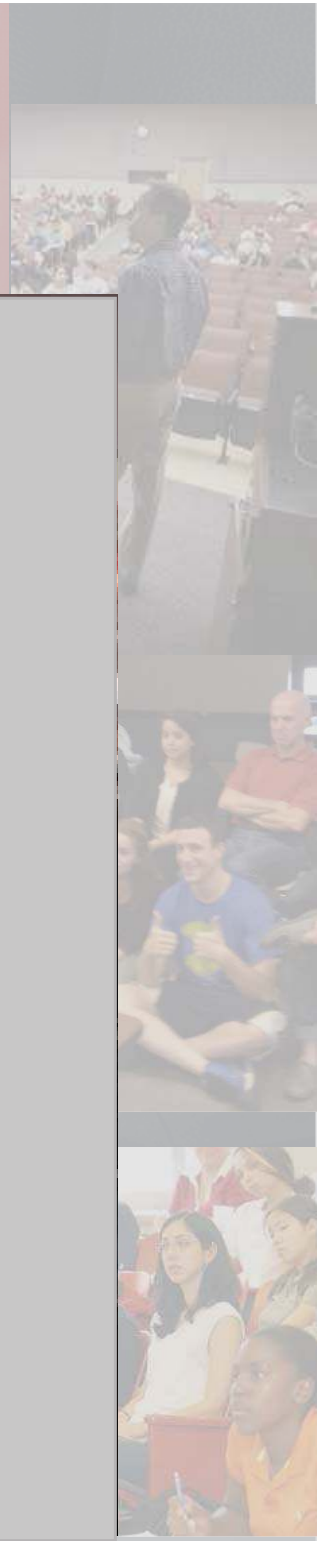
THE PROFESSOR MODIFYING TEACHING LESSON PLAN OR TEACHING APPROACH TO FIT THE CLASSROOM



Remedial Responses to the Physical University Classroom and how they Shape Experiences

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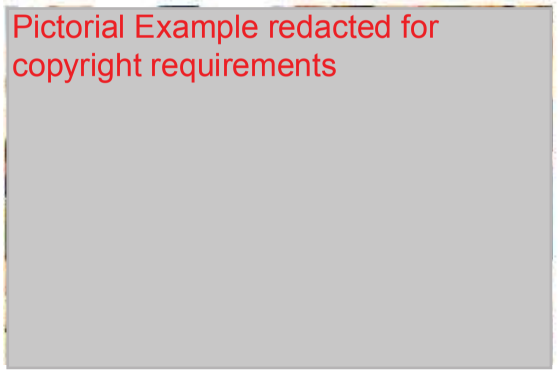
Pictorial Example redacted for copyright requirements

THE PROFESSOR MODIFYING THE ROOM FOR ENVIRON-MENTAL COMFORT

Remedial Responses to the Physical University Classroom and how they Shape Experiences

Pictorial Example redacted for copyright requirements

THE PROFESSOR'S EFFORTS TO FACILITATE STUDENT GROUP FORMATION OR TO MODIFY TEACHING APPROACH OR LESSON PLAN FOR SUCH



Hi!

I am a PhD in Educational Studies candidate researching undergraduate teaching and learning in the classroom environment. Specifically, I am interested in *remedial* or *corrective* responses to the physical undergraduate classroom and the teaching and learning experience.

Examples of corrective responses are: efforts by students to lean forward to see or hear or be heard; efforts to accommodate writing or computer use at their seat; efforts to stay warm or cool; and efforts to modify the lighting or quality of air. Other examples of corrective responses are: efforts to rearrange furniture; changing or altering the lesson plan, class activity or manner of teaching due to the classroom environment; efforts required to allow adequate communication and interaction between teacher and students, and between students; actions required to form working groups when desired.

I am soliciting for participation in an Online Survey and/or Online Focus Groups from **Professors** and from **undergraduates** (and 1st year graduate students who were undergraduates within a year).
Both the Online Survey and the Online Focus Groups ask you to describe your experiences (within the last year), of corrective responses to the physical undergraduate classroom environment. The goal is to understand the impact of these actions on the experience of teaching and learning. Please know that your responses will be edited and coded so that no information will be published that will identify you, your associates, any location, any institution or person.

To participate in the Online Survey, please go to
https://www.surveymonkey.com/s/CR4

For more information on the Online Focus Groups, please go to
https://www.surveymonkey.com/s/CR5
For more information you can check out the FACEBOOK page at
https://www.facebook.com/pages/Research-Undergraduate-Teaching-and-Learning-Despite-Your-Classroom/489005634525255

If you know others that are appropriate to participate, please forward the online links. We hope that results of this study will help to improve the university classroom environment.

Figure A3.

Thanks,
Mikael Powell, PhD candidate, Lesley University
mpowell5@lesley.edu
P.S. Incidentally, those who participate in the survey or focus group can choose to enter a drawing for one of three randomly selected prizes.

What are Corrective Actions in Response to the Physical Undergraduate Class...

Examples of corrective actions are: efforts to lean forward to see or hear or be heard; efforts by students to accommodate writing or computer use at their seat; efforts to stay warm or cool enough; and efforts to modify the lighting or quality of air.

Other examples of corrective actions are: efforts to rearrange furniture; changing or altering the lesson plan, class activity or manner of teaching due to the classroom environment; efforts required to allow adequate communication and interaction between teacher and students, and between students; actions required to form working groups when desired.

The Online Interview will be unstructured, but I hope to listen to your perceptions, opinions, beliefs, and attitudes regarding actions performed by students or teachers to correct shortcomings in the physical classroom of undergraduate students. The goal is to understand the impact of these actions on the experience of teaching and learning. We hope that results of this study will help to improve the university classroom environment.

If you agree to be part of the research study, I will ask you to participate in a 30- minute Online Interview at a date and time convenient to you. Usually this is AUDIO ONLY, but may be video as well, if you prefer. We are planning the Online interview for some time within the next few weeks at your convenience. Please know that your responses will be edited and coded so that NO INFORMATION WILL BE PUBLISHED THAT WILL IDENTIFY YOU, YOUR ASSOCIATES, ANY LOCATION, ANY INSTITUTION OR PERSON.

*** 1. Within the last 12 months have you acted in order to make up for the shortcomings of a physical undergraduate classroom?**

- ◯ Yes
- ◯ No

Consent to Participate in a Research Study

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Mikael Powell, a student at Lesley University, Graduate School of Education, invites you be part of a research project that he will conduct in order to complete requirements for a doctoral degree. Gene Diaz, Ph.D. supervises him. The purpose of the study is to look at actions undertaken to make up for deficiencies in the physical classroom and how they might affect the overall classroom experience. The researcher funds the study internally. We are asking you to participate because you have answered an advertisement for this research and within the last year, you have been associated with teaching or learning in an undergraduate classroom.

DESCRIPTION OF YOUR INVOLVEMENT

If you agree to be part of the research study, we will ask you to participate in one Online Interview at a date and time convenient to you. We are planning for some time within the next few weeks. We will meet together online to discuss corrective responses to the physical classroom environment. The discussion topics include types of actions performed to correct the shortcomings of the university undergraduate classroom and how they might affect the overall class experience. I will guide the discussion, but it is wholly unstructured. The Online Interview will last about 30 MINUTES and we will capture the audio of the Interview to make sure that the written transcript is accurate.

You must agree to be audio-taped to participate in the Online Interview. To protect privacy, we will destroy the electronic audio file after we confirm the written transcript. YOUR RESPONSES WILL BE EDITED AND CODED TO ENSURE THAT NEITHER YOU, NOR ANY OTHER PERSON, ORGANIZATION OR LOCATION CAN BE IDENTIFIED; that revised transcript will be used as the foundation for research.

BENEFITS

While you may not receive a direct benefit from participating in this research, some people find sharing their stories to be a valuable experience. WE HOPE THAT THIS STUDY WILL CONTRIBUTE TO THE IMPROVEMENT OF UNDERGRADUATE CLASSROOM ENVIRONMENTS.

COMPENSATION

Those who agree to participate in the Online Interview can choose whether to enter a drawing for an Apple gift card in the amount to purchase one IPOD Shuffle 2 gigabytes, an EBay gift card for $25.00 or an Amazon gift card for $15.00. If randomly chosen, the gift card code will be sent to your email address. Continued participation during the Online Interview does not affect your eligibility for the drawing.

RISKS AND DISCOMFORTS

Answering questions about your experiences can be difficult. Some persons may find being on audiotape uncomfortable. The interviewer will have a list of local agencies that can provide you with additional information or support if you are interested.

CONFIDENTIALITY

We plan to publish the results of this study, BUT WE WILL NOT INCLUDE ANY INFORMATION THAT WILL IDENTIFY YOU, YOUR ASSOCIATES OR ANY INSTITUTION.

Record of your SKYPE address and email address will be destroyed after this research has concluded.

There are some reasons why people other than the researchers may need to see information you provided as part of the study. This includes organizations responsible for making sure the research is done safely and properly, including the Lesley University institutional review board. Also, if you tell us something that makes us believe that you or others have been or may be physically harmed, we may report that information to the appropriate agencies.

VOLUNTARY NATURE OF THE STUDY

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer an Interview question for any reason. You may ask questions about this research at any time.

CONTACT INFORMATION

If you have questions about this research, including questions about the optional drawing or scheduling of the Online Interview, you can contact Mikael Powell of Lesley University, P.O. Box #2821, Pawtucket, RI 02861, mpowell5@lesley.edu phone 508.399.7343. You can also contact his faculty advisor, Gene Diaz, Ph.D., Lesley University, 29 Everett Street, Cambridge, MA 02138 phone 617.349.8426.

If you have any questions about your rights as a research participant, please contact Lesley University Institutional Review Board, Robyn Cruz, 29 Everett Street, Cambridge, MA, phone (617) 349-8518 rcruz@lesley.edu

CONSENT

By electronically signing this document, you are agreeing to be in the study. Please print this document for your records. One copy of the electronic response will be kept with the study records and can be emailed to you upon your request. Be sure that questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

*** 2. It is required that you certify your consent to participate by submitting an electronic signature. To certify your consent, read the text below, select your response, provide your electronic signature (type your name) and select "Next".**

"I am at least 18 years of age and I agree to participate in the Online Interview. As part of my consent, I agree to be audio-taped. I assert that I have SKYPE (5.0 or higher) loaded onto my computer, because that will be the media for the researcher to show supportive information during the interview and to record the audio ."

- ◯ I certify that I give my consent to participate in the Online Interview with my electronic signature.
- ◯ I do not wish to participate in the Online Interview.

* 3. ELECTRONIC SIGNATURE

Please type your Name to provide your ELECTRONIC SIGNATURE	
please list your Skype address (for the Online Interview)	
please list your email address (scheduling information for the Online Interview will be sent to your email address)	

4. What is your gender?

- ◯ Female
- ◯ Male
- ◯ Other (please specify)

* 5. Please indicate your age today.

- ◯ 18 years old
- ◯ 19 years old
- ◯ 20 years old
- ◯ 21 years old
- ◯ 22 years old
- ◯ 23 years old - 27 years old
- ◯ 28 years old - 32 years old
- ◯ 33 years old - 37 years old
- ◯ 38 years old - 42 years old
- ◯ 43 years old - 47 years old
- ◯ 48 years old - 52 years old
- ◯ 53 years old - 57 years old
- ◯ 58 years old - 62 years old
- ◯ 63 years old or older
- ◯ Other (please specify)

* 6. Please indicate your race (mark one or more boxes).

- [ ] White
- [ ] Black, African American, or Negro
- [ ] Hispanic, Latino, or Spanish
- [ ] American Indian or Alaska Native
- [ ] Asia Indian
- [ ] Chinese
- [ ] Filipino
- [ ] Japanese
- [ ] Korean
- [ ] Vietnamese
- [ ] Other Asian, not listed
- [ ] Native Hawaiian
- [ ] Guamanian or Chamorro
- [ ] Samoan
- [ ] Other Pacific Islander, not listed

Other (please specify)

*** 7. Please select your status in the classroom**

- ◯ Student
- ◯ Teacher

Other (please specify)

END OF ONLINE INTERVIEW CONSENT FORM----Thank You! We will notify you to sc...

8. If you would like to enter the drawing for one of three randomly selected prizes (an Apple gift card in the amount to purchase one IPOD Shuffle 2 gigabytes, an EBay gift card for $25.00 or an Amazon gift card for $15.00) please indicate "Yes". If randomly chosen, the gift card code will be sent to the email address provided with the electronic signature.

- ◯ Yes
- ◯ No

Please select “DONE” below to submit and exit.

Seeking participation from UNDERGRADS --- What are Corrective Ac...

This research is about corrective actions to remedy short-comings in the physical undergraduate classroom, and the student learning experience. Examples of corrective actions are: efforts to lean forward to see or hear or be heard; efforts by students to accommodate writing or computer use at their seat; efforts to stay warm or cool enough; and efforts to modify the lighting or quality of air.

Note: The online survey is developed to skip questions based upon previous survey answers.

Other examples of corrective actions are: efforts to rearrange furniture; changing or altering the lesson plan, class activity or manner of teaching due to the classroom environment; efforts required to allow adequate communication and interaction between teacher and students, and between students; actions required to form working groups when desired.

This Survey asks about your classroom experiences of learning as an undergraduate (whether or not you have performed corrective actions). The Marketing Research 3401 course was chosen because it is taught in several varieties of classrooms types - from fixed auditorium seating to seminar style seating to a level floor with loose tables and chairs. The goal of this survey is to better understand the impact of the classroom environment and student actions, on students' overall experience of learning in this course. We hope that results of this study will help to improve the university classroom environment.

Please know that your responses will be edited and coded so that NO INFORMATION WILL BE PUBLISHED THAT WILL IDENTIFY YOU, YOUR ASSOCIATES, ANY LOCATION, ANY INSTITUTION OR PERSON.

Consent to Participate in a Research Study

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Mikael Powell, a student at Lesley University, Graduate School of Education, invites you be part of a research project that he will conduct in order to complete requirements for a doctoral degree. Gene Diaz, Ph.D. supervises him. The purpose of the study is to look at corrective actions undertaken to make up for deficiencies in the physical classroom and how they might affect the overall classroom experience. The researcher funds the study internally. We are asking you to participate because you are at least 18 years old, have read the preceding page or an advertisement for this research and are enrolled in Marketing 3401 this semester. The survey link will be active for the next few days.

DESCRIPTION OF YOUR INVOLVEMENT

If you agree to be part of the research study, we will ask you to describe your experiences in the physical classroom and your overall experience of learning in this course. The survey should take 10 – 15 minutes to complete.

BENEFITS

While you may not receive a direct benefit from participating in this research, some people find sharing their stories to be a valuable experience. We hope that this study will contribute to the improvement of classroom environments.

RISKS AND DISCOMFORTS

Answering questions about your experiences can be difficult. You may choose not to answer any question and you can stop your participation in the survey at any time. Should you personally need support after relaying your experiences, please contact your healthcare provider for the appropriate services.

COMPENSATION

Those who participate in the survey can choose whether to enter the drawing at the end of the survey for one of three randomly selected prizes: An Apple gift card in the amount to purchase one IPOD Shuffle 2 gigabytes, an EBay gift card for $25.00 or an Amazon gift card for $15.00. If randomly chosen, the gift card code will be sent to the email address provided. Your eligibility is not affected if you choose not to answer certain questions.

CONFIDENTIALITY

We plan to publish the results of this study, BUT WILL NOT INCLUDE ANY INFORMATION THAT WILL IDENTIFY YOU, YOUR ASSOCIATES, ANY LOCATION, ANY INSTITUTION OR PERSON. To protect privacy, your responses will be edited and coded to avoid recognition; that revised document will be used as the foundation for research.

There are some reasons why people other than the researchers may need to see information you provided as part of the study. This includes organizations responsible for making sure the research is done safely and properly, including Lesley University Institutional Review Board. Also, if you tell us something that makes us believe that you or others have been or may be physically harmed, we may report that information to the appropriate agencies.

VOLUNTARY NATURE OF THIS STUDY

Participating in this study is completely voluntary. You may change your mind and stop at any time. You may choose not to answer a question for any reason or enter "No answer" in a text box. You may ask questions about this research at any time.

CONTACT INFORMATION

If you have questions about this research, including questions about the optional drawing, you can contact Mikael Powell of Lesley University, P.O. Box #2821, Pawtucket, RI 02861, mpowell5@lesley.edu phone 508.399.7343. You can also contact his faculty advisor, Gene Diaz, Ph.D., Lesley University, 29 Everett Street, Cambridge, MA 02138 phone 617.349.8426.

If you have any questions about your rights as a research participant, please contact Lesley University Institutional Review Board, Robyn Cruz, 29 Everett Street, Cambridge, MA, phone (617) 349-8518 rcruz@lesley.edu or Nan C. Regina, Northeastern University, Human Subject Research Protection, 960 Renaissance Park, Boston, MA 02115-5000, phone 617.373.4588 n.regina@neu.edu .

CONSENT

Please print this page for your reference and be sure that questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

If you do not finish the survey in one sitting, you may come back to it as many times as necessary until you select "DONE".

*** 1.**

- ◯ Yes, I agree to participate
- ◯ No, I do not wish to participate

* 2. Please select your course

- ◯ Marketing Research - [redacted] (Prof. [redacted], in [redacted])
- ◯ Marketing Research - [redacted] (Prof. [redacted] in [redacted])
- ◯ Other

*** 3. Have you done any actions to remedy the shortcomings of your classroom environment this semester in this course?**

- ◯ Yes
- ◯ No

* 4. Please explain your answer.

*** 5. How much is your overall learning in this course influenced by the corrective actions that you did (or continue to do)?**

- ◯ not at all
- ◯ a little
- ◯ neither influenced nor did not influence
- ◯ a lot
- ◯ entirely

Other (please specify)

*** 6. Please explain your answer.**

*** 7. Please list the major events AND their location, that comprise the experience of your learning for M for example, "studying for exam in dorm"; "meeting with the Professor in his office"; etc...).**

*** 8. How important is what happens in the classroom during class time, to your total experience of learning in ?**

- ◯ not at all
- ◯ a little
- ◯ neither important nor not important
- ◯ a lot
- ◯ entirely

Other (please specify)

*** 9. Please explain your answer.**

*** 10. What is your gender?**

- ◯ Female
- ◯ Male
- ◯ Other (please specify)

*** 11. Please indicate your age today.**

- ◯ 18 years old
- ◯ 19 years old
- ◯ 20 years old
- ◯ 21 years old
- ◯ 22 years old
- ◯ 23 years old - 28 years old
- ◯ over 28 years old
- ◯ Other (please specify)

* 12. Please indicate your race (mark one or more boxes).

- [ ] White
- [ ] Black, African American, or Negro
- [ ] Hispanic, Latino, or Spanish
- [ ] American Indian or Alaska Native
- [ ] Asia Indian
- [ ] Chinese
- [ ] Filipino
- [ ] Japanese
- [ ] Korean
- [ ] Vietnamese
- [ ] Other Asian, not listed
- [ ] Native Hawaiian
- [ ] Guamanian or Chamorro
- [ ] Samoan
- [ ] Other Pacific Islander, not listed

Other (please specify)

Copy of page:

*** 13. How much is your overall learning in this course influenced by the corrective actions that you did (or continue to do)?**

- ◯ not at all
- ◯ a little
- ◯ neither influenced nor did not influence
- ◯ a lot
- ◯ entirely

Other (please specify)

*** 14. Please explain your answer.**

Copy of page:

*** 15. Please list the major events AND their location, that comprise the experience of your learning for [redacted] (for example, "studying for exam in dorm"; "meeting with the Professor in his office"; etc...).**

16. How important is what happens in the classroom during class time, to your total experience of learning in [redacted]?

- ◯ not at all
- ◯ a little
- ◯ neither important nor not important
- ◯ a lot
- ◯ entirely

Other (please specify)

*** 17. Please explain your answer.**

Copy of page:

* 18. What is your gender?

- ◯ Female
- ◯ Male
- ◯ Other (please specify)

* 19. Please indicate your age today.

- ◯ 18 years old
- ◯ 19 years old
- ◯ 20 years old
- ◯ 21 years old
- ◯ 22 years old
- ◯ 23 years old - 28 years old
- ◯ over 28 years old
- ◯ Other (please specify)

* 20. Please indicate your race (mark one or more boxes).

- [ ] White
- [ ] Black, African American, or Negro
- [ ] Hispanic, Latino, or Spanish
- [ ] American Indian or Alaska Native
- [ ] Asia Indian
- [ ] Chinese
- [ ] Filipino
- [ ] Japanese
- [ ] Korean
- [ ] Vietnamese
- [ ] Other Asian, not listed
- [ ] Native Hawaiian
- [ ] Guamanian or Chamorro
- [ ] Samoan
- [ ] Other Pacific Islander, not listed

Other (please specify)

END OF SURVEY----------Thank You for your Participation!

21. If you would like to enter the drawing for one of three randomly selected prizes (an Apple gift card in the amount to purchase one IPOD Shuffle 2 gigabytes, an EBay gift card for $25.00 or an Amazon gift card for $15.00) please list your email address below. If randomly chosen, the gift card code will be sent to the email address provided:

Please select “DONE” below to submit and exit.

Consent/*Assent to Participate in a Research Study
Remedial Responses to the Physical University Classroom and how they Shape Experiences
CLASSROOM OBSERVATION/SURVEY

Invitation to participate in a research study
Mikael Powell, a student at Lesley University, Graduate School of Education and under advisement from a Northeastern University faculty member, invites you be part of a research project that he will conduct in order to complete requirements for a doctoral degree. Gene Diaz, Ph.D. supervises him. The purpose of the study is to observe natural classroom behaviors within various undergraduate classroom settings. The researcher funds the study internally. We are asking you to participate because you have been associated with teaching or learning in an undergraduate classroom.

Description of your involvement
If you agree to be part of the research study, you will give your permission to be observed for one class period and then you will be asked to complete a short questionnaire about your classroom experiences. You must agree to be videoed to participate in this research. To protect privacy, we will destroy the electronic video file after we confirm the written class observation document. Your responses in class and on the questionnaire will be edited and coded to ensure that neither you, nor any other person, organization or location can be identified; that revised observation document will be used as the foundation for research.

Benefits and Discomforts
While you may not receive a direct benefit from participating in this research, some people find sharing their ideas in a questionnaire to be a valuable experience. Some persons may find observation by video uncomfortable; we will try to make the videoing as unobtrusive as possible. We hope that this study will contribute to the improvement of undergraduate classroom environments.

Confidentiality
We plan to publish the results of this study, but we will not include any information that will identify you, your associates or any institution.

There are some reasons why people other than the researchers may need to see information you provided as part of the study. This includes organizations responsible for making sure the research is done safely and properly, including Lesley University and Northeastern University institutional review boards.

Voluntary nature of the study
Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to participate in the classroom observation or answer an item on the questionnaire for any reason. You may ask questions about this research at any time. Whether you are a part of this study will not affect your grade.

Contact information
If you have questions about *this research*, you can contact Mikael Powell of Lesley University, P.O. Box #2821, Pawtucket, RI 02861, mpowell5@lesley.edu phone 508.399.7343. You can also contact his faculty advisor, Gene Diaz, Ph.D., Lesley University, 29 Everett Street, Cambridge, MA 02138 phone 617.349.8426

If you have any questions about *your rights as a research participant*, please contact Lesley University Institutional Review Board, Robyn Cruz, 29 Everett Street, Cambridge, MA, phone (617) 349-8518 rcruz@lesley.edu **or** Nan C. Regina, Northeastern University, Human Subject Research Protection, 960 Renaissance Park, Boston, MA 02115-5000, phone 617.373.4588 n.regina@neu.edu .

Consent
By signing this document, you are agreeing to be in the study. You will be given a copy of this document for your records and one copy will be kept with the study records. Be sure that questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

I am 18 years old or older *and I agree to participate in the study. As part of my consent, I agree to be videoed during one class.*

_____ _____
Signature of person agreeing to take part **Date**

_____
Printed name of person above

_____ _____
Signature of person who explained the study to the participant above and obtained consent **Date**

*** TURN TO THE NEXT PAGE *ONLY* IF YOU ARE NOT AT LEAST 18 YEARS OF AGE**

***Assent for students less than 18 years of age**
By signing this document, you are agreeing to be in the study. You will be given a copy of this document for your records and one copy will be kept with the study records. Be sure that questions you have about the study have been answered and that you understand

what you are being asked to do. You may contact the researcher if you think of a question later.

You will need to send this signed form to your parent or legal guardian and have them forward it to the researchers. It will be greatly appreciated if they returned it to the address below, within a week. A stamped envelope and self-addressed return envelope and postage will be provided to you.

I am 17 years old and I agree to participate in the study. As part of my assent, I agree to be videoed during one class.

___ *I give you permission to video me during class time.*
___ *I DO NOT give you permission to video me during class time.*

Student's name **Student's signature**

Signature of person who explained the study to the participant above and obtained assent **Date**

Parent's/Legal Guardian's statement

The study has been explained to me, and I voluntarily consent to allow my child to participate. I have had an opportunity to ask questions. I understand that the investigator listed above will answer future questions I may have about the research. I give my permission for my child to be videoed as described above and participate in this research. If I have questions about this research or my child's rights as a subject, I may call individuals in the Contact Information above.

I will forward this 3-page signed form to Mikael **Powell of Lesley University, P.O. Box #2821, Pawtucket, RI 02861,** mpowell5@lesley.edu within one (1) week of my receipt of the form and I will make a copy of it for my reference.

I am the parent or legal guardian of the child listed above, and I agree to allow participation in the study. As part of my consent, I agree to let my child be videoed during one class.

___ *I give you permission to video my child during class time.*
___ *I DO NOT give you permission to video my child during class time.*

Student's name **Signature of parent or legal guardian**

Name of parent or legal guardian **Date**

Consent/*Assent to Participate in a Research Study
Remedial Responses to the Physical University Classroom and how they Shape Experiences
CLASSROOM OBSERVATION/SURVEY

I DO NOT agree to participate in the study.

_____	_____
Signature of person declining to take part	**Date**
_____	
Printed name of person above	
_____	_____
Signature of person who explained the study to the participant above and obtained consent	**Date**

Appendix H.

[redacted] – Fall 2013

Section 04 **M/W 2:50pm – 4:30pm** *Classroom R*

Professor: [redacted]
Office: [redacted]
Office hours: [redacted]
Phone: [redacted]
Email: [redacted]
Blackboard: [redacted]

E-Text: [redacted] Figure A3. [redacted]

Prerequisites: [redacted]

Course Description
This course is designed to guide you in conducting a market research project from start to finish. The emphasis is upon quantitative market research with the SPSS package as the primary statistical software tool.

Learning Objectives
Students will have the opportunity to:
1. Link marketing research to its role in business organizations.
2. Compare elements of the marketing research process.
3. Design and implement a survey marketing research project.
4. Use SPSS to carry out appropriate statistical analyses, and interpret the results.

Statistical Package (For technical help, contact [redacted])
SPSS is available for free through MyApps using MyFiles to house your data files. On campus, you must use [redacted] secure to access SPSS. Details to access MyApps is provided in Blackboard and in the [redacted] portal. SPSS is also available as a 6-month rental for $35 plus $4.99 download fee. Details on how to access the rental are provided in the Tech Marketplace of [redacted] Portal under "Free and Discounted Software – More Software tab." You must be able to access SPSS in the classroom through either of these options by **Wednesday, September 25, 2013**.

Resource Help
Visit http://www.[redacted] for all of the academic resources available to you.
Feel free to email or make an appointment to see me for research related questions at any time. I am happy to discuss career plans and enjoy debating the merits of marketing/business strategies until someone's face turns blue.

Time Investment
You are expected to arrive to class on time and remain for the full session. All assigned material must be read before it is covered in class. You will be graded on class participation and the ability to work effectively in a team setting. For the days we use SPSS you will need to bring your laptop and have access to SPSS.

Use of Wireless Devices and Mobile Phones in Class
Students are expected to act professionally in the classroom. Laptops are permitted for use during class time for taking notes or for class lab. Use of chat programs, web surfing, texting and other non-class related activities on laptops or mobile phones are strictly prohibited. Failure to adhere to this policy will jeopardize a student's class participation grade. Further, use of mobile phones during examinations is strictly prohibited (see Academic Honesty Policy).

Active Learning
This course is designed to link marketing research concepts to the real-world. The combination of in-class activities and the group project will provide you with avenues to apply almost every concept and tool covered. I encourage you to bring your own perspectives in critically evaluating the rapidly changing face of marketing research. Through use of a range of online tools (i.e., [redacted] databases, Internet, SPSS, [redacted]) you will have the opportunity to demonstrate these skills through individual and group assignments.

Deadlines and Feedback
- There are no makeups.
- If you miss a class please contact a fellow class member to catch up.
- A hardcopy and **identical** electronic copy in a **single file** of all assignments are required. The hardcopy may be handed in to me at the beginning of class on the due date. The soft copy must be emailed by 5pm on the due date. Final reports are due in class the day of your group's presentation.

Grade Structure:		**%**
Exams (45%)	Exam 1	15
	Exam 2	15
	Exam 3	15
Research Project (30%)	Research Proposal	10
	Final Report	15
	Final Presentation	5
Special Topics (10%)	Handout	5
	Oral Component	5
Participation (15%)	In-Class and Team	10
	Online	5
Total		100

Grades are based on:

A =	100% - 93.5%	C =	78.49% - 73.5%
A- =	93.49% - 90.0%	C-=	73.49% - 70.0%
B+ =	89.99% - 88.5%	D+ =	69.99% - 68.5%
B =	88.49% - 83.5%	D =	68.49% - 63.5%
B- =	83.49% - 80.0%	D- =	63.49% - 60.0%
C+ =	79.99% -78.5%	F =	< 60.0%

Exams
The format of each exam will include multiple choice and short answer questions. All lecture, text and supplementary material is covered and exams are cumulative. Not all text material is covered directly in class and it is the student's responsibility to ensure they are familiar with all assigned chapters. No makeup exams are given in this course except under extreme circumstances.

Research Project
The major written component of this course is a quantitative survey-based marketing research project. This project must address a key client research problem or marketing research question of interest to your team. All project topics must be approved by myself. Requirements:

Research Proposal
The research proposal details the marketing research problem and how you propose to investigate this problem. The research proposal is a well constructed 'skeleton' that will be the framework for the final project. The entire research proposal will be submitted and presented in a slide-based presentation. Requirements (see page 58 of your text for an example proposal):

- Background (incorporate multiple secondary data sources to support importance of the problem)
- Objectives
- Study Design

- Areas of Questioning
- Data Analysis
- Personnel Involved (one slide for each team member including photo)
- Specifications/Assumptions
- Timing

Final Report

The final report will reflect the deliverables outlined in the research proposal. This report will be submitted in a traditional written report format. In addition to the areas already outlined in the research proposal you must also include:

- Complete survey
- Description of data collection process
- Analysis and Results (based on the sample output/deliverables)
- Recommendations/Conclusions
- Final Oral Presentation. 10 minutes with full group participation.

Research Project Topic Selection

The research project is a chance to investigate marketing challenges faced by companies of all industries and sizes. Suggestions for how to choose a problem to investigate:

- companies you have worked for or want to work for
- industries you are interested in
- local small businesses
- 'hot topics' (these will be provided in class)

All topics must be reviewed by me and your research proposal, once approved by me; constitutes a promise to your client that must be satisfied. Be careful to only promise what you can deliver.

Teamwork

The ability to manage time and coordinate teams is a capability expected of every business school graduate. Setting expectations and continual clear communication are essential. Letting your team down will have a direct impact upon your final grade. However there is no reason this situation need arise. Teams should make your work easier and I recommend you adopt a few practices:

- Do not do 'task' work during team meetings. Instead review progress and allocate. Each meeting should end with clear goals for each person to achieve before the next meeting. Do the work while apart and come back together to review progress.
- Nominate a team leader who is charged with coordination. This person should be expected to do less 'task' work as a result and more 'managerial' work to coordinate others. It is not an easy role for some people but it can be highly rewarding.
- It is okay for some people to prefer different areas of work such as statistical analysis or presentations. During the group project specialization can make the work more efficient and effective. I recommended you form a group with a diverse skillset.

Special Topics Presentation (3 to a group)

The landscape of marketing research is far too broad to cover in a classroom. This presentation based assignment requires each group to select a topic of current marketing interest to be shared with the class. Your task is to cover the essentials of a marketing research-related topic. The area may be methodological or topical. You must get topic and date approval from me for this presentation. The deadline for approval is **September 18**. Email [redacted] with the subject line "Special Topics Presentation". In the body of the email list include:

(1) the group member's names,
(2) your top three topics
(3) three potential dates to make the presentation

You are required to cover the following in your presentation:

1) What makes this topic important?
2) How are companies and consumers affected?
3) Provide a short real-world case study of how this topic impacted a group/person
4) Who are the leading companies in this field? What careers are relevant?

You must also provide the presentation slides to me and a one-page handout to each class member that summarizes the essence of your talk. **Material presented in the "Special Topics Presentations" is examinable**. Some possible topics (you may suggest your own):

1. mining online reviews
2. fake online identities
3. online data collection compared to face-to-face data collection
4. focus groups
5. primary data collection: observation
6. primary data collection: experiments
7. falsified academic research
8. gamification
9. functional MRI
10. picture/video-based marketing research
11. location-based analytics
12. mobile device data collection and marketing research
13. issues impacting television and new print marketing
14. top 5 market research agencies worldwide
15. top 5 social media analytics companies worldwide
16. ways for consumers to enhance their data privacy
17. identify the top 5 companies that have the most marketing-related consumer data

Each presentation is limited to 10 minutes. I encourage you to cite multiple references and use multimedia in your presentation if you feel it will enhance the message of your talk. Email your presentation and one-page handout to me the day before your presentation ( ). Only two special topics presentations can be delivered per designated class meeting.

Academic Honesty

In class, we spend time covering ethics in general and in terms of your major project. Honesty and integrity are key elements of proper marketing research, and are specifically detailed in the AMA's marketing code of ethics and the Marketing Research Association's code of ethics. is similarly committed to the principles of intellectual honesty and integrity. All members of the Northeastern University are expected to maintain complete honesty in all academic work, presenting only that which is their own work in tests and assignments. If you violate the policy on any assignment or exam, you will be referred to OSCCR. If the OSCCR finding is guilty, ***you will fail the course***. If you have any questions regarding the proper attribution of the work of others contact your professor prior to submitting the work for evaluation.

About the Instructor

Product innovation and analysis of diverse data are my constant interests.

Class Schedule S04

	Class Topic	In-Class	Reading	Work Due
W 9/4	Course Introduction	Class Survey		
M 9/9	Human subjects review The Marketing Research Process Marketing Research Careers Defining the Marketing Research Problem Types of Marketing Research	Intra-group introductions	Chp.1,2,3	
W 9/11	Secondary Data		Chp.4	
M 9/16	Survey Research		Chp.6	
W 9/18	Survey Research,Sampling		Chp.6,13	Submit Special Topics Presentation topic & dates
M 9/23	Sampling		Chp.13	Review Research Proposal, Email Team Project Groups
W 9/25	Review Statistical Analysis Introduce SPSS/Qualtrics Data Scales	Laptops	Chp.10,15	Introduce SPSS
M 9/30	Questionnaire Design	2 presentations Exam 1 review	Chp.11,12	
W 10/2	Exam 1			
M 10/7	Measurement and Scales	2 presentations	Chp.10	
W 10/9	Develop Project Questionnaire	2 presentations		Research Proposal Due
M 10/14	COLUMBUS DAY, NO CLASS			
W 10/16	Basic Data Analysis Field Work/Editing and Coding	2 presentations	Chp.15	
M 10/21	Sample Size Analyzing Associations		Chp.14,13,17	
W 10/23	Comparison of Groups	2 presentations Exam 2 Review	Chp.16	email draft questionnaire
M 10/28	Exam 2		Chp.5	
W 10/30	**Qualitative Research**	**2 presentations**	**Chp.5**	**Begin Data Collection**
M 11/4	Group project work time	2 presentations Laptops		
W 11/6	Qualitative Research			
M 11/11	VETERAN'S DAY, NO CLASS			
W 11/13	Exam 3			
M 11/18	Group project work time	Laptops		
W 11/20	Group project work time	Laptops		
M 11/25	Group project work time	Laptops		
W 11/27	THANKSGIVING			
M 12/2	Final Presentations			Final Report
W 12/4	Final Presentations			Final Report

Observed Class

Appendix I

Classroom R4 observer log:

Chronological progression of multiple representations in class (Ching et.al, 2003)

TIME	TOPIC/ACTION	DISPLAY ARTIFACT	REPRESENTATION ARTIFACT
2:50	Teacher at Front Center; one student is passing out *papers, walking down the length of the rows of **desks; Two students are at **podium at Front Right [Student Group A].	*Concrete conveyor *(Paper Handout);* **Concrete Carriers *(podium, aisle, desks)*	* Texts
2:55	Teacher had turned off the *lights. A **PowerPoint slide presentation is being shown while one student addresses the class and two students stand alongside at podium at Front Right [Student Group A].	*Ambient artifact *(lighting);* **Concrete Conveyor *(projection screen)*	**Texts*(Presentation)*
3:00	The second of the three students in the Front present a *video [Student Group A].	*Concrete Conveyor *(projection screen)*	**Texts*(Video)*
3:05	One new Student is passing out *papers, walking mostly to the ends of the aisle and students are passing the handout down within the rows of **desks; Two new students are at **podium at Front Right [Student Group B].	*Concrete conveyor *(Paper Handout);* **Concrete Carriers *(podium, aisle, desks)*	* Texts
3:10	Presentation continues [Student Group B].		
3:15	PowerPoint continues, but third students presents *short examples and tables to support presentation [Student Group B].	*Concrete Conveyor *(projection screen)*	*Texts*(Presentation)* ; Inscriptions *(tables and short survey examples)*
3:20	Teacher had turned on the *lights and was addressing the class in the front of the room in questions and answers. He hands out** the assignment from the front to those who did not bring theirs and asks the class to meet within the classroom in groups. Students gather all their items and most move to a different area in the room- some to a ***fixed desk and some stand in the aisle. A couple of students climb over desks.	*Concrete Conveyor *(projection screen)*	*Texts*(Presentation)* ; Inscriptions *(tables and short survey examples)*
3:25	Teacher turns off the *lights and starts a **PowerPoint slide presentation while addressing the class. The presentation includes some survey question examples.	*Ambient artifact *(lighting)* ; **Concrete Conveyor *(projection screen).*	**Texts*(Presentation)* ; Inscriptions *(short survey examples)*
3:30	The teacher's presentation continues.		
3:35	The teacher's presentation continues.		
3:40	The teacher has finished the presentation, turned the *lights on and is walking from group to group. He is either standing in the aisle leaning into the group of four or five students, or siting in one of the **fixed seats with students standing /seating beside him, or crouching on the floor talking to the seated students at their level. Students are referring to the ***assignment handout, their ***laptops, and/or their ***cellphones.	*Ambient artifact *(lighting)* ; **Concrete Carriers *(aisle, desks); *** Concrete Conveyors (handouts, laptops, cellphones)*	***Texts*(Source documents online and saved files, and handouts)*
3:45	The same activity continues.		
3:50	The same activity continues.		
3:55	The same activity continues.		
4:00	The same activity continues.		
4:05	The same activity continues.		
4:10	Teacher had turned off the *lights and began a **presentation to address the class from the front of the room. They remain in their group arrangement.	*Ambient artifact *(lighting);* **Concrete Conveyor *(projection screen)*	***Texts(Presentation); Inscriptions (list and tables)* .*
4:15	The teacher's presentation continues.		
4:20	The teacher's presentation concludes and he turns on the *lights. The researcher addresses the class from the last row and invites them to reach under the desks, fill out the survey and replace them under their desks.	*Ambient artifact *(lighting).*	
4:25	Students complete the survey and leave.		
4:30	Students complete the survey and leave.		