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Instructional Proxemics: Creating a place for space in instructional communication discourse

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INSTRUCTIONAL PROXEMICS: CREATING A PLACE FOR SPACE IN INSTRUCTIONAL COMMUNICATION DISCOURSE

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ABSTRACT

Changes in strategies of teaching and learning, changes in students, and changes in technology have necessitated contemporary changes in spaces of learning. Grounded in the general model of instructional communication (McCroskey, Valencic, & Richmond, 2004), this study proposes Instructional Proxemics as a conceptual framework for assessing the instructional environment through a blending of instructional communication and information/user-experience design. In a field-experiment involving five instructors teaching 15 sections of Public Speaking, students (n = 234) were invited to respond to a survey assessing measures of student learning, teacher behaviors, classroom practices, and classroom perceptions.

Results of this study indicate that learning spaces influence student perceptions across these measures, and that these perceptions are mitigated by the instructor. Instructor journals are used to provide context for these results. In sum, this dissertation advances the general model of instructional communication by promoting Instructional Proxemics as an impetus for the study of contemporary and innovative spaces of learning.

DEDICATION

For my wife;

For the teachers who have inspired me to understand; and,

For the Good Teacher who instructs me everyday to be teachable.

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CHAPTER ONE

INTRODUCTION

"Teachers are hindered by their insensitivity to and fatalistic acceptance of the classroom environment." – Robert Sommer in *Personal Space* (1969, p. 119).

The landscape of spaces devoted to university teaching and learning is changing at a more rapid rate than ever before (AS&U, 2001; Oblinger 2006). Academic and popular media outlets have become aware of a recent educational focus on space and the experience of education. In a feature article in the *Chronicle of Higher Education*, Bartlett (2003) identified student perceptions of traditional classrooms as obsolete, inflexible, and uncomfortable. In the same periodical, Read (2006) lamented the exodus of "digital natives" (Prensky, 2001, p. 1) from lecture halls. *Time* magazine reported on American schools calling them "throwbacks" to an earlier age (Wallis & Steptoe, 2006, para. 2).

Like these media outlets, educators and facility managers are engaging this discussion on campuses nationwide (Jamieson, 2003; Monahan, 2002; Oblinger, 2006; Smaldino, Lowther, & Russell, 2008). As college and university campuses consider building projects, planning teams are consistently asking how space can influence the learning that occurs within (see Oblinger, 2006). Unfortunately, academic research on spatial design – especially empirically-based research on instruction with space as an independent variable – is limited. Moreover, the history of education has reached a point in which teachers and students are creating new trends in education in the classroom but are hindered by the space itself (Jamieson, 2003; Kolleny, 2003; Okojie & Olinzock,

2006; Venezky, 2004) limiting instructor ability to engage contemporary students in and with technology. Fortunately, the technology is becoming available to assess and renovate spaces of learning to match the growing needs of teachers and students engaged in the learning process.

This study investigates how spaces of learning can become facilitators for learning in institutions looking to maintain pace or become front-runners in an ever-changing educational world, offering the contention that the study of spaces of learning must become as central to the study of instructional communication as the now burgeoning fields surrounding the technologized communication-oriented classroom (Information Society Commission, 2002; Johanssen, 2004). In a similar vein, instructional communication discourse must adopt stronger and more nuanced stances on the study and implementation of learning spaces, advancing the scholarly dialogue beyond the largely monolithic current discussion of Instructional Proxemics to a more dynamic understanding of classroom space and instructional environment within the modern university setting.

Framing the study

Favoring a blended approach to engage in the discussion of learning spaces, this study engages three intertwined support areas: information design, instructional communication, and technological proxemics. These three areas offer an eclectic mix of research from a variety of disciplines, including communication studies, English and technical writing, education, technologies, and architecture. Illustrative definitions of each for the purposes of this study are provided below:

1. *Information design*: the study of the conceptualization, formation, production, and distribution of data as meaningful knowledge (Kress & van Leeuwen, 2001; Albers & Mazur, 2003). Recently, information design theory has begun a shift toward user-experience design which heavily considers the interaction between the presented product and the user of that product to understand the experience created by the design for its user (Shedroff, 2001, UX Matters, 2007).
2. *Instructional communication*: the transactional process through which students and teachers use verbal and nonverbal messages to encourage mutual learning (McCroskey, Valencic, & Richmond, 2004; Mottet, Richmond, & McCroskey, 2006).

The two fields described above are areas of study which have been established in various forms within the disciplines of English and communication studies. The third area of study proposes a compilation of research addressing the relationship between space and technology. One endeavor of this study continues to be the collection of relevant literature on this topic and the definition of a new concept to frame this study, termed herein as "technological proxemics."

3. *Technological proxemics*: the study of space, its design, and its uses in relationship to the implementation of technology within space. This study focuses on the physical classroom and the shifts in its design which parallel the rise of computing technology, although technological proxemics may be considered in many different built and virtual environments. While

"technological proxemics" is a term created within this study, researchers in education, architecture, and computing discuss this genre of information (Jamieson, 2003; Kerr, 2004; Oblinger, 2006; Venezky, 2004).

By engaging with and mixing together these support areas, this study blends relevant theory from multiple sources to study space and its uses in the classroom.

Why study space?

Educational space and the use of space in the classroom, which this study terms "Instructional Proxemics," have been discussed by educators for centuries. Henry Barnard's *Practical Illustrations of the Principles of School Architecture* (1851) was an influential and widely-circulated work that matched pedagogical aims of the time with architectural designs of classroom space (McClintock & McClintock, 1968). Barnard chronicled the foundations of today's classic images of traditional classroom space: the one-room schoolhouse; cell-like rooms arranged in rows; and precursors of the stadium-seating of lecture auditoriums prevalent across college campuses. The straight rows and linear feel of the classroom shared by each of these images (and with many contemporary formal learning spaces) were created for functional reasons: ambient light needed to filter from windows throughout the space; instructors needed adequate surveillance of students; and students' attentions needed to be directed to the instructor who imparted knowledge from a podium (Sommer, 1969). While these ideas were novel and appropriate for an American antebellum time period, they have remained largely unchanged today.

Like Sommer, educators and architectural theorists (McClintock & McClintock, 1968) of the mid-20th Century recognized that these spaces had become obsolete. In the

1960s and 70s, researchers pioneered "classrooms without walls," a system in which classes were assigned to large multi-functional areas. According to Cuban (2007), this movement was largely discredited and abandoned because of complaints about disruptiveness in the large open spaces. The traditional classroom codified by Henry Barnard in 1851 remained and another opportunity arose for educators in the 1980s: computer-based technology (Suppes & Macken, 1978; Carter Ching, Levin, & Parisi, 2004; Jamieson, 2003).

As the importance of digital technology has increased over the last 40 years, classrooms have incorporated technological accoutrements into standard, functional educational spaces. In some schools, LCD (liquid crystal display) projectors hang from classroom ceilings to project digital images onto screens at the front of classrooms. In others, wireless Internet access or direct Ethernet ports allow constant connection to the Web. These technologized classrooms continue to be assessed in the literature through frameworks of administration (Watson, 1990; Williams, 2002), effective teaching methods (Hefzallah, 2004; Roblyer, 2006), and teacher/student perceptions of technology use (Wood & Fassett, 2003; Okojie & Olinzock, 2006; Li, 2007) In many schools, Web-based programs create virtual spaces to supplement or take the place of physical classroom environments. Studies of virtual spaces have focused on the ability of these classrooms to replicate face-to-face classroom experiences, with varied results (Carrell & Menzel, 2001; Benoit, et. al. 2006; Li 2007). While these technological advancements have filtered into the classroom, they have redirected the focus of classroom study from the use of space to the integration of technology (Jamieson, 2003). In this way,

technology has hindered the advancement of proxemics – the use of space – in the classroom.

Certainly, the integration of technology is an important goal for educational centers. Students who are "digital natives" (Prensky, 2001) are filling colleges and universities whose faculty and staff are largely "non-native" speakers of the digital language. This new "digital divide" is a generational one defined by childhood access to computing technologies (DigitalDivide.org, 2007). These "native" students will be prepared to engage with various forms of media, at least on the level of popular culture if not also in their classroom spaces. Therefore, educators and administrators alike must be ready to face the challenges that technology poses to classroom instruction as they contemplate ways to integrate technology into the classroom (Okojie & Olinzock, 2006).

The impact of these challenges will be felt by every college and university across the nation. According to the Carnegie Foundation (2007), the number of accredited institutions for higher education has surpassed 4,400. Administrators, students, and instructors across disciplines must be ready to maintain pace or experiment with innovative changes in technology and increasing levels of competence with technology in the classroom. Like many institutions of higher education (see Oblinger, 2006), Clemson University recently embarked on a plan to update aging classroom buildings with new technology and maximize instructional space for both quantity and quality of teaching (Billings, et. al., in press). This plan evolved into the redesign of formal learning spaces (classrooms and laboratories) as well as informal learning spaces (lounges, hallways,

meeting spaces, etc.) to meet the changing needs of instructors and students. Oblinger (2006) chronicles this trend on many other college and university campuses.

Furthermore, these challenges are at once historical, present, and future challenges for instructors and administrators. As researchers engage with the historical ideas of classroom space in the present day, the technology discussed is ever-changing. The technology ten or twenty years in the future is likely to be different from the technology typical in today's classroom (Jamieson, 2003, Johanssen, 2004, Oblinger, 2006). As a result, classroom spaces must be stable enough to provide adequate space for learning, but simultaneously malleable enough to accept new technologies as they emerge.

Given this history of educational spaces and their significance in collegiate America, this chapter will first assess three catalysts for change in educational space identified by Oblinger (2006): changes in teaching and learning, the influx of information technology, and changes in students; second, offer information design as a new lens for the study of classroom space and the experience of its users; and finally, issue a call for research on the construct of physical space.

Three catalysts for change in educational space

Changes in teaching and learning. Despite the static nature of classroom design, pedagogy has recently made a dynamic shift from the delivery of information to the facilitation of information exploration. Instructional communication as a field has already defined this shift. Beebe, Beebe, and Ivy (2004) charted the historical evolution of this transition from communication-as-action to communication-as-interaction to

communication-as-transaction as follows herein. Framed around the work of Lasswell (1948) and Shannon and Weaver (1949), the communication-as-action model suggested communication as the delivery of a message from sender to receiver: in this case from teacher to student. Later, the communication-as-interaction model added the concept of feedback from receiver to sender (Rogers, 1994; Schramm, 1954) recognizing at least a limited role for students in responding to the instructor. Further, the communication-as-transaction model integrates the sender and receiver as mutual and simultaneous senders and receivers (Berlo, 1960). The study of these transactions has influenced instructional communication as previously noted: the integration of both teacher and student as co-communicators (Beebe, Beebe, & Ivy, 2004). These mutual beneficiaries of the learning process are engaging in a different pedagogical structure than that which is promoted by the physical space of traditional classroom spaces.

Paralleling this shift in pedagogical practice is a shift in pedagogical theory. In *Pedagogy of the Oppressed* (1970), Paulo Freire attacks the "banking" model of pedagogy in which the teacher deposits information into the minds of students; an application of the communication-as-action model discussed above. Instead, Freire advances the goals of critical pedagogy which enables students to think, discuss, and construct ideas and learn from one another.

Bruffee's *Collaborative Learning* (1998) echoes Freire's call for constructivist pedagogy in the drive toward collaboration, suggesting that collaboration and cooperation are both assets to learning by "helping students to work together on substantive issues" (p. 83). Like Freire's approach, this team framework for learning shatters the "banking"

model of pedagogy in favor of a collaborative quest for knowledge. Interestingly, Bruffee (1998) recognizes the difficulty of implementing collaborative learning due to constraints of architecture and use of educational spaces (Appendix A, pp. 259-261) – a cause which this study seeks to at least partially address.

Friere, Bruffee, and their respective contemporaries give theoretical insight into the changes witnessed and documented by the instructional communication scholars listed above. The parallel shift in theory and practice moves from the denounced "banking" model and the communication-as-action model in the classroom toward collaborative, communication-as-transaction models. Such theory, as it facilitates the need for Instructional Proxemics, will be discussed in Chapter Two.

Influx of information technology. In the meantime, the rise of the use of technology in schools has fundamentally changed instruction. Roblyer (2006) divides the history of educational technology into three periods: the pre-microcomputer era, the microcomputer era, and the Internet era. According to Roblyer, the *pre-microcomputer era* began in 1950 with the first computer used for instruction at Massachusetts Institute of Technology (MIT). A flight simulator driven by computer was used to instruct pilots on maneuvers. The first computer used for school children came nine years later to teach binary arithmetic in New York City. During this time, approximately 25 universities were invested in computer applications for computer assisted instruction. According to Suppes and Macken (1978), by the 1970s, the advancement of PLATO (Programmed Logic for Automatic Teaching Operations) connected educators at thousands of terminals across the nation. These terminals were largely owned by universities and district offices across

the nation which maintained control over the applications of the equipment for classroom instruction. Thus, by the late 1970s, teachers had very little control over the application of computer-based technologies in their classrooms.

In 1977, the invention of a small desktop version of its predecessor ushered in the *micro-computer era*, allowing teachers to control their own computers within their own classrooms. Roblyer (2006) suggests that these computers required specialized knowledge to operate. To save funds and encourage computer use for specialized tasks, educational centers like universities and district offices purchased networked integrated learning systems (ILS) with built in curricula to shape computer education. Kerr (2004) suggests that such systems, still controlled by administrative offices, created pockets of teachers within schools that were the "teacher-computer-buffs" (p. 129). Following the addition of micro-computers into the classroom, debate arose over classroom management principles in relation to environment. Watson (1990) debates the benefits of computer integration into the classroom over the seclusion of computers to computer classrooms containing rows of desktops, arguing that dispersion of computers into classrooms encourages more diverse uses of the computer than their isolation into dedicated classroom space.

With the influence of an accessible World Wide Web circa 1994, the *Internet era* was born. According to Wells and Lewis (2006) of the National Center for Education Statistics (NCES), only 3% of all classrooms in public schools had access to the Internet in 1994. By 2000, email and multimedia technologies helped computers to become ubiquitous in classroom instruction increasing to 77% of all classrooms in public schools

and to 94% by 2005 (Wells & Lewis, 2006; DeBell & Chapman, 2006). University instructors found computers commonly appearing in classrooms, and universities pioneered the uses of computers for applications of distance education, classes conducted in virtual spaces through telecommunications or on the Web (Roblyer, 2006).

Because of the rapid shifts in technology over the last three decades, educators and researchers diverted their focus from the changing spatial needs of the classroom to the integration of technology into the space (Carter Ching, Levin, & Parisi, 2004). The product of this diverted focus has been beneficial to teaching and learning and the access of students to the information contained on the Internet. But technology in and of itself cannot improve instruction: technology must be strategically integrated into the classroom (Venezky, 2004).

Thus, many school and university buildings are filled with traditional classroom spaces that have been "upfitted" with current technology. Classrooms look the same as they always have with rows of desks and a space for the teacher at the head of the class. But now that same classroom might host a computer and technology required to display images on a screen and, in some classrooms, interact with those on-screen images through smart board technology. Wireless technology now gives universities the option to give students access to the Internet anywhere on campus. Intel's (2005) computing on campus survey demonstrated that wireless technology was growing exponentially on college campuses nationwide. Such technology now removes the need for computers to be wired to one location in the classroom opening a new set of possibilities for the use of space in conjunction with technology.

One other reaction to this influx of technology is to create classrooms which occupy no physical space. These virtual classrooms (often referred to by the terms online or distance education classes) remove all necessity of physicality from the classroom environment. These virtual sites are currently being studied in comparison to traditional classrooms (Benoit, Benoit, Milyo, & Hansen, 2006). Neither a simple "upfitting" of the traditional classroom nor a removal of physical space altogether seem to be influencing the "fatalistic nature" (Sommer, 1969) of the traditional learning space. Thus, the physical space itself must be studied because of technological changes.

"Technological proxemics" is the study of space, its designs, and its uses relating to the implementation of knowledge, processes, and tools which meet the needs of its users. Many researchers have begun study into this area of research, though the area has lacked a defining term. Although technological proxemics can be studied in many physical and virtual spaces, this study emphasizes its use for educational spaces.

According to Kerr (2004), the real impact of technology on education will likely not be the integration of high-powered devices into the classroom, but rather the ways in which teachers re-imagine what a classroom might look like when it is influenced by technology. This re-imagining of learning spaces is the continuing aim of the study of technological proxemics in educational environments.

Changes in students. In *Digital Natives, Digital Immigrants*, Marc Prensky (2001) writes, "Our students have changed radically. Today's students are no longer the people our educational system was designed to teach" (p. 1). The students entering universities in this decade are different than their collegiate predecessors. The technologically-savvy

generation of digital natives, coined the "Net Generation" (Junco & Mastrodicasa, 2007), come to campuses motivated to achieve, favoring group work and experiential learning. Howe and Strauss (2000) defined seven core traits of this generation's peer personality: special, sheltered, confident, conventional, team-oriented, achieving, and pressured. These traits point to the uniqueness of contemporary students and their successors in the amount, availability, and uses of communication technology. In general, the peer group uses this technology to enhance psycho-social development and to access "free" information online (Junco & Mastrodicasa, 2007).

These distinct differences have a polarizing effect on faculty members. As previously discussed, contemporary students use the Internet as a social tool; are skilled at multi-tasking, file-sharing, and web-searching; and prefer email over face-to-face discussion as a medium for conflict-management (Junco & Mastrodicasa, 2007, p. 56). Some repercussions of these tendencies are viewed negatively by faculty and staff in the college setting: students can often be seen engaging in chats or e-mail during class (Read, 2006); the use of cut-and-paste plagiarism as a writing technique is an increasing problem (NPR, 2006); and faculty members receive confrontational e-mails concerning grading procedures and policies (coined "flaming" by Hawisher & Moran, 1993). Certainly these behaviors hold the potential for negative outcomes, but faculty and staff tend to assume that students have been taught the correct way to interact with technology because the faculty and staff have had to learn this technology. For their students, however, much of this technology has been ubiquitous. Junco and Mastrodicasa (2007) report that information online has always been "free" for these students despite current growing

debates and lawsuits over file-sharing and intellectual property rights. Furthermore, information online is readily accessible and thorough, even to the point of becoming overwhelming. Thus, these students look to the classroom as a learning experience, rather than a source for information that they could find elsewhere.

The shift to a transactional model of instructional communication, a focus on the integration of technology into the classroom (and its newfound flexibility in terms of wireless capabilities), and the rapid change in the student population have dramatically changed teaching and learning in universities over the last three decades (Jamieson, 2003). Because of this shift in teaching and learning, educators and administrators must consider new approaches for understanding and conceptualizing Instructional Proxemics as they engage classroom design.

A new lens for Instructional Proxemics

Information design offers a new lens through which space and instruction can be considered. Similar to the field of instructional communication, the field of information design has recently shifted its focus from the delivery of information (communication-as-action) to the experience of the user (communication-as-transaction). By analogy, an understanding of this field's transition may offer insights into a similar shift in instructional communication.

Mazur (in Albers & Mazur, 2003) offers an historically situated view of information design: "The field of information design applies traditional and evolving design principles to the process of translating complex, unorganized, or unstructured data into valuable, meaningful information" (p. 23). Information designers tried to find the

most effective way to organize information so that it was the most accessible to the largest number of people. The parallel between this strategy in information design and the strategies employed by educators in the communication-as-action model is clear. The power and focus was situated on the designers (both of classroom instruction and information) and their role in the delivery of information. The origins of this history may date back as far as Aristotle, Plato, and Cicero who serve as the foundational thinkers defining oratory: the design of information in oral form (Bizzell & Herzberg, 2001). These thinkers and the long history of pedagogues following have advocated the skill of the designer in creating a designed product. Contemporary designers continue this important study by searching for the best possible designs for the display of information (Tufte, 1990, 1992, 1997, 2006; Wurman, 1997; Jacobson, 2000).

Recent scholarship in information design incorporates the physical, emotional, and visceral responses of the user, demonstrating that aesthetics, comfort, and interest enhance user experience (Csikszentmihalyi, 1990; Coates, 2003; McDonagh, Hekkert, van Erp, & Gyi, 2004; Goleman, 2006, Williams, 2007). Carliner (2000) asserts that the field of technical communication, for example, was historically dominated by the logistics and physical elements of document design. This echoes the oral design mentioned previously in which all focus was given to the skill of the speaker. Carliner argues for a new framework for technical communication that involves features of physical design, concepts of cognitive understanding, and issues of affective appeal. His demonstration in terms of technical communication signals a need for change to match the changing media and consider the emotional impact of design on the user. Norman

(2005) calls this emotional impact a visceral response: "We either feel good or bad, relaxed or tense. Emotions are judgmental and prepare the body accordingly" (p. 13). For Norman, cognition (e.g. the behavioral and reflective responses) comes only after the visceral response has occurred. The visceral response is so primal, so bodily, that it is pre-cognition. The gut reaction to a design occurs before the user can even consider whether or not to have the reaction.

A few years prior to Norman's (2005) *Emotional Design*, Jordan's (2000) *Designing Pleasurable Products* was published. In it, Jordan defines pleasure as the addition of value or the removal of need and categorizes four different types of pleasure that the user might experience: ideo-pleasure; psycho-pleasure; socio-pleasure; and physio-pleasure (pp. 13-14). These pleasures arise from the emotion that comes with values, cognition, relationships, and body, respectively. For Jordan, the emotional response of the user is crucial in understanding how information design functions. Functionality and usability must be combined with pleasurability to create a clear picture of information design.

In *Experience Design 1,* Shedroff (2001) writes that "meaning resides only in the minds of the audience" (p. 60). For Shedroff, meaning equates with derived understanding: from a cognitive, behavioral, and affective response. Shedroff argues that what is necessary for the user is an experience. The experience should attract users, engage them in some way, and conclude the experience in a meaningful way (p. 4). Much of the rest of his study in experience design is a play on emotions. He evokes different emotional responses throughout the study with color, design, surprise, and intrigue; all

the while keeping the user in mind, allowing the user to interact with the book, and equipping the user to reflect upon and evaluate the content of the study.

Likewise, Bolter and Gromala (2003) argue that the design must not only deliver information, but it must also allow the user to engage with the information experientially. By analogy, this is true for classrooms in the model of communication as transaction. The instructor and student become collaborators in the learning process. As educators begin to consider the aesthetics, comfort, and interest of the user, they will also consider new factors of the classroom experience with these three factors becoming crucial to comprehending physical space of the classroom. The experience of the user is as much a part of the design as the content and, thus, the user must play a justified role in new conceptualizations of information design. Through this synectical framework, classrooms can be considered as spaces which engage instructors and learners. Their experiences in the classroom are important to the design of the classroom space as a facilitator of success in the classroom.

A call for research

Physical space is a construct ready to be studied in instructional communication research. Indeed, the concept of space must become central to the communication-oriented educator. Despite the fact that much experimental research on communicative interaction in the classroom has been conducted (Mottet, Richmond, & McCroskey, 2006) current research on physical classroom space is limited (Jamieson, 2003). Furthermore, research on university classrooms has lagged behind research on K-12 classrooms (Jamieson, 2003) and leading journals related to instructional communication

have placed little emphasis on classroom space (*Communication Education, Communication Teacher*). Thus, this study begins with a call for research on Instructional Proxemics: space, its design, and its uses in learning settings. Well-devised, strategic studies of Instructional Proxemics will advance the field and discourse of instructional communication. Care should be taken so that these qualitative and quantitative studies are designed to be reliable and valid. Building upon the work of researchers throughout the history of instructional communication, Instructional Proxemics can become an area of study that will both inform scholars in the field and serve as a resource for administrators seeking to balance the quality of instruction with the limited quantity of available space.

Later chapters will address the theoretical grounding for Instructional Proxemics and its applications, culminating in a field experiment assessing three spaces of learning. This experiment is an assessment of three different learning spaces and the respective learning outcomes, perceptions of teacher behavior, and perceptions of space of the users therein. Thus, the final goal of this study is the continued examination and revision of space so that contemporary teacher will no longer have to, as Sommer (1969) suggests, be hindered by the spaces of learning.

CHAPTER TWO

LITERATURE REVIEW

"Designs for classrooms not only tell us much about the didactic means that were used therein; they also reveal the essence of the pedagogy that directed the educative efforts of past times." – McClintock and McClintock (1968, p. 60)

In 1851, Henry Barnard compiled a reference guide of classroom spaces entitled, *Practical Illustrations of the Principles of School Architecture*. Barnard writes in this compendium about his experiences visiting American school houses, noting that the school's "location, construction, furniture, and arrangements seemed to hinder, and not promote, to defeat and not perfect, the work which was to be carried out within and without its walls" (p. 9). He attributes the poor construction of these schools' spaces to the lack of a consideration of the users, arguing that teachers and students have differing needs based on the type of material they are learning, the type of activities in which they are engaged, and the physical size of the students as they mature from early childhood toward adulthood. In Barnard's mind, the perfected school was one which considered the needs and the comfort of its users and was built to accommodate their needs.

The result of Barnard's foundational work in this arena was the construction of school houses which met the needs of pre-Civil War student and teacher populations. Barnard's work and the work of his contemporaries (e.g. Horace Mann, James Henry) were centered on the establishment of standards for classrooms. These standards were designed to meet the needs of the users of the buildings; some are things that might be considered as typical quality control issues today: proper ventilation, available restroom

facilities, adequate lighting, and adjustable heating and cooling. These concerns have persisted to present times. Moreover, changes in the technology behind these systems have changed their application to educational environment. For example, schools no longer use wood burning stoves to heat classrooms or rely on sunlight from windows to light the spaces; heating and cooling are largely self-regulating; and restrooms are a required component of any campus building project.

Barnard also described the furnishings placed into school rooms and suggested that each learner should have his/her own seat (or at most two people to a common space). His illustrations depict the best options of the time for learners. Figure 2.1 depicts Wales' improved school furniture. The heavy iron and wood creations were built to be sturdy and available in various sizes to match the size and age of the learner. Contemporary desk and chair combinations have been created of materials making them more lightweight and compact than antiquated predecessors, and these new designs are even internally adjustable to modify sizes of individual desks and seats in some cases.

No. 3 represents an improved single desk for one scholar, on iron supports, with American school chairs to correspond. Each desk is furnished with an ink-well, and a metal cover of the best kind. The top is grooved, to accommodate pens, pencils, and other small articles, with a safe resting-place.

Figure 2.1: Wales' Improved School Furniture (Barnard, 1851, p. 133).

In addition, Barnard addressed issues of room size and layout. The room size, he wrote, depended on the number of students to be instructed within it. He therefore addressed the issues of aisle size and room layout based on the number of students served (see Figures 2.2 and 2.3 for examples of the rows and aisles depicted in his illustrations). These rows were designed for two reasons: to maximize teacher disciplinary control, and to promote visibility based on the entry of light to the sides and rear of student seating. These designs, according to Barnard, were preferable to the design depicted in Figure 2.4 in which desks are lined in rows, attached to walls and floor with multiple (more than two) students assigned to each table.

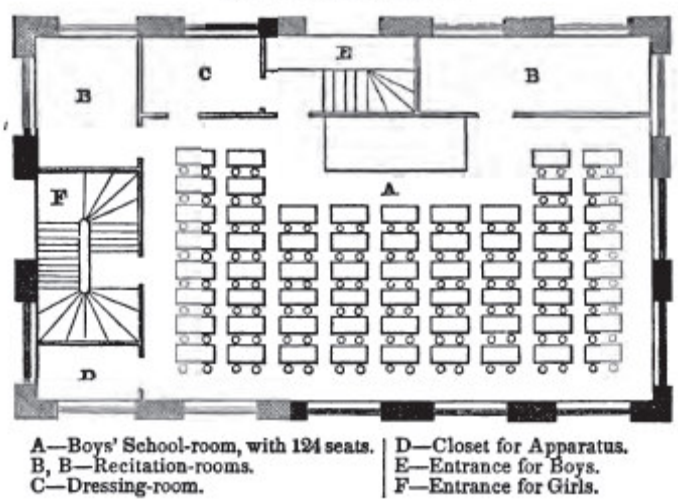
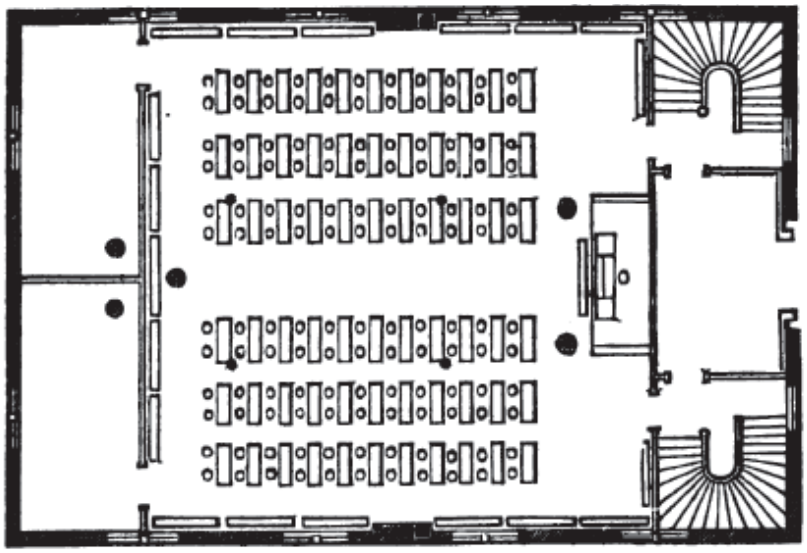


Figure 2.2: Plans for classrooms in Rome, N.Y. (Barnard, 1851, p. 119).



A—Front entrance.
B—Girls' entrance.
C—Boys' entrance.
I—Centre aisle, eight feet.
L—Aisle between each range of seats and desks, two feet four inches.
K—Side aisle, four feet four inches.
M—Space five feet wide.
T—Teachers' platform and desk.
R—Recitation rooms, each twenty-three feet by twelve, furnished with twenty chairs, seven inches from the wall and thirteen inches apart.
S—Library and apparatus, from eleven feet by fourteen feet.
N—Kimball's desk and two chairs.
O—Piano.
r—Hot air registers.
c—Ventilating flue or foul air duct.

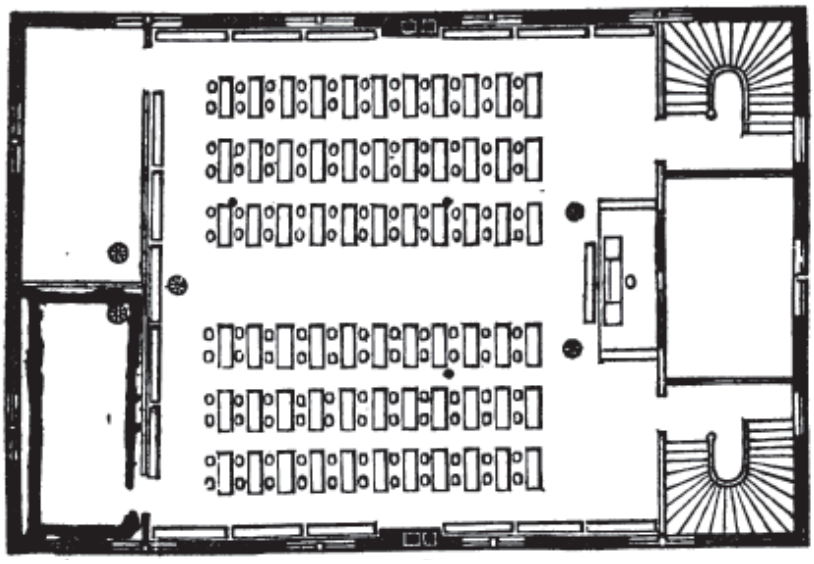
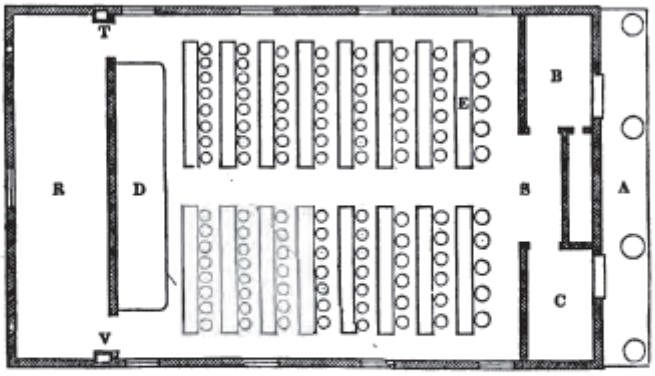


Figure 2.3: Plans for Hartford Public High School (Barnard, 1851, p.112).

The following plan presents a mode of seating a District School-House similar to that adopted in several public school-houses in the city of New York.



The building is 50 feet long (beside the porch 5½ feet in front) by 30 feet wide.

A—Porch.
B—Girls' entrance and lobby.
C—Boys' do.
D—Teacher's platform.
E—Mott's school desk and chair.
R—Recitation-room for assistant.
S—Stove.
T—Smoke flue.
V—Flue for ventilator.

The above mode of seating has been adopted in other districts, and in one instance, with the desks attached at one end to the wall, as in the following plan recommended by Hon. Ira Mayhew. There are serious objections to this arrangement of the seats and desk.

Figure 2.4: Warwick, RI School-house (Barnard, 1851, p. 52). Note the caption: "There are serious objections to this arrangement of the seats and desks."

The linear design of classrooms compiled by Barnard, both his preferred design and the objectionable design, remain largely unchanged today (Jamieson, 2003). Typical classrooms are set up in rows similar to the designs of these antebellum school-houses. Students are either seated individually or alongside other students facing the "front" of the room as defined by the stage for the instructor. This lack of change could be attributed to several factors: teachers and students may prefer sitting in linear rows because rows are conducive to learning; they may prefer sitting in linear rows because tradition indicates that a classroom should be linear; they may prefer sitting in linear rows because such design reflects their schemas for classroom appearance; or they may prefer sitting in rows because there has been no reason to change the structure of a classroom

over the last two centuries. This is certainly neither an exclusive nor exhaustive list of the reasons classrooms are standardized so consistently and uniformly, but it sheds light on the type of decision-making that may drive contemporary school design.

For Barnard, school design was foremost driven by pedagogy – a notion with which few would disagree. That is, the space should reflect the instruction that occurs within it. Over a century after Barnard's compendium, educational theorists McClintock and McClintock (1968) lamented the result of this compendium: Barnard's designs endured while his emphasis on pedagogy-driven architecture did not. This chapter opened with a quotation of their discontent. McClintock and McClintock were speaking in a time of attention to classroom design when educators of the late 1960s and early 70s were beginning to try out a variety of techniques, among them the open classroom and computer-assisted instruction. As noted in Chapter One, attention to computing and information technology has increased, and its influence has risen to the point at which the spatial design of classrooms must again be addressed and, if necessary, revised.

Thus, this study begins with the assertion that the study of education should necessarily be concerned with the spaces of learning. Using Barnard as a starting point, this literature review contends that the spaces of learning should follow the pedagogical aims of instruction; to contend the inverse would be counterintuitive. To that end, this analysis begins with pedagogy and learning theory, tracing major influences of the last century leading toward the field of instructional communication, and continues with an analysis of contemporary theories concerning educational space and architecture. By combining perspectives of these theoretical movements, this review will blend these

seemingly disparate theories into a user-centered, spatial design theory for education which this study incorporates as "Instructional Proxemics." Subsequently, this chapter will utilize an analysis of current trends in the design of educational spaces, constructing the grounding for empirical research into the ways whereby such trends reflect pedagogical changes in teaching and learning.

Instructional Theory

Scholarship of teaching and learning is derived first from learning theory. The theoretical framework of pedagogies and practices begins with an understanding of the way people learn. Thus, this section will begin with an overview of the major schools of learning theory, then discuss the study of instructional communication, and finally address relevant models of instructional communication that can further the discussion of space as it relates to teaching and learning.

Learning theory

In the tradition of educational psychology, learning theory is often divided into three classifications: behaviorism, cognitivism, and constructivism. Behaviorism asserts that learning is the result of stimuli in the environment to which a subject responds. B.F. Skinner's (1950, 1954, 1968) work in operant conditioning provides a foundation for behaviorism. If a behavior results in positive reinforcement, that behavior is likely to occur again. If a behavior results in punishment, that behavior is not likely to occur again. Such description simplifies the claims of behaviorism, as it must deal with complex issues in the educational environment; however, proponents of behaviorism often relate to learning in terms of stimulus and response.

The cognitivist approach to learning can be categorized by information processing. A learner's mind is set up in categories. When new information is presented to a learner, it is either adopted into an existing category or it defies the category, resulting in a re-shaping of the learner's schemas that incorporate this dissonant information. A simple example of this theory in action might be a small child who encounters a horse for the first time. The child may have no category for "horse." The child could process the new information in two ways, among others: she may have a category for "dog" and could perceive that the horse is a large dog; or she may restructure her categories and create a new category for horse. The study of this process of defining, refining, and mapping information into categories is the focus of cognitivist approaches to learning. Cognitivism began to overshadow behaviorism as the leading approach to human learning in the 1960s.

Constructivism emerged as a reaction to behaviorism and cognitivism, positing that learning is a joint process of experience and activity. This theoretical shift from the other two models suggests that learning is a process of construction rather than acquisition. One pioneer of this theory was Russian psychologist Lev Vygotsky (1962, 1978), who devised social development theory. This theory suggests that a learning scenario is comprised of social interaction, a more-knowledgeable other, and the zone of proximal development, which Vygotsky defined as the difference between the ability of a learner to perform a collaborative task and his ability to perform the same task independently. The shared experience and activity of learners in common creates

learning. In this constructivist view, learning can occur but cannot be complete without social interaction.

These various models provide different lenses through which education can be studied and classified. They are all theories about learning, not pedagogical theories which describe teaching practices (Chapter One briefly discussed the work of Paulo Friere and Kenneth Bruffee who created pedagogical theories based around the constructivist learning theory). Rather, the models express different views on the means whereby people learn. Even though this study most closely aligns with constructivist models, an understanding of the approaches of behaviorism and cognitivism can only create a richer foundation for understanding the complexities of learning as it occurs in various settings.

Student learning outcomes in educational research have generally been categorized as cognitive, behavioral, or affective learning. Teachers, artifacts, curriculums, and environments can be assessed based on their abilities to increase the likelihood of positive learning outcomes on these three measures. One complication of measuring these outcomes is that researchers do not agree on the best practices for operationalizing learning, as most measures can only assess student perceptions of their own learning rather than the learning itself.

Cognitive learning, a construct devised by Bloom (1956), refers to the ability to receive, process, recall, and apply information. Anderson and Krathwohl (2001) later revised Bloom's taxonomy by categorizing four different types of learning (factual, procedural, conceptual, and metacognitive) to offer researchers a better understanding of

the ways that cognitive learning could be classified. For researchers, cognitive learning has been one of the most perplexing of constructs to operationalize. It has in the past been operationalized in terms of the grades a student received on course assignments, the differences between pre- and post-tests on a given topic, and student perceptions of his/her own learning. One current model for assessing cognitive learning is the "learning loss" method in which students rate how much they learned in a class and then rate how much they think they would have learned given the ideal instructor (Richmond, Gorham, & McCroskey, 1987). The two scores are then subtracted to reveal a "learning loss" score. The quest to ascertain a best practice for measuring this outcome is ongoing and increasingly debated.

Behavioral learning of psychomotor skills and behaviors is similarly complex to evaluate. Behavioral learning takes time and practice. Thereby, over the course of an academic term or year, behavioral learning is difficult to assess. Students are usually asked to assess their perceptions of the behaviors learned in the course and their likelihood of using the behaviors in the future to measure their learning of course material on the behavioral level.

Affective learning, unlike the other instructional outcomes has been researched exhaustively and is considered one of instructional communication's most important contributions to the scholarship of teaching and learning. Affective learning measures assess the student's acceptance and liking of the course, instructor, and content. First classified by Krathwohl, Bloom, and Masia (1964), affective learning has proven

important in determining whether students will internalize and apply information to their lives, as it represents their overall demeanor toward the content and means of instruction.

These three learning outcomes have shaped the way that formal classroom-based learning has been operationalized in the literature. This emphasis on classroom-based learning does not diminish the important work of educational researchers into student development theory who have identified learning beyond the classroom environment, but rather suggests that formal learning (classroom-based) and informal learning (outside the classroom) both have key roles to play in the development of the student as a whole person.

Like constructivist learning theory, student development theory largely incorporates educational psychology in studying the psychosocial and cognitive-structural development of students. Pioneers in this study included Erikson (1968) and Piaget (1932, 1970, 1972), whose work spawned considerable research into student development. On the college level, Chickering and Reisser's (1993) research into what they called the seven vectors of social development demonstrated specific needs and goals of students entering and enrolled in higher education. This framework led to the study of identity in racial, ethnic, gender, and other forms (see Evans, Forney, & Guido-DiBrito, 1998). Perry's (1970) work in the intellectual development of college students and Kohlberg's (1971) work in the moral development of college students led to a great deal of research on gender differences in information processing. Further research into typology studies (of which the Myers-Briggs analysis is the most ubiquitous) and person-

environment studies have continued to make this field one of interest to educators and researchers across disciplines.

From a historiographic perspective, these studies provide a foundation for determining which avenues have been explored in the literature and which avenues, such as the interplay between space and learning, still need to be pursued. However, because this dissertation sought to examine the relation of classroom space to learning outcomes, it privileges the cognitive, behavioral, and affective learning of students over the psychosocial and cognitive-structural models.

All of these conceptualizations of learning and learning outcomes within the classroom are intricately tied to the teacher-student dynamic and the communicative behaviors of teacher and students. In this area, instructional communication has developed ways to synthesize learning theories and pedagogical theories to assess these learning outcomes in relation to teacher and student behaviors.

Instructional Communication

The teacher-student dynamic is a complex interpersonal relationship which occurs in a group setting. For this reason, research in instructional communication (the study of the communicative behaviors of teachers and students) is a product of and complement to research in interpersonal communication. The foundational works of interpersonal communication in immediacy (e.g. Mehrabian, 1967) are also foundational for instructional communication.

McCroskey, Richmond, and McCroskey (2002) argue that quality instruction is a three-legged stool, meaning that instructors in any discipline must have a firm grasp on

(a) content knowledge, (b) pedagogy, and (c) instructional communication. Within this conception, instructional communication is the link between the knowledge of a subject and the ability to teach it. This field of study is related to but different from the study of communication education, the study of the teaching of communication principles, because it focuses on behaviors of teachers and learners regardless of the subject matter being taught.

In Chapter One, the researcher discussed a shift which has been documented by researchers in instructional communication from the communication-as-action model to the communication-as-transaction model in the classroom (Beebe, Beebe, & Ivy, 2004). This shift has paralleled the debate in pedagogy from the "banking" model of education to a more collaborative model of education, meaning that researchers in instructional communication have been interested in the means which a teacher might employ to encourage interaction and transaction in the classroom. The communicative behaviors which occur between teachers and students have been codified primarily in terms of student perceptions of teacher behavior within instructional communication and related fields. Some of the devised teacher communication constructs that have been widely studied include teacher immediacy, teacher content relevance, and teacher credibility (Glascock & Ruggiero, 2006). Student perceptions of these teacher communication behaviors have been shown to be directly related to student learning outcomes both perceived and actual (Witt & Wheeless, 2001; Witt, Wheeless, & Allen, 2004).

First, teacher immediacy is the perceived physical or psychological closeness between teacher and student. The construct of immediacy was first defined by Mehrabian

(1967) and operationalized by Andersen (1979) during her dissertation research. Andersen's scales for assessing teacher immediacy have been used and modified with great success, making teacher immediacy one of the most widely studied constructs in instructional communication. Most recently, Smythe and Hess (2005) developed the Nonverbal Immediacy in College Classroom Instruction (NICCI) scale to measure student perception of teacher immediacy in behaviors specifically tuned to college-level instructors. Positive non-verbal immediacy behaviors include facilitating enjoyment, casual attire, self-disclosure, and deflation of power. Non-verbal immediacy has been shown to be one of the best predictors of student satisfaction, student affective learning, student engagement/participation, and student motivation in the classroom. Verbal immediacy (like the use of instructional humor) has proven to be a much more difficult construct to measure because of its inextricable connection to nonverbal behaviors (Sanders, & Wiseman, 1990; Witt & Wheeless, 2001).

Second, teacher content relevance has been defined as the ability of the teacher to make the content of the course applicable to students' lives (Frymier & Shulman, 1995). Teachers can often increase content relevance by using many real world examples, experiential learning, and practical illustrations of course content in class.

Third, teacher credibility has been defined in the classroom as joint influence of the competence, trustworthiness, and caring of the instructor toward the students (Teven & McCroskey, 1997; McCroskey & Teven, 1999). The development of teacher credibility was first established by McCroskey, Holdridge, and Toomb (1974) as the ability of the teacher to persuade the students in the course that he/she is a competent

teacher. Teacher credibility can have a distinct impact on the willingness of the students to learn, participate, and stay motivated in a class. The persuasion employed by the teacher both verbally and nonverbally also allows the teacher some measure of power and influence over the student. McCroskey (1966) indicated many factors related to teacher credibility but these factors were pared down by further research to teacher competence and teacher character. Teacher character refers to student perceptions that the teacher is trustworthy and honest; teacher competence refers to the teacher's grasp of his/her content area and ability to relay this information to the student.

Later research indicated that a third factor, caring (or goodwill), should be a fundamental part of the construct of teacher source credibility. Caring refers to the concern which the teacher demonstrates for the welfare of the students. McCroskey and Teven (1999) offer a scale for the assessment of teacher credibility along these three factors attempting to relate it to the other components of this model. Further tests of this assessment have continued in the literature, most recently demonstrated as Banfield, Richmond, and McCroskey (2006) used this framework to assess the role of teacher incivility on perceptions of teacher credibility. Teacher credibility, content relevance, and immediacy have all been interrelated with affective learning and correlated with each other, owing to the need for the development models that will allow researchers to develop and apply theory to the research and practice of teaching and learning.

Rhetorical/relational goal theory. One of the major conceptualizations which ties these elements together in current instructional communication discourse is the rhetorical/relational goal theory posited by Mottet, Frymier, and Beebe (2006). This

theory “focuses on the rhetorical and relational goals that teachers and students have and how these goals guide the instructional communication that is transacted in the classroom” (p. 260). It is founded in the notion that communicative behaviors of teachers influence and are influenced by the communicative behaviors of students (e.g. communication-as-transaction, Beebe, Beebe, & Ivy, 2004). These behaviors interact and mutually impact the teaching and learning outcomes in the classroom.

Relevant teacher goals (e.g. immediacy, credibility, and content relevance) have already been discussed within this study; however, student goals have also been identified in the literature. These goals vary from student to student and results associated with student goals have largely been attributed to individual differences (McCroskey, Valencic, & Richmond, 2004). Nevertheless, compelling studies have demonstrated that student goals are present and often related to motivation (McCroskey, Richmond, & Bennett, 2006), engagement, willingness to communicate, and incivility (Boice, 1996; Simonds, 1997).

One important facet of this theory is that it addresses two sets of goals in the classroom or other communication contexts: rhetorical goals and relational goals. Rhetorical goals refer to the goals of influence and achievement in the classroom. Examples of rhetorical goals in the classroom might be the desire of teachers for student mastery of skills and/or the desire of students for academic achievement. Relational goals suggest the development and maintenance of interpersonal bonds. Examples of relational goals in the classroom might be the desire of teachers for demonstrating concern for their students and/or the desire of students to enjoy time in class. Mottet, Frymier, and Beebe

(2006) suggest that these purposes drive the communication of both the teachers and the students in classroom settings, but that their specific outcomes differ. Student goals may include academic achievement, engagement in the classroom, and acquisition of content knowledge. Teacher goals may include demonstration of content competency, teacher immediacy, and classroom engagement. These goals often overlap, for example, a teacher may attempt to use immediacy to increase student motivation to learn (Frymier & Shulman, 1995).

In the Mottet, Frymier, and Beebe (2006) definition above, the rhetorical/relational goal theory assesses how the goals of the classroom participants shape the communication *in the classroom*. The researchers stress that, "the exact nature of those goals and how those goals are accomplished differ with different grade levels and different contexts" (p. 269). Logically, one of the factors that creates different contexts is the physical space which defines the classroom. This study aims to advance the rhetorical/relational goal theory by situating instructional communication within the physical walls of the classroom. Teachers who favor an experiential or collaborative approach to learning might be hampered by a room in which tables and chairs are bolted to the floor. Similarly, an instructor who favors the banking model of education might feel out of place in a circular computer lab. However, the present study is not the first conceptualization of environmental influences in instructional communication discourse.

General model of instructional communication. This study furthers one current conceptualization of environmental influence in instructional communication: the general model of instructional communication (McCroskey, Valencic, & Richmond, 2004). This

model lists six essential components of instructional communication discourse: teachers, students, student perceptions of teacher behavior, student perception of teacher credibility, instructional outcomes, and the instructional environment. The significance of this general model of instructional communication is extremely high: theory-building requires that models be constructed and tested in hopes of a constant refining process that results in accurate and complete theory.

Placing the bulk of their focus on teachers, instructional outcomes, and student perceptions of both teacher behavior and teacher credibility, McCroskey, Valencic, and Richmond (2004) dismiss the other two factors: the students and the physical environment. Moreover, they devote only one paragraph of their manuscript to the educational environment stating: "since most of these environmental factors are beyond the control of the teacher or the students, most of the variance created by the environment will function as error variance in the testing of instructional communication theories" (p. 198). Thus, their study accepted all environmental influence as error variance, noting that environmental influence can include elements of the institutional culture, instructional level, campus climate, and many other factors. Perhaps even more important to their decision to largely negate environmental factors is the presumption of this traditional, fatalistic classroom. The authors have essentially claimed that the classroom is so standardized and uncontrollable that instructors across spaces, disciplines, and universities have no ability to exercise influence over the design of their educational environments.

The present study suggests that one aspect of the environment that *can* be studied is the physical space of the classroom. In so doing, the present study aligns itself with and furthers the proposed general model of instructional communication. To adequately study the learning environment, one must also consult theories concerning space and its uses in education.

Proxemics & space theory

Proxemics, a term coined by Edward Hall in his 1966 work, *The Hidden Dimension*, is the interrelated study and observation of man's use of space as a marker of culture. To flesh out his definition, he divided American uses of space into 4 categories: intimate space (0 to 18 inches); personal space (18 inches to 4 feet); social space (4 to 12 feet); and public space (12 to 25+ feet). This use of space, he argues is integrally related to American cultural acceptance, meaning that the nature of these spaces for other cultures can be quite different.

Beyond Hall (1966), other theorists have posited that proxemics is not only related to issues of personal space, but also to issues of physical territory. Robert Sommer studied this concept in *Personal Space: The Behavioral Basis of Design* (1969) as it relates to educational space. He found that students sitting in the middle and front of the class were more likely to be successful and participate in class than those who sat near the back or to the sides of the room. As a result, he suggested that pedagogical practice should change to create the most effective learning spaces for all students, believing that the majority of teachers are "hindered by their fatalistic acceptance of the classroom environment" (p. 119).

Others have advanced Sommer's queries by relating space and education. In *Educating by Design*, Strange and Banning (2001) offer three architectural models relating to the use of space as a manipulator of behavior:

1. *Architectural Determinism*: a space defines and dictates the behavior to occur within it. One-way streets and bridges are typically good examples of dictated behavior. Moreover, any visitor to an IKEA store recognizes that this company has provided a solitary path through the entire building that must be followed, even to the detriment of a shopping experience.
2. *Architectural Possibilism*: a space defines a set of acceptable behaviors and the user can choose which to embody. Examples of this type of design might include formal English gardens or grocery stores.
3. *Architectural Probabilism*: a space is designed so that some behaviors are more likely to occur than others. For example, a church often has plenty of entries, exits, and paths of behavior, but users are more likely to walk down the aisles and through the grid of pews than they are to swing down from the balcony or jump across pews to find a seat.

These architectural theories emphasize the role that space plays in shaping, even defining, behavior. Proxemics, then, can relate to both personal and public space and involve an understanding of its uses as a force which can define behaviors or can be used to change them.

Instructional Proxemics

Building a theory of Instructional Proxemics is crucial to understanding the ever-changing role of communication within any modern classroom. Whetten (1989), building on the work of Dubin (1978), identified three elements of theory development: (a) the variables and concepts considered influential in the process studied; (b) the relationship between these variables; and (c) the reasons which define the relationships between variables. The current study posits that physical space is a concept primed for study in instructional communication and that it has some relationship to the outcomes for students and teachers. Thus, a study of the relationship between physical space (proxemics) and the rhetorical and relational goals of classroom participants (instructional communication) will be a study that advances the theoretical development of research in instructional communication (see Figure 2.5).

Applying the lens of user-experience design to this discussion can also further the understanding of Whetten's third element: the reasons which define relationships between space and learning. As discussed in Chapter One, the experience of the user -- in this case related to classroom aesthetics, comfort, and patterns of use -- illuminates the contribution brought by research on physical classroom space. Consequently, Instructional Proxemics is a combination of both instructional communication and proxemics, as seen through the lens of user-experience design.

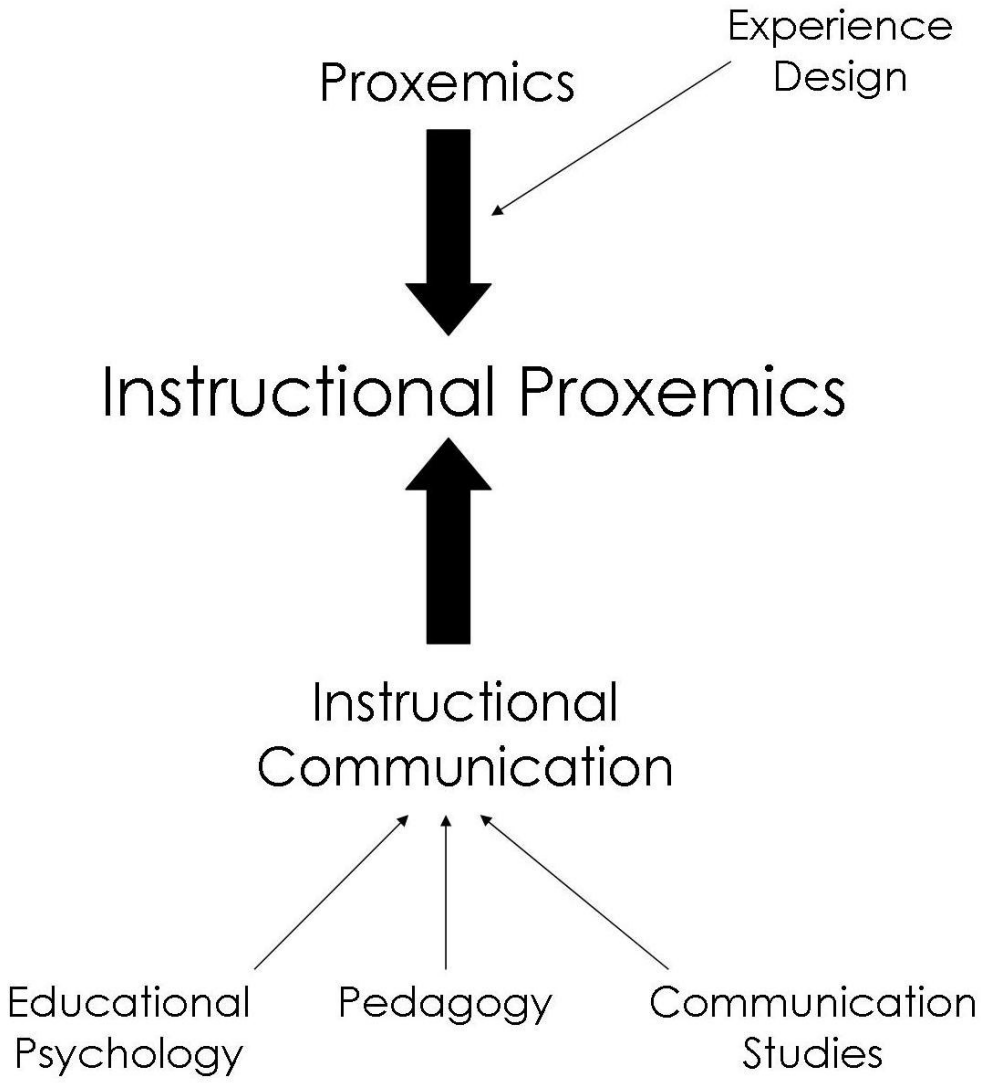


Figure 2.5: A Model for Instructional Proxemics

Instructional Proxemics represents a new paradigm for conceptualizing the use of classroom space, but the term in itself does not represent a new area of study. Rather, it is a new theoretical conceptualization of the types of study that are burgeoning in the discourse surrounding teaching and learning. For example, Dober (1992) compiled a

resource guide of college architecture, assessing the built environment created by building projects on campuses nationwide. This guide posits that institutional architecture must be consistent within campuses to create an institutional character and atmosphere. Carter Ching, Levin, and Parisi (2004) studied the artifacts of the classroom including concrete carriers, concrete conveyors, physical and virtual artifacts, texts, and inscriptions. By assessing the integration of these instructional items into the college classroom, they were able to categorize and document the use of artifacts in the college classroom. Welch (2005) assessed classrooms based on topoi she defined as lighting, color and texture of surfaces, budgetary support, and others to create a standard for understanding the physical design of the technologized classroom. Her findings indicate that the topoi are all related to one another through implementation, administrative decision making, and financial control. These studies resonate with the historical foundation laid by the illustrations of Barnard (1851) in the documentation of design of usable spaces, and the factors which impact the construction and use of the spaces once they are built.

In addition to these studies, much work has been completed concerning the study of the technologized classroom. Johanssen's (2004) edited work is instructive for scholars interested in the means for studying educational communicative technologies. Architectural studies (Aiken & Hawley,1995; *American School & University*, 2001; Kolleny, 2003), the National Center for Educational Statistics (Wells & Lewis, 2006; DeBell & Chapman, 2006), and reports from programs like the Maine Learning Technology Initiative (Gravelle, 2003; Lane, 2003; Sargent, 2003; Gritter 2005) all apply

this type of study and practice within the framework of current, innovative designs of the intersection between technology and space.

The study of Instructional Proxemics, the actual space and use of the classroom, must supplement and be integrated into the study of the technologized classroom as represented in these and many similar works. Thus, this dissertation aims to further the study of physical classroom space as it has been and is being designed and built on campuses around the country.

Current trends in spaces of learning

Educational theorists Strange and Banning (2001) suggest that the physical environment sets limits on patterns of behavior making some actions more probable than others. In terms of formal classroom spaces, Jamieson (2003) suggests that current institutional architecture provides an optimal environment for teacher-centered practices. This method of one-way delivery of information harkens back to Freire's (1970) denounced "banking" model for instruction; and, according to Jamieson (2003), that model is the practice that institutional architecture consistently promotes.

Conversely, the communication-as-transaction model suggests that instructors and students are collaborators in the learning process. As such, the spaces they occupy should allow for collaboration to occur in the form of classroom projects, activities, and reflection, in addition to the delivery of information promoted by the traditional, linear classroom spaces of Barnard's (1851) designs. Toward this end, current trends in educational design emphasize the willingness of institutions to embrace this collaborative pedagogy.

Diane Oblinger's *Learning Spaces* (2006) fuses a compilation of work which describes and depicts emerging trends in the design of educational spaces. Her main objective is to understand how learning and space can work synergistically with technology to achieve practices that are cutting-edge, transactional, and pedagogically sound. She suggests that innovative classrooms that are "harmonious with learning theory and the needs of current students" must address the issues of flexibility, comfort, sensory stimulation, technology support, and decenteredness (pp. 2.6-2.7). Using case studies from current practices in campus architecture, Oblinger defines seven emerging trends in design: (1) emphasizing learning, not teaching; (2) enabling social encounters; (3) designing learning complexes; (4) creating a service philosophy; (5) integrating technology; (6) allocating space for experimentation and innovation; and, (7) involving users. These seven trends point to the overarching drives through which faculty, technologists, librarians, and administrators are bringing together space, technology, and pedagogy to ensure learner engagement and success.

According to Oblinger, a shift to a more collaborative pedagogy in the classroom has demanded a shift in the spaces of education. The shift toward flexible learning spaces underlies the claims in her first, second, and third trends (all related to the physical design of the space). These spaces are coined "flexible" because they are adaptable to different pedagogical aims.

Oblinger is not alone in emphasizing flexibility. Other theorists, architects, educators, and media outlets have suggested that a primary way to promote learning rather than teaching is through the use of a combination of formal and informal learning

spaces and the integration of mobile furniture into the classroom. Venezky (2004) suggests that such changes will allow educational space to enhance the collaborative nature of the Vygotsky (1978) model of education over the skill and drill models based on the learning theories of Piaget. Bruffee (1998) recognizes the difficulty of implementing collaborative learning due to the constraints of the architecture and use of educational spaces (Appendix A, pp. 259-261), but suggests that changes in architecture can change pedagogy. Strange and Banning (2001) echo Bruffee's claim: "The extent to which the design and layout facilitates interaction of participants is thought to be an important antecedent to involvement" (p. 145), and suggest that flexibility is the key to a collaborative physical design. Moreover, in 1998, the American School and University Magazine reported that the flexible learning space was one of the top ten design ideas for the 21st century.

Monahan (2002) categorized the flexibility of spaces using five qualities of flexible educational space that allow for different functions within that space: fluidity, convertibility, versatility, scaleability, and modifiability. *Fluidity* refers to the ability of a space to permit the flow of people, light, sight, sound, and air through the space as opposed to a space that contains or confines. *Versatility* suggests the ability of a space to be used for multiple things rather than a space being dedicated for a single use. A *convertible* space is one that offers ease of adaptation for various uses as opposed to a space that is impossible or difficult to rearrange. The *scaleability* of a space references the space's ability to expand or contract as necessary rather than a room with consistent

dimensions across time. *Modifiability* refers to an invitation of active manipulation within a space as opposed to a space which dictates the placement of items within it.

Within this study, spaces are identified according to their fluidity, versatility, and convertibility, relative to each other. Scaleability is not addressed as all rooms have consistent, permanent dimensions. Moreover, Monahan suggests that modifiability is very rarely found in spaces even if they posses all of the other four properties because modifiability is the result of the other four alongside a culture of active manipulation.

The following two descriptions are practical examples of this trend from the field. Estrella Mountain Community College is known for its radical flexibility (Oblinger, 2006). Classrooms are designed to be wholly flexible. Large spaces are divided by zigzag whiteboard walls on casters that can be reconfigured to create various classroom learning spaces of all sizes. This type of construction allows the space to achieve Monahan's very rare category of modifiability because the space incorporates all four of the other features and is so extraordinarily flexible.

Marianist Hall at the University of Dayton is an interesting example of the living/learning environment that is a popular goal for many contemporary American institutions as it contains a residence hall connected to academic learning space. Many students who reside in Marianist Hall take classes in its open corridors and glass-enclosed classrooms. These rooms must be able to be modified to meet the needs of the classes using them. They also allow people light and sound to flow through the space into multiple classes at any given time. Fluid learning spaces like Marianist Hall blur the line between formal and informal learning environments and between learning and living.

These qualities identified by Monahan do not necessarily present a goal of achieving quality instructional space through flexibility. Spaces that are created to be flexible do inspire collaborative learning processes by allowing students and teachers to work together in groups, offering opportunities for using spaces for functions other than formal learning; and providing accessibility for learning in a variety of ways. However, flexibility can also be a difficult administrative challenge; for example, a wholly modifiable space, like a school gymnasium which doubles as a cafeteria and triples as an auditorium (and could be partitioned for classroom space) requires that the space be dramatically changed daily, if not hourly, for each purpose. These qualities of flexibility are areas for study to determine how the flexibility of space may influence classroom design. Through academic assessment of flexible spaces, researchers can explore new innovations in classroom design while both avoiding the pitfalls that extinguished the open classroom (Cuban, 2007) and creating opportunities for instructional effectiveness in a digital age.

Researching Instructional Proxemics

Laboratory-based research cannot replicate the complexities of the instructional environment. Conversely, the complexities of an instructional environment pose challenges for creating a controlled experimental environment. Thus, research on Instructional Proxemics can incorporate several experimental strategies.

Continued quantitative, qualitative, and mixed method studies can help to expand a growing understanding of Instructional Proxemics. Instruments designed through the study of instructional communication and the study of space can each benefit an

understanding of the interplay between communication and space. In addition, research on newly-designed spaces is not only experimental and documentary in nature. It also provides opportunity for innovation as a necessary precursor, simultaneous event, and ultimate result of this research. As such, design-based research is another strategy for studying space.

Design-based research, pioneered by Brown (1992) and expanded upon by the Design-Based Research Collective (2003), posits that successful innovation is a combined result of the experimental intervention and its context. This is a deviation from traditional research methods, which seek to isolate the intervention to demonstrate its effects. Instead, in the learning environment, the designers, researchers, and instructors work as a team to create strategic modifications to the experiment in hopes that the end result will be a refined innovation and a generator of theory that can then be tested. The main goal of design-based research is to create models for successful theory and practice rather than to assess the attributes of a particular artifact, teaching strategy, or program. Design-based research presents intriguing application for research in instructional communication and the learning environment. For the purposes of this study, design-based research adds one more lens through which the implications of this study can be considered.

This particular study examined communicative behaviors in the learning environment. Thereby, a strictly controlled experiment was not feasible given the seemingly infinite permutations that inevitably alter the learning environment. To assess the communicative behaviors and their relation to space, this study employed primarily

quantitative research methods through surveys. Questionnaires contained approximately 80 quantitative items, demographic measures, and three qualitative measures. In addition to these surveys, the researcher also assessed journal entries written by the five participating instructors to provide context for the quantitative findings. The specifics of these measures will be addressed in Chapter Three.

Therefore, this extensive field experiment addressed multiple goals of classroom space as well as the perceptions of the spaces in which classrooms take place. This study suggests that each of these factors will be influenced by physical space as an independent variable. The variables of space are characterized by Monahan's qualities of flexible space listed above. Building on McCroskey, Valencic, & Richmond (2004), the surveys assess both student goals and instructor goals via measures of student perception. What follows is a list of the research questions this study poses as measurable under its design:

Research Question 1a (RQ 1a): In what ways is student *behavioral* learning influenced by classroom space?

RQ 1b: In what ways is student *affective* learning influenced by classroom space?

RQ 1c: In what ways is student *cognitive* learning influenced by classroom space?

RQ 2a: How are student perceptions of teacher *credibility* influenced by classroom space?

RQ 2b: How are student perceptions of teacher *immediacy* influenced by classroom space?

RQ 2c: How are student perceptions of teacher *content relevance* influenced by classroom space?

RQ 3: How are classroom practices influenced by classroom space?

RQ 4: How are student perceptions of classroom space influenced by classroom design?

Collectively, these research questions aid the establishment of Instructional Proxemics as a warranted avenue for the study of instructional communication as well as underscoring the need to study space as a variable that impacts all forms of communication in more meaningful ways than most scholars have previously acknowledged.

CHAPTER THREE

METHODS

Many different quantitative and qualitative methodological options could potentially provide insight in this formative area, each offering unique balances of strengths and weaknesses. This study employed two specific methods, one assessing the perceptions of student-participants and one assessing the perceptions of instructor-participants. Both methods stood to provide the most insight with the least potential for confounding variables. First, to assess student-participant perceptions, a single, end-of-term survey was requested of students. While a panel design could have provided other insights, a single survey was chosen over multiple surveys to eliminate any Hawthorne effect that could arise. Students were invited to participate in the survey during class near the end of term. This methodological choice allowed the researcher to assess students perceptions based on their experience over a single term in the classroom without prompting them at any prior time that the physical design of their classroom was the primary variable of investigation. Instructor-participants presented a quite different case in that all five selected instructors knew much more about the aim of the study beforehand. As such, instructors were invited to submit journals which allowed the researcher to attain insight into classroom differences and teaching style preferences of each instructor. Using journals rather than on-site observations or recordings of classroom behavior was deemed less intrusive. Thus, the methodological choices in this field experiment were chosen to provide the researcher with data that were unencumbered

by the influence of the research design offering the greatest utility for scholarship in this area.

Participants

A total of fifteen sections of an undergraduate class in public speaking were used for this study with as many as 19 students (M = 15.6, SD = 2.4) assigned to each class section. The 234-student sample included 117 (50.4 %) males and 115 (49.6 %) females (two did not indicate gender), ranging in age from 18 to 25 (M = 19.82, SD = 1.219). Participants included 20 (9 %) first-year students, 123 (53 %) sophomores, 44 (19 %) juniors, and 45 (19 %) seniors (two did not indicate their classification) and represented all five colleges at the institution, a National University in the Southeast region of the United States. Participants included 201 (86 %) White students, 22 (9 %) African-American students, and 11 (5%) students who selected multiple ethnicities or "other."

Students self-selected sections of public speaking without knowing that certain sections would be taught in different learning environments. The fifteen sections, chosen based on course length (50 minutes), meeting times (class beginning between 9:00 am and 2:30 pm), and availability of the instructor to teach three sections in the study, were placed into three different learning environments. These fifteen sections each met three times per week for 50 minutes per meeting. Instructors and students who declined participation were excluded from the study. Only one student in attendance on the day of survey administration declined participation.

A course in oral communication is required for graduation with the majority of students taking public speaking to meet this requirement. Public speaking is thereby

offered to students at all levels, canvassing a wide swath of university disciplines. When invited to complete a survey instrument, participants gave informed consent during a regularly-scheduled class meeting time.

The study also invited participation from the five instructors teaching these fifteen sections of public speaking. These instructors gave informed consent to the study at the beginning of the term. No first-time or graduate student instructors taught in this study. All instructors had previously taught this course at the university and all were categorized by the institution as "lecturers" holding Master's degrees in communication or related fields. One instructor was male; four were female.

Facilities

Three classrooms were used as designated space for study and all were located within the same classroom building, eliminating potential self-selection biases that students may have selected because of the vicinity of the classes to other campus facilities.

The first classroom was arranged with furniture typical to the institution (and most US college campuses): tablet-desks for each student and a podium with computer, LCD projector, and wall-mounted screen (see Figure 3.1). The desks were new Herman Miller Caper chair designs with attached foldable tablet desk. This classroom had fluorescent lighting controllable by wall switches and ambient light from two windows. The surfaces in the room (walls, floors, and wood surfaces) were all refinished or repainted prior to completion of the study.

Figure 3.1: Traditional classroom, from student perspective (left) and instructor perspective (right).

Classroom 1 will be referred to as the traditional classroom. Based on the properties of flexible space listed in Monahan (2002), this classroom had low versatility, low convertibility and no fluidity.

The second classroom had the same dimensions, computer equipment, refinishing, and lighting as the traditional classroom. However, this room was fitted with new mobile furniture on gliders, allowing it to move around the room with relative ease (see Figure 3.2).

This furniture consisted of multi-user tables and detached Caper chairs that could be arranged in various formations by the students and instructor, including, but not limited to: rows (seating 2 students per individual table), small groups (seating up to 6 students per constructed tables), and seminar tables (seating upwards of 20 students per constructed table).

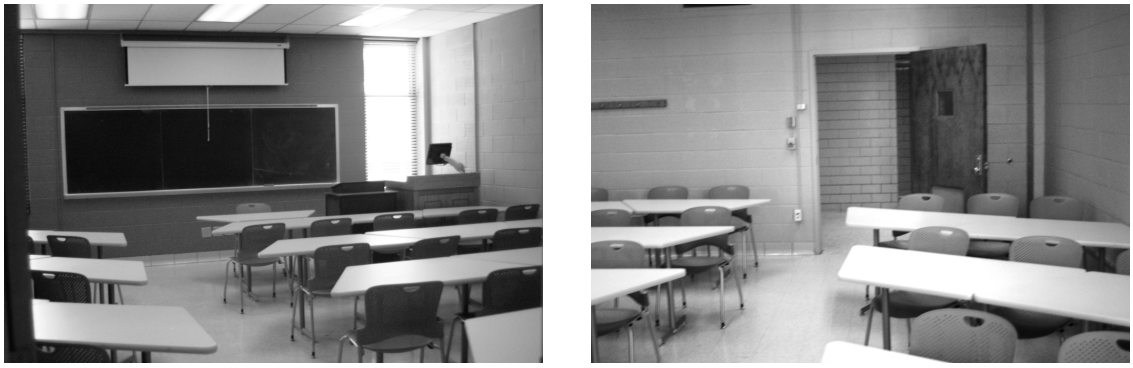


Figure 3.2: Versatile classroom, from student perspective (left) and instructor perspective (right).

This furniture allowed each student to have a shared workspace with other students, as well as enough desk space to spread out laptops, notebooks, and course materials. Classroom 2 will be referred to as the versatile classroom. Based on the properties of flexible space listed in Monahan (2002), this classroom had high versatility, moderate convertibility and no fluidity.

The third classroom was a "studio" space: two open, adjoining areas allowed different events to occur simultaneously in the same space (see Figure 3.3). The sections assigned to this classroom may move about the larger space based on their instructional needs as well as the needs of other users of the space. The furniture in this space was all mobile and offered various styles of seating. Classroom 3 will be referred to as the fluid classroom.


Figure 3.3: Fluid classroom, from a standing perspective (left) and a seated perspective (right).

Based on the properties of flexible space listed in Monahan (2002), this classroom had high versatility and high convertibility similar to the versatile classroom. In addition, it had high fluidity because it allowed movement of light, sound, people, and air throughout the space.

Experimental design

This study involved the students and the instructors across a single term allowing the course to operate from beginning to end. Each of the 15 sections was assigned to a particular classroom in one building. To control for instructor differences, each instructor taught three sections and was assigned to teach one section in each classroom. This design allowed the researcher to control for classroom building variations and time of day (see Figure 3.4). All classes met three times a week for 50 minutes, and all classes met on the same days each week. Classes were schedules to ensure that all three rooms were being utilized at the same times to control for any external factors that may impact user-

experience within a classroom building.

The course was based on a standardized syllabus with a common final exam; thus, the researcher was able to control for number and difficulty of assignments, frequency of practice, and learning expectations. Because the selected course was a general education requirement at the university, the researcher was able to enlist a variety of students from different majors, colleges, and class years throughout the university. The study design and instruments were all approved by the Institutional Review Board at the university (see Appendices A, B, and C).

19 students per section		Classroom Design		
		Traditional Classroom	Versatile Classroom	Fluid Classroom
Instructor	A	9:05	2:30	12:20
	B	10:10	9:05	2:30
	C	11:15	10:10	9:05
	D	12:20	11:15	10:10
	E	2:30	12:20	11:15

Figure 3.4: Study design concept based on classroom space and instructor.

Instrumentation

Student-Participant Data

A survey (see Appendix D) was administered at the end of the term to assess student experiences in the classroom and to measure teacher immediacy and competence from the student perspective. The instrument employed 7-point Likert scales and 7-point word comparison scales as well as 3 open-ended questions concerning classroom perceptions. Self-reported demographic and grade achievement information were collected. The use of appropriate scales for research questions one and two were determined by the set scales previously tested by prior researchers studying each specific research question (Sanders & Wiseman, 1990; Frymier & Shulman, 1995; Teven & McCroskey, 1997; McCroskey & Teven, 1999; Smythe & Hess, 2005). Three of the scales (two from Sanders & Wiseman, 1990; one from Smythe & Hess, 2005) were modified from 5-point Likert scales to 7-point Likert scales for greater variability and to maintain a stronger sense of internal consistency of the measures. The new 7-point scales were tested for reliability to ensure that they correlated with findings on the original scales, and all six modified scales demonstrated reliability scores similar to their originals.

Behavioral learning. Behavioral learning has been defined as the commitment of the student to the skills taught in a course (Sanders & Wiseman, 1990). Student perceptions of behavioral learning were measured using a modified version of the behavioral commitment scales used by Sanders and Wiseman (1990) consisting of two four-item measures based on the work of Andersen (1979). Participants were asked to

indicate their likelihood of enrolling in a course of the same subject matter and their likelihood of using the behaviors learned in the course using seven-point word comparison scales. Previous use of the scale (Sanders & Wiseman, 1990) has achieved an Alpha reliability of .91. In this study, the modified scale yielded a Cronbach's alpha score of .88.

Affective learning. Affective learning has been conceptually defined in the classroom as the emotional response of the student to the course, instructor, and content (Bloom, 1956). Affective learning was measured using a modified version of the scales of Sanders and Wiseman (1990) consisting of three four-item measures based again on the work of Andersen (1979). Participants were asked to rate the course, the course content, and the behaviors learned in the course using seven-point word comparison scales. Previous use of the scale (Sanders & Wiseman, 1990) has achieved an Alpha reliability of .95. In this study, the modified scale yielded a Cronbach's alpha score of .94.

Cognitive learning. Cognitive learning has been conceptually defined in the classroom as the comprehension, recall, and application of course content (Bloom, 1956). Cognitive learning was measured using responses to two scales (Richmond, McCroskey, Kearney, & Plax, 1987; Teven & McCroskey, 1997). Participants were asked to indicate on a scale of 1-7 how much they thought they learned in the class and how much they thought they could have learned in the same class given the ideal instructor. A "learning loss" score was obtained by subtracting item one from item two. For instance, if a student rated his learning as a "five", but indicated that if he had the ideal instructor, he would

have been able to rate his learning a "six", the learning loss score would be "one." In addition to these measures, students were asked to self-report their received or expected grades on major class projects and for the class overall.

Teacher credibility. Teacher credibility has been conceptually defined in the classroom as joint influence of the competence, trustworthiness, and caring of the instructor toward the students (Teven & McCroskey, 1997). Teacher credibility was measured using the Teacher Credibility Scale developed by McCroskey and Teven (1999) consisting of 18 items. Participants were asked to rate their professor on items relating to the constructs of competence, trustworthiness, and caring using 7-point word comparisons. Previous use of the scales for each construct (Teven & McCroskey, 1997; McCroskey & Teven, 1999) has achieved Alpha reliabilities ranging from .85 to .94. In this study, the scale yielded a Cronbach's alpha score of .94.

Teacher immediacy. Immediacy has been conceptually defined as the perceived intensity and interaction between communicators and their audience (Mehrabian, 1967), in this case between teacher and student. Teacher immediacy was measured using a modified version of the NICCI (Nonverbal Immediacy in College Classroom Instruction) developed by Smythe and Hess (2005) and consisting of eight items. Participants were asked to rate their perceptions of instructor immediacy behaviors using a Likert-type scale from one (strongly disagree) to seven (strongly agree). Previous use of the scale (Smythe & Hess, 2005) has achieved an Alpha reliability of .81. In this study, the modified scale yielded a Cronbach's alpha score of .82.

Teacher content relevance. Relevance has been conceptually defined in the classroom as the linkage between classroom content and student interests. Teachers who achieve high content relevance are those who create these linkages (Frymier & Shulman, 1995). Teacher content relevance was measured using a modified version of the relevance scale (Frymier & Shulman, 1995) consisting of 12 items. Participants were asked to indicate the frequency with which their teachers performed each behavior using a Likert-type scale from one (never) to seven (very often). Previous use of the scale (Frymier & Shulman, 1995) has achieved an alpha reliability of .88. In this study, the modified scale yielded a Cronbach's alpha score of .91.

Classroom practices. The frequency of typical chair configurations (rows vs. non-rows), active movement of furniture during class, and occurrence of group work during class were practices chosen to highlight some practices common to all classroom spaces studied. Participants were asked to respond to several items related to the frequency of these space-related behaviors using seven-point scales from one (never) to seven (very often).

Classroom perceptions. Ability to hear the instructor and other classmates, number of distractions, and overall comfort and enjoyment of the classroom space were perceptions chosen to illustrate student reactions to the studied spaces. Participants were asked to respond to a seven-point Likert-type scale from one (strongly disagree) to seven (strongly agree) by comparing the test classroom to "another classroom" on a seven-point comparison scale. Participants were also asked to respond to three open-ended free responses queries concerning their thoughts about their particular classroom space.

Instructor-Participant Data

In addition to the data collected from student surveys, instructors were asked to report in a journal any classroom activities which had to be modified, changed, or were otherwise influenced by the space of the classroom (see Appendix E). As each instructor taught the same class in each of the test rooms on any given day, they were asked to chronicle their comparisons of the classrooms.

Administration

The surveys were administered and collected by the researcher and two assistants on a single day at the end of the semester. A script was incorporated to ensure consistency of survey administration (see Appendix F) during the normal class meeting time and all instructors were asked to leave the room during survey administration. After collection, the surveys were immediately filed and only the researcher had access to the survey documents. Data was entered into SPSS for Windows version 15.0 as it appeared on the survey. The raw data was first cleaned for any missing values. On each of the scales (see Appendix D), reversed items were recoded so that scales could be computed.

Instructor journals were submitted electronically to the researcher following the end of the term. Only the researcher had access to copies of the journals, which identified their authors.

Data analysis

Student-Participant Data

To address research questions one and two, frequencies and correlations for scale variables were computed. Linear regression analyses were used to determine the model of

best-fit for the relationships between independent and dependent variables. Thus, ordinary least-squares regression examined the effects of a series of variables that could have proven significant as controls, such that they could be entered as factors in subsequent ANOVA models. Because ANOVA is a preferred statistical method for experimental research designs (Kerlinger & Lee, 2000), a 2 x 3 x 5 factorial ANOVA was obtained to detect significant main effects and interactions on each of the scale variables (behavioral learning, affective learning, and cognitive learning; teacher credibility, teacher content relevance, and teacher immediacy) across two levels of gender (a control which proved statistically significant based on linear regression), three levels of classroom design (traditional, versatile, and fluid), and five levels of instructor (A, B, C, D, and E). Due to concerns surrounding factorial designs and the frequency of Type I and Type II error rates (Smith, Levine, Lachlan, & Feduik, 2002), the analyses employed Bonferroni adjustments to compare the means of cells of relevant factors within the study design. This technique was used successfully by Witt and Schrodt (2006) in their comparisons of technology use, teacher immediacy, and student affect. To answer research questions about classroom practices, frequencies were run on classroom practices to compare the means by classroom. To address research questions about classroom perceptions, correlations were generated between various classroom comparison perceptions.

Instructor-Participant Data

Instructor journals were assessed individually. Direct quotes were identified from each journal related to the rooms and instructor perceptions of the four Research

Questions: student learning, instructor behavior, classroom practices, and classroom perceptions. Those quotations are reported in Chapter Four. Each journal was assessed individually so that the instructor assessments could be matched with quantitative scores to provide context to the quantitative results. Only five instructors were used in this study to add to the integrity of the design (see Figure 3.4). Thus, rather than formally coding these journals, each journal was assessed as an individual case study and used as a lens through which the researcher could understand consistencies or variations within reported student perceptions.

CHAPTER FOUR

RESULTS

This chapter reports the statistical findings in the student survey data as well as the instructor-participant data from semester-long journal entries.

Student-participant data

Research Questions 1 & 2

The first and second Research Questions concerned the impact of classroom space on perceptions of student learning and instructor behavior, respectively. Frequency data consisting of mean scores and standard deviations as well as minimum and maximum scores for all scale variables related to student learning (behavioral learning, affective learning, and cognitive learning loss) and instructor behavior (teacher credibility, teacher content relevance, and teacher immediacy) are reported in Table 4.1. In addition, correlations were generated for the scale variables and are reported in Table 4.2.

The first Research Question dealt with different types of student learning and whether there was a relationship between learning type and learning environment. Whereas Table 4.1 provides some of the overarching data, Table 4.2 begins to answer this question by showing that each form of learning was significantly correlated with all the others. The only negative correlations demonstrated were the relationships between cognitive *learning loss* and each other learning measure, suggesting that cognitive *learning* is positively correlated with each other measure. Thereby, one could aptly conclude that all measured forms of learning (behavioral, affective, and cognitive) positively relate to one another.

Table 4.1

Scores of Scale Variables for Perceptions of Student Learning and Instructor Behavior

Scale Variable	*M*	*SD*	Min.	Max.
	Student Learning			
Behavioral	38.97	9.70	8	56
Affective	71.29	11.29	23	84
Cognitive (Learning Loss)	.49	.92	0	6
	Instructor Behavior			
Credibility	112.79	13.61	45	126
Content Relevance	66.26	11.02	17	84
Immediacy	53.29	3.71	33	56

Table 4.2

Pearson correlations between student perception scales (n = 234)

Scale Variable	1	2	3	4	5	6	7
1. Behavioral Learning	--	.568*	-.268*	.387*	.381*	.225*	.118
2. Affective Learning		--	-.502*	.713*	.675*	.483*	.291*
3. Cognitive Learning (Loss)			--	-.605*	-.435*	-.494*	-.117
4. Teacher Credibility				--	.708*	.562*	.319*
5. Teacher Content Relevance					--	.526*	.389*
6. Teacher Immediacy						--	.126
7. Student Comfort [a]							--

[a] Student comfort was a one-item measure, rather than a scale created from multiple items.
* $p < .001$

The second Research Question dealt with different types of teacher behavior and whether there was a relationship between student perceptions of these behaviors and learning environment. Again, Table 4.1 provides some of the overarching data and Table 4.2 begins to answer this question by showing that each category of teacher behavior was significantly and positively correlated with all the others. In addition, all teacher behaviors were significantly correlated with all learning measures. One could aptly conclude that all forms of learning and all measured teacher behaviors positively relate to one another.

Linear regression analyses were used to determine the amount of variance in the system that could be attributed to demographic, room, and instructor control variables (see Tables 4.3, 4.4, 4.5, 4.6, 4.7, and 4.8). Control variables of race and gender as well as study variables of room and instructor were dummy-coded (0, 1) for linear regression because each of these variables is categorical rather than ordinal. For each variable that emerged as a significant predictor, post-hoc comparisons of the means were assessed to determine the direction of these differences. Directions of instructor differences are not reported here because, while the presence of these differences are important to this study, the directionality of these differences (e.g. does Instructor A elicit higher perceptions that Instructor B?) is not crucial in the study design.

Each linear regression table reveals statistical findings and indicates the amount of system variance that can be attributed to the proposed model. The amount of attributable variance skewed widely depending on learning type. Table 4.3 depicts the results of the linear regression analysis for the behavioral learning scale, indicating that the four variables assessed account for just 2.0 % of the variance in this system. This analysis indicates that gender (female) emerged as a significant predictor variable with females perceiving higher behavioral learning than males.

Table 4.3

Summary of Linear Regression Analysis for Variables Predicting Behavioral Learning (n = 234)

Variable	*B*	*SE B*	β
Gender (Female)	3.695	1.302	.190**
Race (White)	-2.690	2.236	-.097
Race (Other)	-3.245	3.598	-.072
Instructor (A)	.164	2.085	.006
Instructor (C)	2.691	1.977	.113
Instructor (D)	.594	1.950	.025
Instructor (E)	.865	2.047	.034
Classroom (Versatile)	2.271	1.569	.109
Classroom (Fluid)	1.574	1.568	.076

Note. adjusted $R^2 = .020$
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.4 depicts the results of the linear regression analysis for the affective learning scale and indicates that the four variables assessed account for 5.2 % of the system variance. In addition, this analysis indicates that gender (female), race (other), and instructor (D) emerged as significant predictor variables. Comparisons of the means indicate that females perceived higher affective learning than males and African-American students perceived higher affective learning than White or "other" students.

Table 4.4

Summary of Linear Regression Analysis for Variables Predicting Affective Learning (n = 234)

Variable	*B*	*SE B*	β
Gender (Female)	3.198	1.489	.142*
Race (Black)	1.695	2.559	.044
Race (Other)	-7.615	3.456	-.145*
Instructor (A)	2.748	2.386	.093
Instructor (C)	-.564	2.248	-.020
Instructor (D)	-4.704	2.231	-.172*
Instructor (E)	-1.299	2.356	-.044
Classroom (Versatile)	-.062	1.800	-.003
Classroom (Fluid)	-.965	1.793	-.040

Note. adjusted $R^2 = .052$
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.5 depicts the results of the linear regression analysis for the cognitive learning loss measure and indicates that the four variables assessed account for 9.9 % of the system variance. Race (other), classroom (fluid), and instructor (D) emerged as significant predictor variables in this system. Comparisons of the means indicate that students who identified as "other" perceived higher cognitive learning loss than White or African-American students; and that students in the fluid classroom perceived higher cognitive learning loss than students in the versatile or traditional classrooms.

Table 4.5

Summary of Linear Regression Analysis for Variables Predicting Learning Loss Score (n = 234)

Variable	*B*	*SE B*	β
Gender (Female)	-.160	.120	-.087
Race (White)	.140	.210	.052
Race (Other)	.822	.332	.193*
Instructor (A)	-.073	.196	-.030
Instructor (C)	-.047	.183	-.020
Instructor (D)	.600	.180	.267**
Instructor (E)	.112	.187	.047
Classroom (Versatile)	.063	.146	.032
Classroom (Fluid)	.363	.144	.185*

Note. adjusted $R^2 = .099$
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.6 depicts the results of the linear regression analysis for the teacher credibility scale, indicating that the four variables assessed account for 12.6 % of the variance in this system. Many variables emerged as significant predictor variables: gender (female), race (other), and instructor (A, B, C, and E). Comparisons of the means indicate that females perceived higher teacher credibility than males; and that African-American students perceived higher affective learning than White or "other" students, in that order.

Table 4.6

Summary of Linear Regression Analysis for Variables Predicting Teacher Credibility (n = 234)

Variable	*B*	*SE B*	β
Gender (Female)	4.974	1.706	.183**
Race (White)	-2.934	2.893	-.076
Race (Other)	-15.592	4.717	-.245**
Instructor (A)	8.827	2.750	.247**
Instructor (B)	8.829	2.564	.266**
Instructor (C)	10.925	2.576	.327***
Instructor (E)	5.792	2.672	.165*
Classroom (Versatile)	-.776	2.043	-.027
Classroom (Fluid)	-2.075	2.069	-.071

Note. adjusted $R^2 = .126$
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.7 depicts the results of the linear regression analysis for the teacher content relevance scale, indicating that the four variables assessed account 11.7 % of system variance. Gender (female), race (white and other), instructor (A, C, and E) each emerged as a significant predictor variable in this system. Comparison of the means indicate that females perceived higher teacher content relevance than males; and that African-American students perceived higher content relevance than White or "other" students, in that order.

Table 4.7

Summary of Linear Regression Analysis for Variables Predicting Teacher Content Relevance (n = 234)

Variable	*B*	*SE B*	β
Gender (Female)	4.185	1.382	.191**
Race (White)	-4.662	2.344	-.149*
Race (Other)	-12.793	3.821	-.250**
Instructor (A)	8.032	2.227	.278***
Instructor (B)	3.377	2.077	.126
Instructor (C)	5.317	2.098	.196*
Instructor (E)	4.279	2.151	.153*
Classroom (Versatile)	-.426	1.657	-.018
Classroom (Fluid)	1.717	1.674	.073

Note. adjusted $R^2 = .117$
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.8 depicts the results of the linear regression analysis for the teacher immediacy scale and indicates that the four variables assessed account for 7.7 % of system variance. Gender (female), race (other), and instructor (D) emerged as significant predictor variables in this system. Comparison of the means indicate that females perceived higher teacher immediacy than males; and that African-American students perceived higher teacher immediacy than White or "other" students, in that order.

Table 4.8

Summary of Linear Regression Analysis for Variables Predicting Teacher Immediacy (n = 234)

Variable	*B*	*SE B*	β
Gender (Female)	1.249	.475	.169**
Race (White)	-.155	.810	-.015
Race (Other)	-2.957	1.321	-.170*
Instructor (A)	.211	.769	.021
Instructor (C)	-.410	.720	-.045
Instructor (D)	-1.547	.715	-.032*
Instructor (E)	.726	.744	.076
Classroom (Versatile)	-.240	.571	-.030
Classroom (Fluid)	-1.054	.575	-.133

Note. adjusted $R^2 = .077$
* $p < .05$, ** $p < .01$, *** $p < .001$

The least attributable variance was found in the behavioral learning model, followed by affective learning and teacher immediacy. The most attributable variance was found among teacher credibility, teacher content relevance, and cognitive learning. In these analyses, each scale for student learning and each scale for teacher behavior was assessed to determine if student gender or race could be a significant control. Gender was found to be a significant control for five of the six scales. Because gender proved to have a significant effect on system variance in a number of cases, it was included as a control in subsequent ANOVAs.

The race "other" was found to be a significant control in five of the six scales. But, due to the low count (N = 11) of students indicating "other" and due to the possibility of multiple races within the "other" category, race was not considered to be a significant control and was not included in subsequent ANOVAs. Based on the data in these tables, one could conclude that an analysis of variance model including differences in gender, instructor, and classroom may hold some predictive value in assessing student learning and instructor behaviors.

Based on the results of the linear regression analyses and because ANOVA is a preferred method of analysis in experimental designs (Kerlinger & Lee, 2000), 2 x 3 x 5 factorial ANOVAs were run on each of the devised scales. For significant interactions, the means were plotted to demonstrate the nature of the effect. For significant findings related to classroom, post-hoc Bonferroni tests were used to determine the relationship between rooms. These post-hoc tests were not used to address instructor differences because, while these differences are important to this study, the directionality of these

differences (e.g. does Instructor A achieve higher perceptions that Instructor B?) is not crucial in the study design. However, these differences can be viewed in many of the subsequent charts and graphs.

RQ 1a. Research Question 1a dealt with the impact of the classroom on measures of behavioral learning. For the behavioral learning scale, the results of the factorial ANOVA yielded a significant interaction effect for classroom by instructor, F (8, 196) = 3.25, p = .002. The interaction effect is plotted in Figure 4.1. Based on the means depicted in this figure, student perceptions of behavioral learning in the traditional and versatile classrooms were much less diversified than those in the fluid classroom. The converse lines of Instructors C and D in Figure 1 underscore the differences that may result when instructors are placed into different classrooms.

The main effect for classroom, F (2, 196) = .643, p = .527, and the main effect for instructor, F (4, 196) = .461, p = .764, were not significant. However, gender did demonstrate a main effect on behavioral learning, F (1, 196) = 12.48, p = .001, with post-hoc comparisons of the means indicating that female students perceived higher behavioral learning than male students. The interactions between gender and other variables were not statistically significant: gender by instructor, F (4, 196) = .832, p = .506, gender by classroom, F (2, 196) = 1.37, p = .257, gender by room by instructor, F (8, 196) = 1.26, p = .269. In sum, these results may demonstrate that the combination of instructor and classroom space could have some influence on behavioral learning.

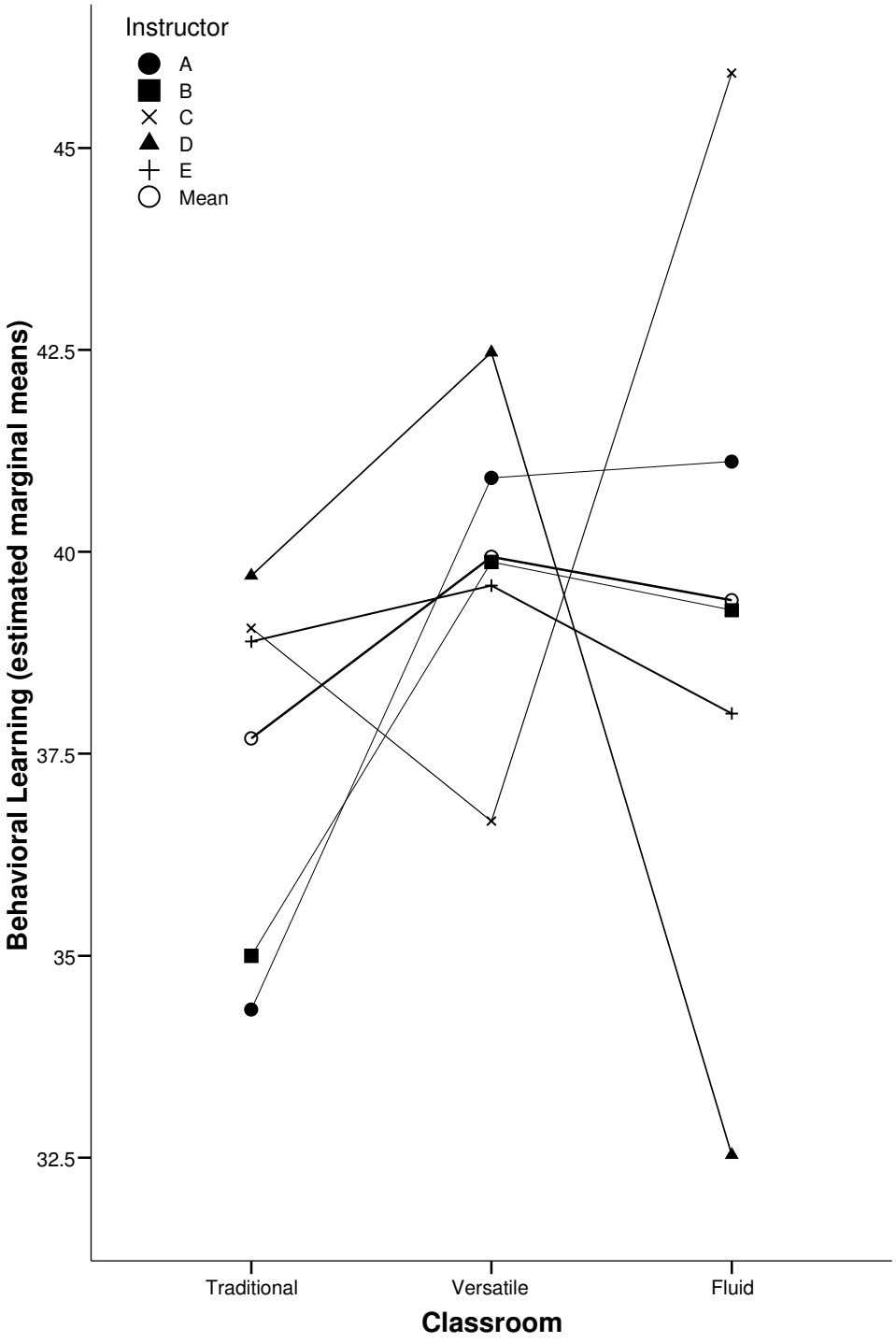


Figure 4.1: Estimated means on behavioral learning scale for classroom and instructor

RQ 1b. Research Question 1b dealt with the impact of the classroom on measures of affective learning. For the affective learning scale, the results of the factorial ANOVA yielded a significant interaction effect for classroom by instructor, F (8, 212) = 4.68, $p <$ .001, and a significant main effect for instructor, F (4, 212) = 3.29, p = .012. The main effect for classroom, F (2, 212) = 0.13, p = .881, was not significant. The interaction effect is shown in Figure 4.2. Student perceptions of affective learning were relatively consistent across instructors in the traditional classroom, but became more diversified in the other two rooms.

Gender demonstrated a main effect on affective learning, F (1, 196) = 9.17, p = .003, with post-hoc comparisons of the means indicating that female students perceived higher affective learning than male students. However, the interactions between gender and the other variables were not statistically significant: gender by instructor, F (4, 196) = 1.664, p = .160, gender by classroom, F (2, 196) = 1.36, p = .258, gender by room by instructor, F (8, 196) = 1.23, p = .281. These results indicate that affective learning may indeed be influenced by both instructor differences and the combination of instructor and classroom space.

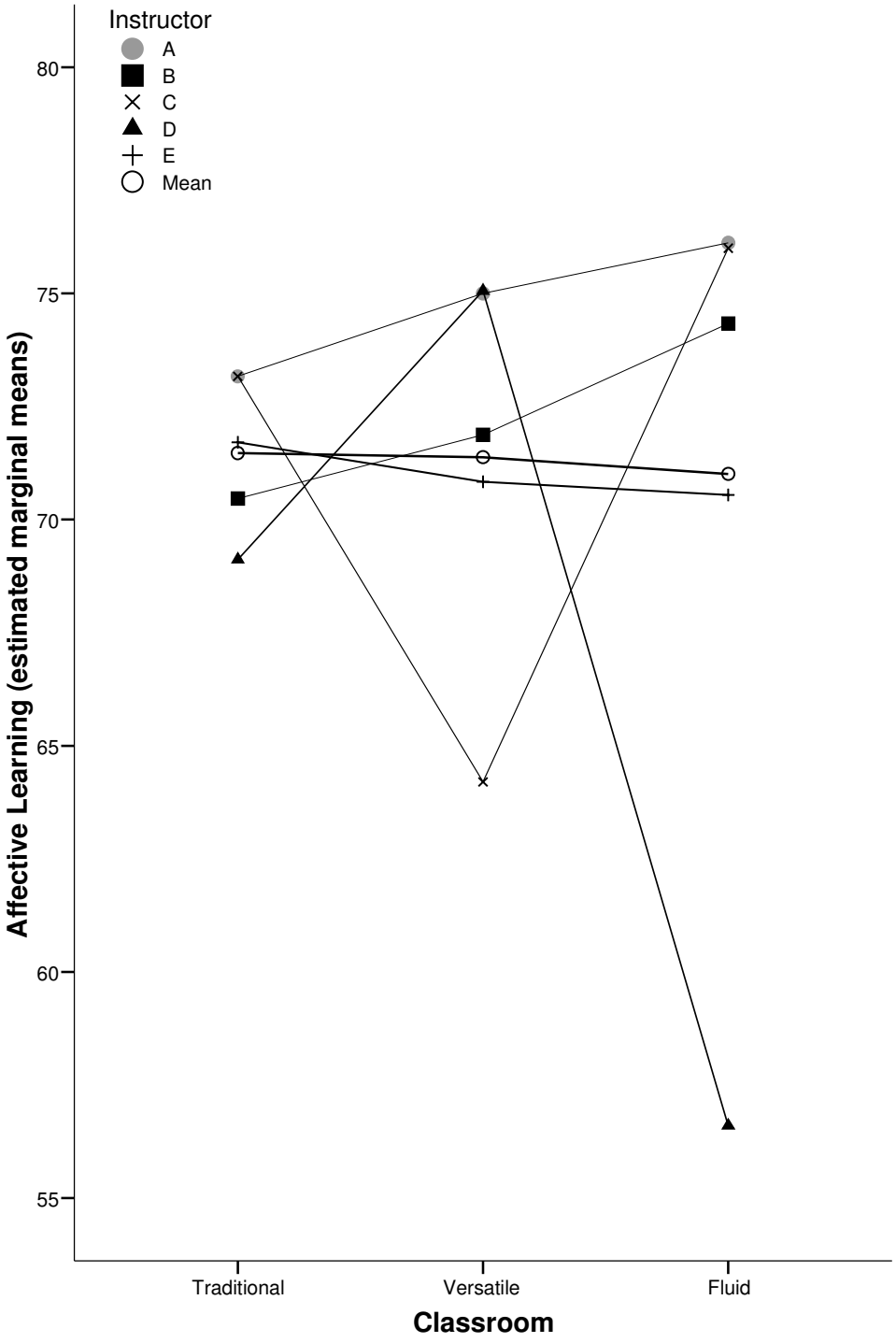


Figure 4.2: Estimated means on affective learning scale for classroom and instructor

RQ 1c. Research Question 1c dealt with the impact of the classroom on measures of cognitive learning. For the cognitive learning measure (learning loss score), the results of the factorial ANOVA yielded a significant interaction effect for classroom by instructor, F (8, 208) = 2.62, p = .009, and a significant main effect for instructor, F (4, 208) = 5.83, $p < .001$. The main effect for classroom, F (2, 208) = 1.30, p = .276, was not significant. The interaction effect is shown in Figure 4.3. Student perceptions of cognitive learning loss were relatively consistent in the traditional and versatile rooms compared to the fluid classroom.

For cognitive learning loss, the interaction of gender by classroom, F (2, 191) = .46, p = .632, was not significant. The main effect of gender, F (1, 191) = 3.53, p = .062, was not significant; the same held true for the interaction effect of gender by room by instructor interaction, F (8, 191) = 1.77, p = .085. These two results could be considered significant at a broader measure of significance, and thus may merit further discussion. However, the interaction effect for gender by instructor, F (4, 191) = 3.03, p = .019, was significant. This interaction is plotted in Figure 4.4. These results may demonstrate that student gender, instructor, and classroom may be related to cognitive learning.

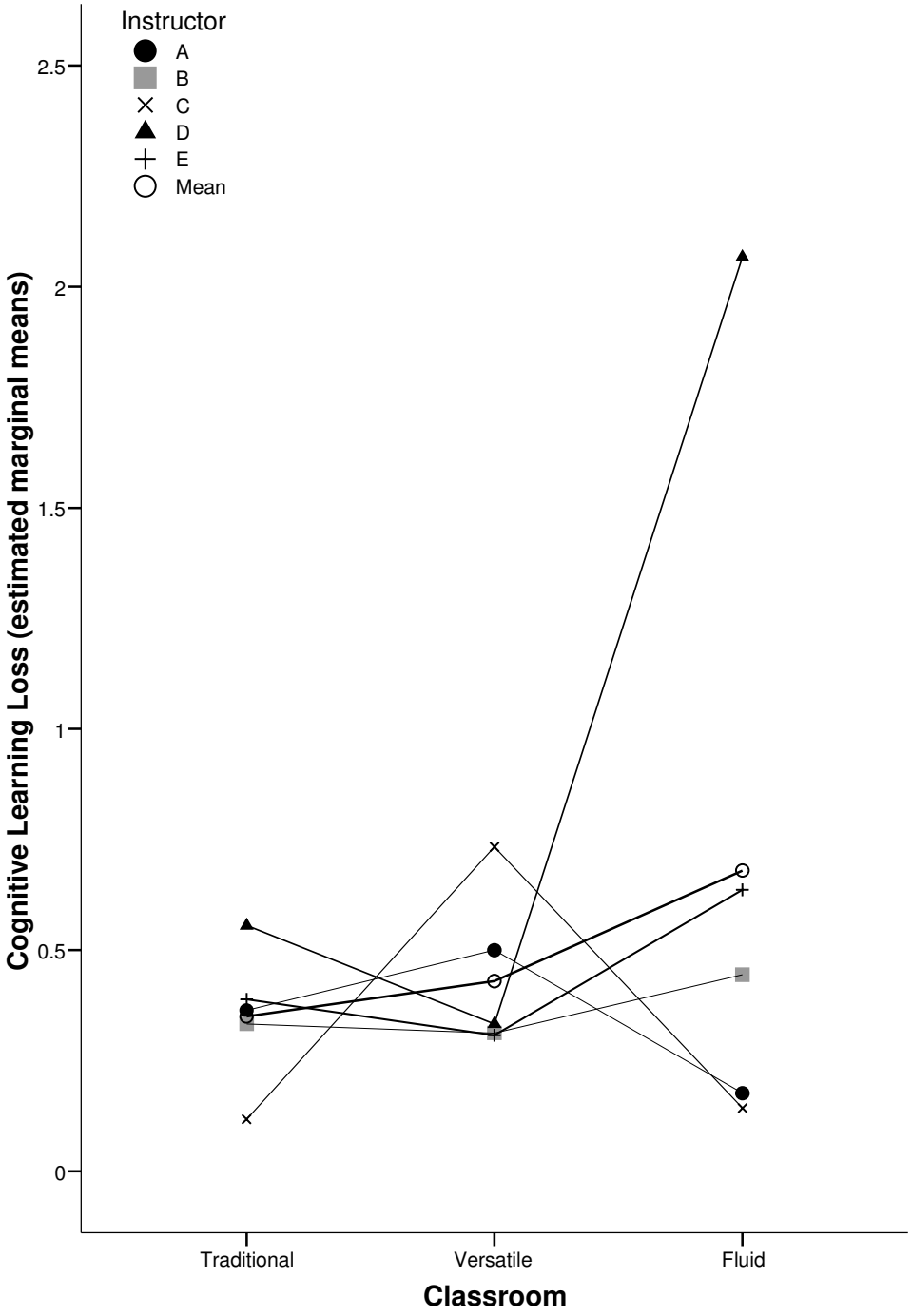


Figure 4.3: Estimated means on cognitive learning loss score for classroom and instructor

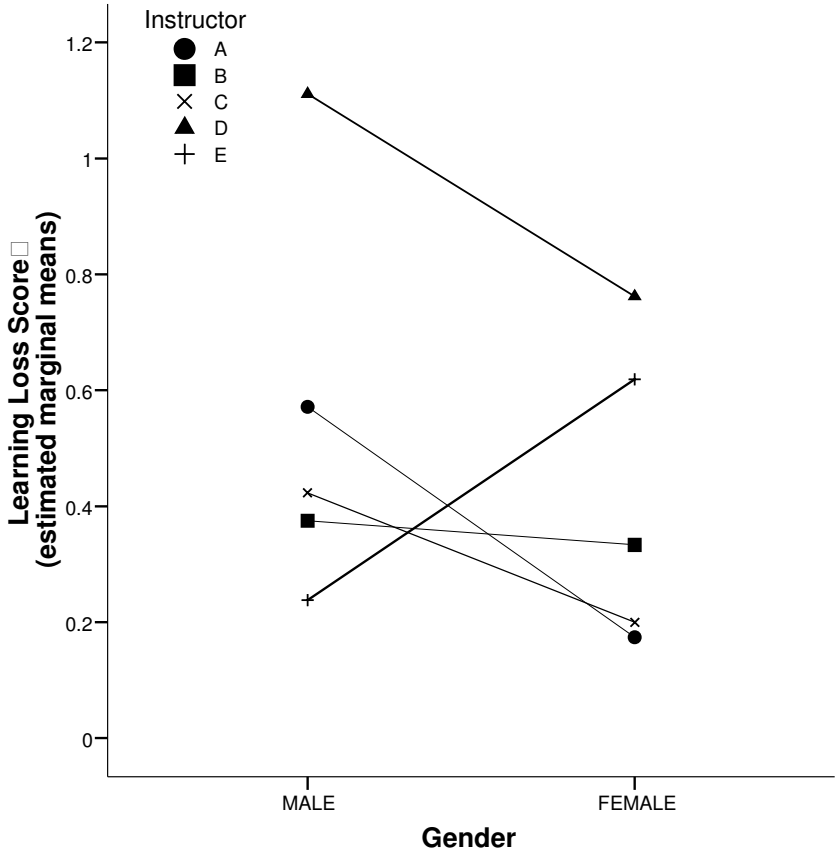


Figure 4.4: Estimated means on cognitive learning loss score for gender and instructor

To better understand the findings related to cognitive learning loss, cognitive learning was also measured as a function of reported/anticipated final grades. For the self-reported final grade, the results of the factorial ANOVA yielded significant main effects for instructor, F (4, 190) = 3.70, p = .006, gender, F (1, 190) = 4.71, p = .031, and classroom, F (2, 190) = 3.51, p = .032. Like the cognitive learning loss measure, measures of anticipated grades indicate that gender, instructor, and classroom may each

relate to cognitive learning. Interaction effects were not significant for classroom by instructor, F (8, 190) = .785, p = .616, gender by instructor, F (4, 190) = .795, p = .530, gender by room, F (2, 190) = .483, p = .617, and gender by room by instructor, F (8, 190) = .826, p = .581.

Post-hoc Bonferroni tests demonstrated that the mean final grade expected in the fluid classroom was significantly higher than the final grade expected in the versatile classroom and higher than the final grade expected in the traditional classroom, but not significantly so. In addition, post-hoc comparisons of the means indicated that female students' perceived overall grades were higher than those of male students. These results may further confirm the findings that student gender, instructor, and classroom all impact student cognitive learning.

RQ 2a. Research Question 2a dealt with the impact of the classroom on measures of teacher credibility. For the teacher credibility scale, the results of the factorial ANOVA yielded a significant interaction effect for classroom by instructor, F (8, 199) = 5.80, p <.001, and a significant main effect for instructor, F (2, 199) = 6.36, p < .001. The main effect for classroom, F (2, 215) = .73, p = .481, was not significant. The interaction effect is depicted in Figure 4.5. Student perceptions of teacher credibility were relatively consistent across instructors in the traditional and versatile classrooms, but became more diversified in the fluid room.

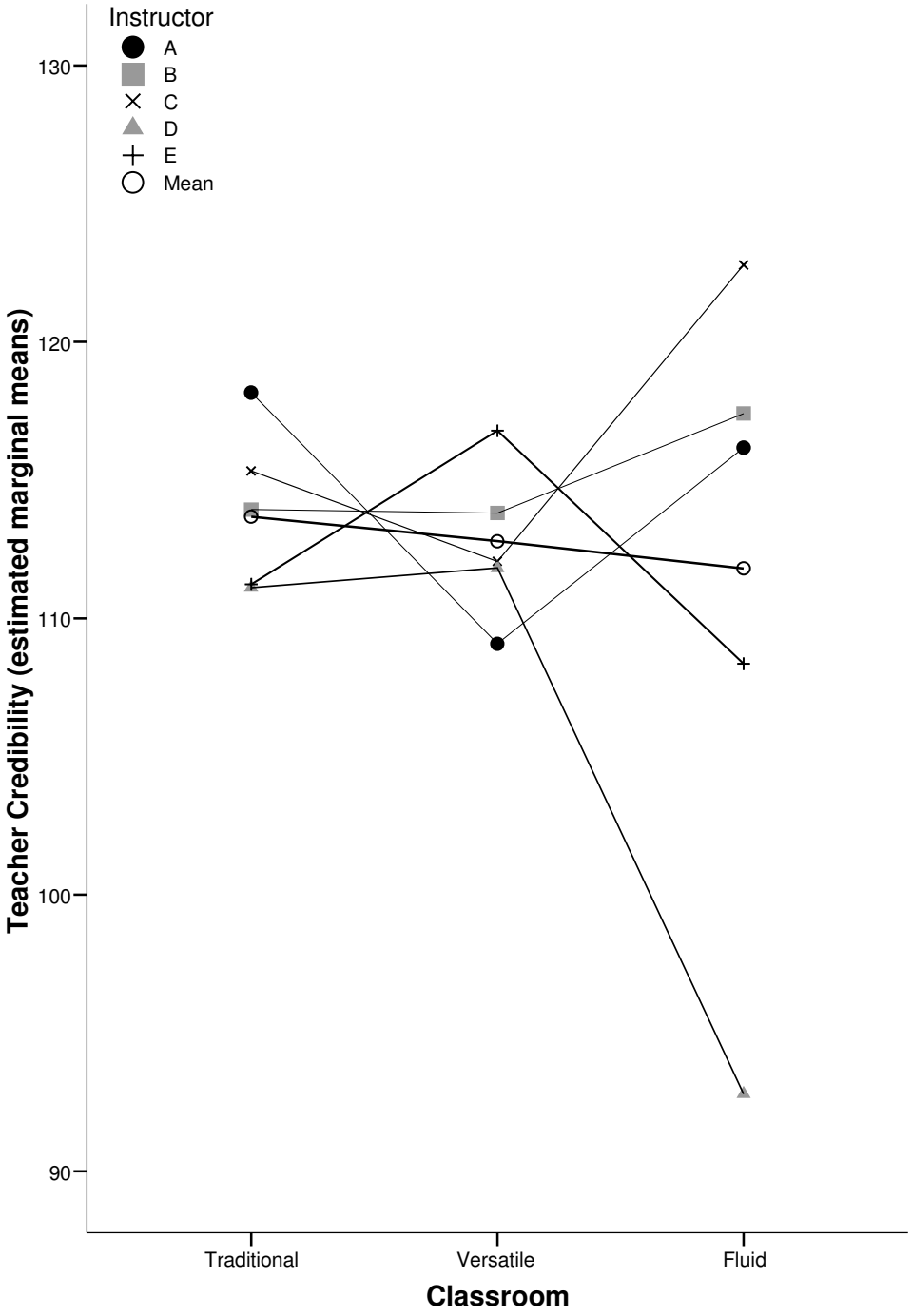


Figure 4.5: Estimated means on teacher credibility scale for classroom and instructor

Gender did demonstrate a main effect on teacher credibility, F (1, 199) = 11.45, p = .001, with post-hoc comparisons of the means indicating that female students perceived higher levels of teacher credibility than did male students. However, the interactions between gender and the other variables were not statistically significant: gender by instructor, F (4, 199) = 2.38, p = .053, gender by classroom, F (2, 196) = .414, p = .662, gender by room by instructor, F (8, 196) = 1.18, p = .315. In sum, these results indicate that the combination of instructor and classroom may influence student perceptions of teacher credibility.

RQ 2b. Research Question 2b dealt with the impact of the classroom on measures of teacher content relevance. For the teacher content relevance scale, the results of the factorial ANOVA yielded a significant interaction effect for classroom by instructor, F (8, 199) = 5.79, $p < .001$, and a significant main effect for instructor, F (4, 199) = 4.05, p = .004. The main effect for classroom, F (2, 199) = .765, p = .467, was not significant. The interaction effect is depicted in Figure 4.6. Like the behavioral learning interaction depicted in Figure 4.1, Instructors C and D demonstrate converse and opposing scores which are similar in the traditional room, but largely different in the versatile and fluid room.

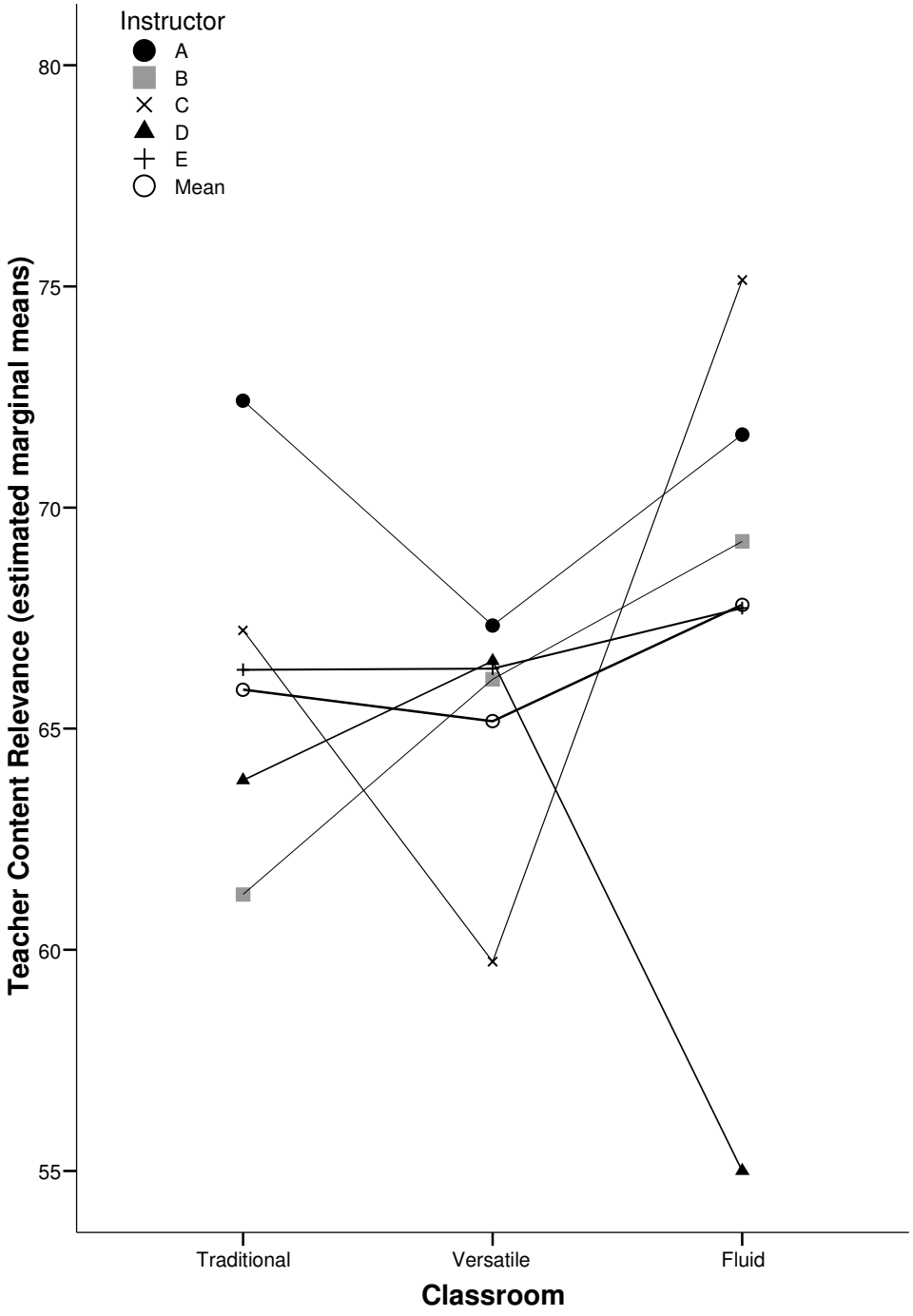


Figure 4.6: Estimated means on content relevance scale for classroom and instructor

Gender did demonstrate a main effect on teacher content relevance, F (1, 199) = 14.12, $p < .001$, with post-hoc comparisons of the means indicating that female students perceived higher teacher content relevance than male students. However, the interactions between gender and the other variables were not statistically significant: gender by instructor, F (4, 199) = 1.83, $p = .124$, gender by classroom, F (2, 199) = .234, $p = .792$, and gender by room by instructor, F (8, 199) = .765, $p = .634$. Like the results for teacher credibility, these results indicate that the combination of instructor and classroom may influence student perceptions of teacher content relevance.

RQ 2c. Research Question 2c dealt with the impact of the classroom on measures of teacher immediacy. For the teacher immediacy scale, the results of the factorial ANOVA yielded a significant interaction effect for classroom by instructor, F (8, 202) = 4.62, $p < .001$, a significant main effect for instructor, F (4, 202) = 3.99, $p = .004$, and a significant main effect for classroom, F (2, 202) = 3.25, $p = .041$. The interaction effect and directions of these relationships are depicted in Figure 4.7. Post-hoc Bonferroni tests indicate that the traditional classroom had higher immediacy scores than the other two classrooms, however, none of these differences were statistically significant.

Gender did demonstrate a main effect on teacher immediacy, F (1, 202) = 9.35, $p = .003$, with post-hoc comparisons of the means indicating that female students perceived higher teacher immediacy than male students. The interaction effect for gender by instructor, F (4, 202) = 3.01, $p = .019$, was also significant. This interaction is plotted in Figure 4.8.

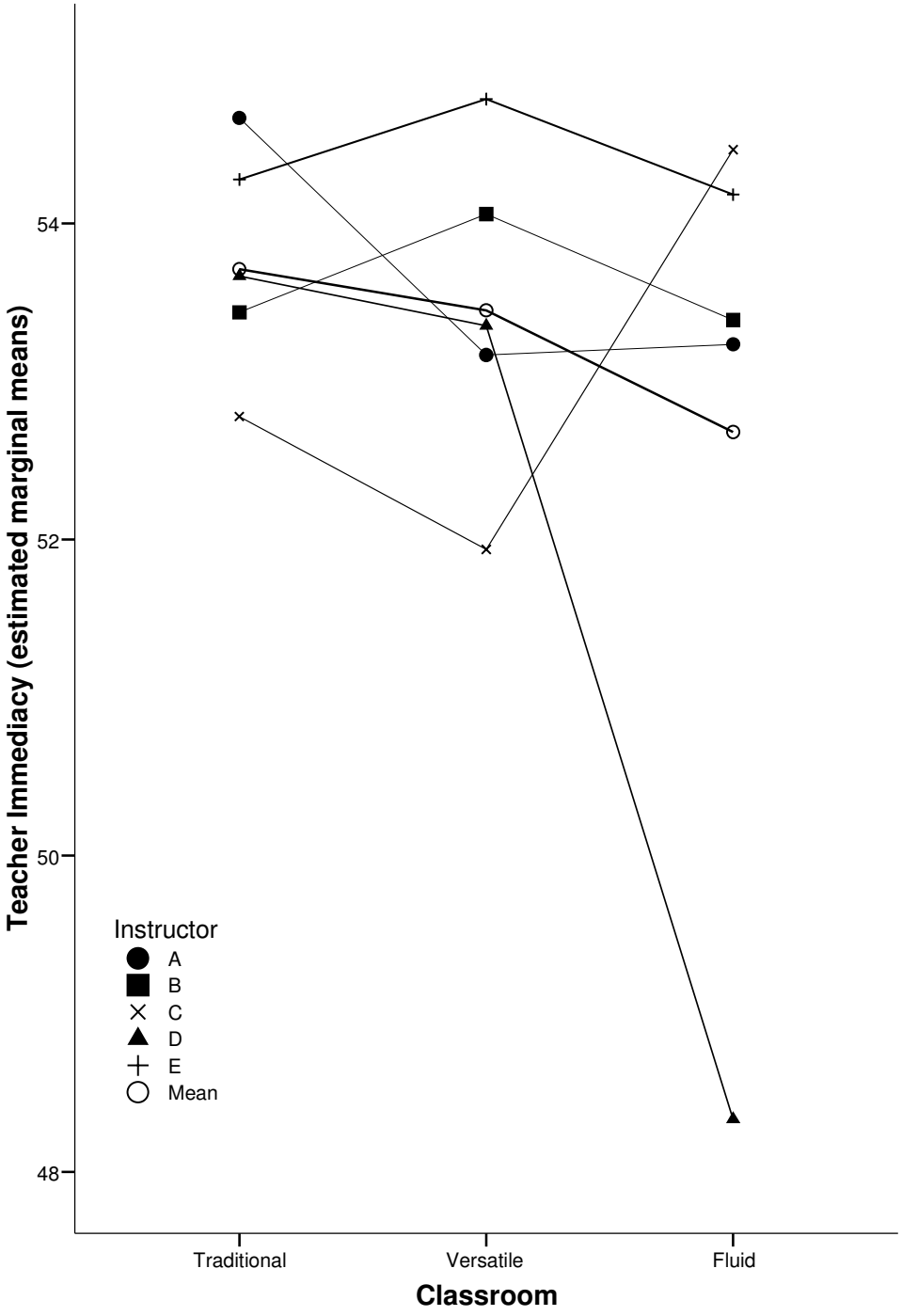


Figure 4.7: Estimated means on teacher immediacy scale for classroom and instructor

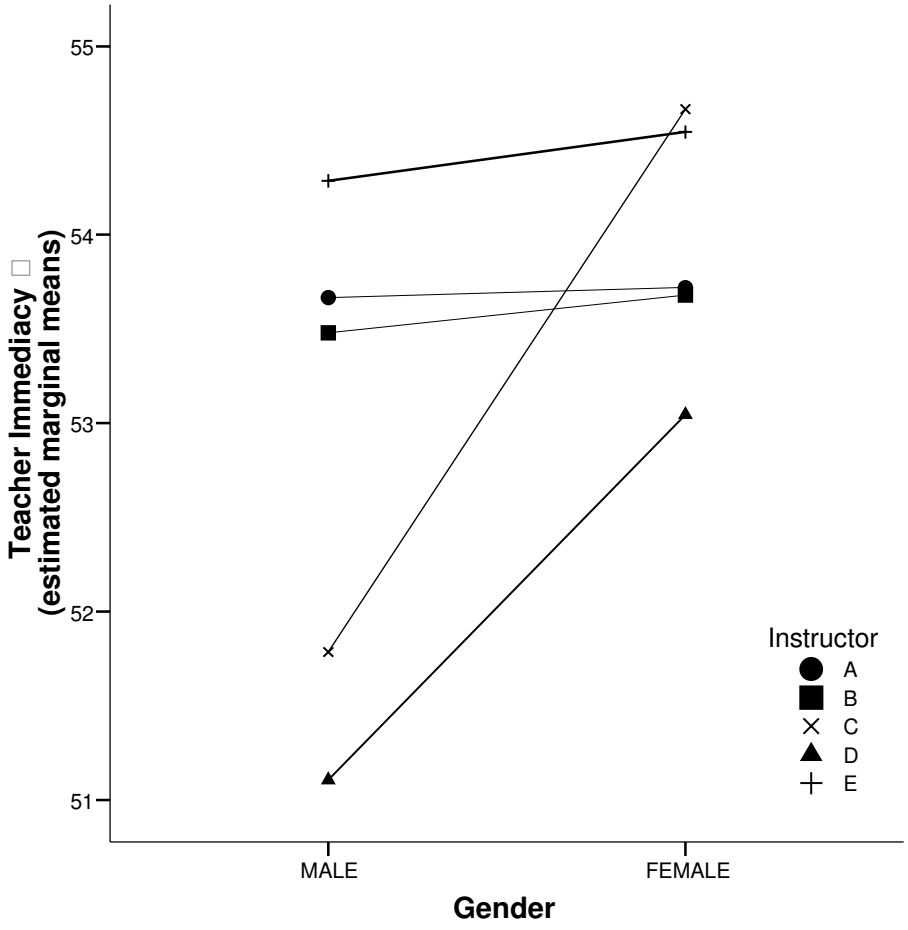


Figure 4.8: Estimated means on teacher immediacy scale for gender and instructor.

The interactions between gender and the other variables were not statistically significant: gender by classroom, F (2, 202) = .343, p = .710, gender by room by instructor, F (8, 202) = 1.79, p = .081. These results indicate that gender, instructor, and classroom may impact student perception of teacher immediacy behaviors.

Research Question 3

The third Research Question concerned the impact of classroom space on classroom practices. The survey asked students to indicate how often they sat in rows, sat in formations other than rows, moved the furniture in the room, and how often they worked in groups in class. Table 4.9 lists the mean scores and standard deviations for student perceptions of measured classroom practices, indicating that students reported differences between the fluid classroom and the other two rooms. Using ANOVAs to test the significance of these differences, three of the four measures were shown to be significantly impacted by classroom: frequency of sitting in rows, F (2, 231) = 1586.68, p = .001, frequency of sitting in configurations other than rows, F (2, 230) = 64.60, p = .001, and frequency of moving the furniture, F (2, 231) = 69.91, p = .001. The effect of classroom on frequency of group work was not significant, F (2, 229) = 2.31, p = .10.

Table 4.9

Means for Perceptions of Classroom Practices by Classroom

	Traditional (n=82)		Versatile (n = 76)		Fluid (n = 76)	
Item	*M*	*SD*	*M*	*SD*	*M*	*SD*
How often did the class…						
sit in rows	6.66	.613	6.78	.556	1.33	.855
sit in formations other than rows	3.00	1.361	2.47	1.379	5.45	2.294
work in groups	4.35	.964	4.33	1.025	4.69	1.498
move the furniture	3.33	1.287	2.87	1.330	5.49	1.740

Post-hoc Bonferroni analyses indicate that the means of the fluid classroom were significantly different than the other two means in each of these three cases. Table 4.9 indicates the directions of these differences. One could aptly conclude from the data that classrooms influence the practices that occur within them, even if the course and lesson plans are held constant.

Research Question 4

Research Question 4 concerned the impact of classroom space on student perceptions of classroom spaces. Table 4.10 lists means and standard deviations related to classroom atmosphere.

Table 4.10

Means for Classroom Atmosphere Perceptions by Classroom

	Traditional (n=82)		Versatile (n = 76)		Fluid (n = 76)	
Item	*M*	*SD*	*M*	*SD*	*M*	*SD*
Compared to other classrooms…						
this classroom is more comfortable	4.62	1.29	4.68	1.29	5.76	1.38
this classroom is more enjoyable	4.50	1.18	4.49	1.33	5.30	1.75
this classroom has more distractions	3.48	1.43	3.36	1.61	5.01	1.77
I can better hear the instructor here	5.44	1.38	5.25	1.86	4.76	1.80
I can better hear my classmates here	5.46	1.29	5.20	1.77	4.74	1.77
I would enjoy another class here	4.74	1.46	4.29	1.70	5.07	1.98
I would rather give speeches here	5.09	1.53	4.53	1.92	4.59	2.09

Note. These items asked students to compare "this room" to "another room." A mean of 4.00 on this scale would be neutral. Thus, a score above 4.00 indicates agreement with the statement listed in this table, whereas a score lower than 4.00 indicates disagreement with the statement listed in this table.

Table 4.11

Pearson correlations between perceptions of classroom practices and atmosphere perceptions (n = 234)

Variable	1	2	3	4	5	6	7	8	9
1. Frequency of sitting in rows	--	-.150*	-.602**	-.351**	-.254**	-.406**	.158**	.158**	-.147**
2. Frequency of group work		--	.307**	.271**	.234**	-.105	.094	.098	.157**
3. Frequency of moving furniture			--	.297**	.257**	.238**	.027	.003	.169**
4. Student comfort [a]				--	.733**	.014	.238**	.244**	.601**
5. Enjoyability [a]					--	.009	.339**	.329**	.621**
6. Frequency of distractions [a]						--	-.308**	-.305**	-.010
7. Ability to hear the instructor [a]							--	.899**	.430**
8. Ability to hear classmates [a]								--	.442**
9. Desirability of the room for another class [a]									--

[a] These measures asked students to compare "this room" to "another room."
* $p < .05$, ** $p < .001$

Students rated the fluid classroom as more comfortable and more enjoyable than the other two classrooms, however, they indicated that, in comparison to the other two rooms, the fluid classroom had more distractions and made it harder to hear the instructor and other class members.

A correlation matrix (Table 4.11) demonstrates the relationships among these variables and between these variables and selected classroom practices. This correlation matrix demonstrates that the frequency of group work, frequency of moving furniture, comfort, enjoyability, ability to hear the instructor and ability to hear classmates are all positively correlated with the desirability of the room for another class; however, the

frequency of sitting in rows is negatively correlated with desirability of the room, among other measures including enjoyability and comfort. Students perceptions of comfort and enjoyability were not correlated with the frequency of distractions in the rooms. These findings indicate that perceptions about classroom space are influenced by classroom space. One might conclude from this data that students do perceive differences between classrooms and that these differences are noteworthy.

Instructor-participant data

The quantitative data analysis addressed each Research Question in the previous section. In an effort to pair qualitative data with the quantitative analyses, compilations of relevant quotations from each instructor's journal are listed below.

Instructor A

Instructor A rated the fluid classroom as the favorite learning space followed by the traditional classroom and then the versatile classroom. About the traditional classroom, this instructor wrote:

> The bad thing (about the traditional classroom) is that it is very traditional and as a result I think the students fall into the traditional student teacher role. They will answer questions but they don't volunteer an answer or an opinion.

Concerning the versatile classroom, Instructor A wrote:

> They (the students in the versatile classroom) have a very good understanding of the terms, but don't get the big picture of putting together a speech and communicating with the audience. Maybe that is a benefit and drawback of a more lecture based class.

About the fluid classroom, Instructor A wrote:

> I often feel like (the class in the fluid classroom) is getting a different experience. Whereas I might cover something through lecture, example, exercise in the other classes, in this class it gets covered through a discussion… Prior to this class I think only two of them knew each other. After class I will often see about 6 of them in a circle outside of the (classroom) continuing on with a discussion that was started in class.

This instructor's scores for learning in Figures 4.1, 4.2, and 4.3. On all three measures, student learning was higher in the fluid environment than the other two rooms.

The instructor also commented on teacher behaviors in each of the rooms: "I felt that I was a stronger, more creative teacher in this (fluid) room." About the traditional classroom, the instructor wrote, "Now this is a room I am used to … I know how to control a classroom like this. I know how to maneuver in a classroom like this." About the versatile room, the instructor wrote, "I am much more likely to just stay at the front of the room. It feels very weird to move around." This instructor's scores on all teacher behavior scales (see Figures 4.5, 4.6, 4.7) indicated declines in scores for the versatile classroom.

This instructor also spent a large portion of the journal describing the arrangement of furniture in each of the rooms and its effect on student participation in class. To describe the traditional classroom, Instructor A repeatedly referenced the "nice, neat rows" and "blank stares" from students. The instructor commented that, "If I keep them

in rows, they won't say anything, but if the whole class is in one big circle, they talk up a storm."

To describe the versatile classroom, the instructor repeatedly used the word, "cramped," indicating that the room made the instructor "feel fat" and "surrounded." However, this instructor also wrote that, the students "talk a great deal with the people who share their table."

To describe the fluid classroom, Instructor A called the furniture "easy to move around" and suggested that the students "were used to communicating with each other and looking at each other." This instructor identified the possibility of distractions in this room and called the interruptions "a wonderful teaching tool," saying, "You can never be in control of your speaking environment."

Instructor A's feedback indicates that this instructor noticed differences related to student learning and instructor behavior that were supported by quantitative student data. In addition, Instructor A detailed differences in classroom practices and perceptions from the instructor perspective that correspond with student data about the three rooms.

Instructor B

Instructor B ranked classroom preference in the following order: traditional, versatile, fluid, commenting that "I believe there were many positives and a few negatives with each setting.…Even with the difficulties experienced in the (fluid classroom), that there are a number of positives that came from that setting." Two positives this instructor referenced for the fluid classroom were "rapport building" and the students' "greater esprit d corps than the other classes." Note that, for this instructor,

affective learning increased in the fluid classroom (see Figure 4.2). The difficulties referenced by this instructor in the fluid classroom related to "interruptions" and "visiting classes" that were using the other spaces in the fluid room rather than their assigned classroom. Student data indicates higher number of distractions in the fluid room as well (see Table 4.10). The instructor also commented on the impact of these positives and negatives on student speeches:

> The oft-maligned (fluid classroom) may have been the best setting for this (informal speaking) exercise. The students improvised and adapted very well. One student even incorporated the furniture and some of the students into his presentation to great effect. We did have one speaker distracted by a group that walked through without regard to the speaker. I continue to grow frustrated with the rudeness demonstrated.

Related to teacher behaviors, this instructor wrote, "I am sort of an old school, chalkboard kind of (person)." On most days, the instructor indicated "nothing of note to report" or that "all went well" in all rooms. On days in which students were giving speeches, this instructor twice (out of fourteen speech days) opted to relocate speeches to an area other than the fluid classroom, writing that, "I still do not feel that it is an ideal setting for a public speaking class, though it is perfect for many other types of courses." The instructor indicated that this relocation was "frustrating" but that "I am beginning to think that perhaps we are doing these students a disservice by having a public speaking class here." In contrast to this concern, the students' learning scores for Instructor B were equivalent and in some cases higher in this environment than in the traditional or versatile

rooms (see Figures 4.1, 4.2, 4.3). At the end of the term, this instructor wrote, “I believe this has been a very productive semester. I hope that each class had a positive and educationally enriching experience.”

Instructor B commented primarily about the events surrounding speech days. Whereas this instructor indicated a distinct preference for using the traditional and versatile rooms for the presentation of speeches, and whereas this instructor relocated his classes twice on speech days from the fluid classroom to another classroom, student perceptions do not support this assessment. Table 4.10 indicates that students reported a perceived preference for giving speeches in the versatile room and the fluid room over “another room.” The traditional room scored the highest on this measure, but not by a large margin.

Instructor B’s journal provided context for the student’s scores on affective learning and teacher behaviors. This instructor’s assessment of the three classrooms was not supported by student data; however, this disparity may provide context for an understanding of the relationship between instructor and classroom when compared to the responses of other instructors.

Instructor C

Instructor C indicated that “I am a creature of habit.…My ideal classroom would be using the same room for all (my) sections, regardless of room features.” After the first week, this instructor “resolved to try and make sure my mindset is accepting of all the class environments and is thinking of ways to best utilize and overcome challenges versus feeling surprised and paralyzed by them.” In terms of student learning, this

instructor noted that student learning was "almost the same" in the traditional and versatile rooms, deeming student speeches to be frequently "lacking in vocal variety and energy." In the studio classroom, this instructor noted that, "there were stronger presentations in this class than any one of my other classes. With that said, the weaker speeches in this class were by far my weakest overall." So, in this case, the deviation in quality of speeches was particularly noteworthy in the fluid setting as some students thrived in this environment while others struggled with greater frequency than other classes.

In comparisons of the rooms, Instructor C called the traditional room "the most quiet class," referenced "low participation," and said that the students thought the room was "just like any other room." This instructor called the versatile room "stationary," writing that students had "weaker peer interaction" but that they "participate well with instructor led discussion." About the fluid classroom, this instructor wrote, "flexible," "promotes dialogue, peer interaction," and "encourages student involvement but also easy for students to get distracted."

The most frequent journal topic for this instructor was the frequency of distractions in the fluid classroom. Compared to other journals, it appears that this Instructors C and D had the highest frequency of distractions in this room. At the beginning of the study, Instructor C wrote about the level of distractions, in this case people walking through the class, "I am not even sure if I feel that I can teach in (the fluid room)…. I can honestly say that the environment negatively impacted my teaching this week and my students' ability to learn." In week three of the study, this instructor wrote:

> During a class activity, I had students discuss how they would adapt to different situations, audiences, and environments. In both (other rooms), this went as expected and stayed fairly academic; however, in (the fluid classroom), the class took off with the topics and really began to generate a quality discussion.…For the first time, I am seeing that (the students) don't necessarily see being in (the fluid classroom) as a negative.

Around midterm, the frequency of distractions increased and this instructor wrote:

> I am at the point that I want to investigate moving rooms and dropping out of the study. It is negatively affecting my teaching and my students' ability to learn….I am so frustrated and truly exhausted with the effort I am unsuccessfully putting into (the class).

By the end of the term, the instructor wrote:

> I can honestly say that even though my (fluid classroom) class ended up being my favorite group of students and my strongest speakers as an overall class, the room still did not win me over. … It was too much effort and frustration compared to the benefits.

Despite the high frequency of distractions, the students in this particular class (Instructor C, fluid classroom) perceived the highest levels of behavioral learning (Figure 4.1), the lowest level of cognitive learning loss (Figure 4.3), and the highest levels of both teacher content relevance (Figure 4.6) and teacher immediacy (Figure 4.7) of any classroom/instructor combination in the entire study.

Overall, instructor C's journal is filled with discussion of ways to create learning opportunities in the distractions of the fluid classroom. In the process, this instructor came to appreciate and work with the fluid classroom. This discussion of overcoming obstacles provides context for the high scores in this instructor-classroom combination.

Instructor D

Instructor D preferred first the traditional classroom, second the versatile classroom, and third the fluid classroom. About the traditional classroom, this instructor only commented that the class seemed "comfortable and energetic" and that the instructor "liked this room best." Concerning the versatile classroom, this instructor, like Instructor A, found the room to be "cramped," saying that "this classroom setup really annoys me":

> I have been trying to figure out the dynamics of this class as it seems a little "dead."… I think the setup of this room has something to do with the energy….I feel too many barriers between me and my students….I see a lot of them kind of lazily leaning on these desks in a way other than they do (in the other rooms).

Concerning the fluid classroom, this instructor commented that "the students seem comfortable in it," and they "seem to enjoy this area. Likewise, I seemed to have adapted to it in a positive way too."

The journal of Instructor D recounted similar distractions to that of Instructor C calling the room, "a three-ring circus" and commenting that, "We all had a good laugh again about this room set-up." The instructor wrote about dealing with distractions: "Now I just make a joke about all of the action and my students laugh along with me." Further, Instructor D wrote that "this class is an unusual mix of students and I need as much order

as possible…. They seem fine and attentive when the room's quiet but with the activity it seems to bother all of us." At the end of the term, the instructor referred to the fluid classroom as "a war zone" with "way too much activity with people coming in and out and distracting us." These distractions for Instructor D resulted in student perceptions opposite those of Instructor C who also commented on many distractions. This class (Instructor D, fluid classroom) had the lowest scores on behavioral learning (see Figure 4.1) and affective learning, (Figure 4.2), the highest cognitive learning loss (Figure 4.3), and the lowest scores on teacher credibility (Figure 4.5), teacher content relevance (Figure 4.6), and teacher immediacy (Figure 4.7) of any classroom/instructor combination in the entire study.

Whereas Instructor D's scores in the traditional and versatile classrooms did not vary widely from peer scores on any measure, Instructor D's low scores in the fluid classroom run in stark contrast to those of Instructor C. The journals of both Instructors C and D, when viewed together, provide context for the disparity in scores and provide a starting point for understanding the reported interactions between instructor and classroom.

Instructor E

Instructor E preferred, in order, the traditional classroom, the versatile classroom, and the fluid classroom. This order of preference mirrors that of Instructors B and D. This instructor called the traditional classroom "business as usual" and found that the tablet desks within it were "comfortable to sit in." In relation to the versatile classroom, Instructor E said, "I dread what that room is going to look like when I enter every day,"

and that “I almost wish we had someone to arrange the tables and chairs into a tolerable format at the beginning of each day.” About the fluid room, this instructor wrote:

> (The fluid classroom) is a unique classroom environment that challenges students in a variety of ways. Students get the realistic challenge of having distractions at any given moment, as passersby cross through the room during their performances. I see this as realistic preparation for bustling workplaces in the 21st century.

This instructor also commented that, “I fear the students poor classroom experience may affect their performance in the class. For this reason, I would prefer not to teach in the (fluid classroom) again.”

Instructor E chose not to comment further on student learning or instructor behavior, writing, “I have found a way to manage each classroom. There are always going to be some inconveniences. I am eager to see what the students thought.” Instructor E’s classes were consistently in between other class scores on all measures (see Figures 4.1, 4.2, 4.3, 4.5, 4.6, 4.7).

Instructor E’s journals provide context for the reported perceptions of students. The journal did not indicate distinct differences in learning or behavior in any classroom, and student perceptions supported that observation. Instructor E’s consistency in all three rooms provides an additional element to consider in the instructor-classroom interaction, especially when all five instructor journals are taken together.

Summary of Instructor Feedback

Overall, the five instructors found the versatile and fluid classrooms to be more challenging than the traditional classroom. Some viewed the challenges as positive and necessary while other found the challenges were significant negatives and offered unnecessary stress to their pedagogical choices and endeavors. When comparing the feedback from the journals to the significant differences found in the quantitative results, one could conclude that the instructor-classroom interaction is a tangible and influential interaction that impacts pedagogical choices and results.

CHAPTER FIVE

DISCUSSION

This dissertation explored the extent to which classroom design influences student and teacher perceptions of learning, teacher behavior, classroom practices, and overall classroom atmosphere. Overall, the results indicate that classroom design impacts these perceptions in many interesting ways, often but not universally associated with impressions about the instructor placed within the space. Moreover, they encompass theoretical and empirical contributions as well as reveal the inherent limitations present in this study. Thus, these results lend support to the importance of considering how Instructional Proxemics impacts communication within the spaces of learning.

Theoretical Contributions

This study aimed to (a) advance theoretical models currently present in instructional communication discourse (the general model of communication and its parent, rhetorical/relational goal theory), (b) consider one model for experimentation suggested in educational research, and (c) justify a theoretical grounding for the study of Instructional Proxemics.

General model of instructional communication

The findings of this study are grounded within the complex structure defined by the general model of instructional communication (McCroskey, Valencic, & Richmond, 2004), furthering the study of the learning environment as a measurable variable. This model suggests that there are six essential components of instructional communication

discourse: teachers, students, student perceptions of teacher behavior, student perception of teacher credibility, instructional outcomes, and the instructional environment.

McCroskey, Valencic, and Richmond (2004) focus on teachers, instructional outcomes, and student perceptions of both teacher behavior and teacher credibility, and dismiss the other two factors (students and physical environment) as immeasurable. They devote little attention to educational environment, stating that "since most of these environmental factors are beyond the control of the teacher or the students, most of the variance created by the environment will function as error variance in the testing of instructional communication theories" (p. 198). By accepting environmental influence as error variance, they largely negate environmental factors, essentially claiming that instructors have no ability to exercise influence over the design of their educational environments.

This manuscript has suggested that the dismissal of the physical environment as an immeasurable entity necessitates inquiry into the ability for assessment of said environment. Thus, the large number of statistically significant findings present in this research serve to advance the theory of the general model of instructional communication by measuring that which was claimed to be immeasurable or perhaps even inconsequential. The physical space of the classroom is one aspect of the physical instructional environment that can be measured. In so doing, the present study aligns itself with and furthers the proposed general model of instructional communication. From the data presented in Chapter Four, one could aptly surmise that the instructional

environment (broadly) and the physical classroom space (specifically) impacts the communication that occurs within them.

In addition, the data demonstrate that the learning environment works in cooperation with other factors in instructional communication: teachers, student perceptions of teacher behavior and credibility, and student learning outcomes. The strong interaction between instructor and classroom noted on all variables relating to student learning and teacher behaviors (see Figures 4.1, 4.2, 4.3, 4.5, 4.6, 4.7) combines five of the six variables in the model and demonstrates the effectiveness of this complex model in identifying factors present in instructional communication. Thus, this study accentuates the general model of instructional communication, lending support and credibility to its hexagonal model of interaction among these factors.

In that the general model of instructional communication advances the rhetorical/relational goal theory explained in Mottet, Frymier, and Beebe (2006), this study also advances the rhetorical/relational goal theory by situating the theory into the instructional environment. Thus, this study suggests that the rhetorical and relational goals of the instructors and students take place within a learning environment that is not inconsequential. Rather, the physical space can shape the communicative behaviors chosen by both students and teachers during the expression of those goals in the classroom. This claim recalls the previous discussion of architectural probabilism (Strange & Banning, 2001) and situates the rhetorical/relational goal theory in the learning environment, seeking to understand what impact the environment has upon the communicative goals of the people within it.

Design-based Research

The beginning of this study offered a discussion of design-based research (Brown, 1992), most recently advanced by the Design-Based Research Collective (2003). The goal of design-based research is to consider the potential effects in an experimental context, providing an additional assessment-oriented lens for this study. The goal of this type of research is to create modifications with the hope that the end result will be a refined innovation with theory that can be tested.

So far, this study has assessed the attributes of classroom space by isolating it among variables (in the general model of instructional communication) to identify the impacts of classroom space on instructional effectiveness in terms of perceived learning, teacher behavior, and classroom practices and perceptions. But the goal of this study is not only to identify classroom space as an area worthy of study in instructional communication (although this study provided voracity for that claim); but also to engage in a discussion of the necessity of providing adequate, pedagogically-based classrooms in which learning can thrive in a 21st Century sphere.

Based solely on instructor journals, Instructor D appears to have a strong affection for the traditional classroom and its associated pedagogy, termed the "banking" model or "sage-on-a-stage." This instructor's comments revealed that, in the fluid classroom, this preference surfaced: "I need as much order as possible…. They seem fine and attentive when the room's quiet, but with the activity it seems to bother us all." This desire for order is not a negative one for this instructor. This study has claimed that the shift from this teaching model toward a more collaborative model necessitates a shift in spatial

classroom design. A shift in classroom design is likely to be a shocking change for instructors who are used to the traditional classroom and this shock should not go unnoticed. Instructor B indicated a similar response: “I am sort of an old school, chalkboard kind of (person).” Instructor C commented that, “I am a creature of habit.” Even Instructor A, the only instructor to prefer the fluid classroom, indicated that the traditional classroom was the one that “I know how to maneuver” and “control.” These are likely to be the responses of many instructors who are used to a traditional classroom, but placed into a flexible learning space.

However, the issue here is not solely instructor preference for a particular type of classroom, but rather, instructor adaptability. Of the four instructors (B, C, D, E) who preferred the traditional classroom to the fluid classroom, Instructors B and C demonstrated higher student behavioral and affective learning scores in the fluid classroom than the traditional classroom while Instructors D and E demonstrated lower scores on these measures in the fluid classroom than in other rooms (see Figures 4.1 and 4.2). Thereby, instructor preference for a particular room is not a successful indicator for higher levels of instructional success in that space versus other spaces.

This is a perplexing discovery and one about which this study can hardly comment effectively given the small number of instructors participating in this study. However, one can suggest that those instructors who wrote in their journals about adapting to the fluid classroom and using the space as a teaching tool (A, C) had the highest student perceptions of behavioral learning and affective learning, and the lowest cognitive learning loss among instructors in this room (see Figures 4.1, 4.2, and 4.3). In

this instance, instructor adaptability appears to trump instructor preference in terms of the influence of the classroom space variable.

This finding is intriguing for future design-based research into flexible classroom spaces. Design-based research can seek to modify flexible learning spaces to achieve optimum results for student learning given the subject matter and instructor adaptability. Therefore, the contribution that this study brings to design-based research is the understanding that, when studying innovative classroom designs using design-based research, researchers should find ways to help instructors adapt to the learning environment being evaluated. This adaptability appears crucial to pedagogical success in the classroom. Design-based research can thereby become increasingly important for academics and innovators who are currently designing new classroom designs to be used for learning. It will allow these researcher-pedagogues the opportunity to create innovative research into classroom design without sacrificing pedagogical aims of the participating classes.

Instructional Proxemics

This study also proposed Instructional Proxemics as a combination of information design and instructional communication which assesses space, its design, and its use in the spaces of learning. Figure 2.5 depicts Instructional Proxemics as an intersection of these two areas of study and demonstrates that spaces of learning can be understood in the experience of the user, both student and instructor. The pedagogical, educational, and communicative inputs into instructional communication intertwine with the inputs of design concepts and the study of the user's experience of built space. This intersection

creates a view of the classroom interaction that encompasses both the communicators and the environment.

The usefulness of Instructional Proxemics is demonstrated in the previous discussions of the general model of instructional communication and design-based research. It is an illustration of the missing link that conceptualizes and frames the "instructional environment" using the lens of information design, allowing the learning environment to be studied in its various forms. The data in this study has demonstrated that the effects of spaces of learning are measurable. Thereby, Instructional Proxemics can become a theoretical concept for the advancement of the study of space, its design, and its uses in the classroom. Instructional Proxemics was a conceptual impetus for this study and, as such, it redefined past conceptualizations of the instructional environment into contemporary spaces of learning. As a result, in applying the lens of spatial design and proxemics to instructional communication, Instructional Proxemics represents a new paradigm for understanding the use of classroom space, and a theoretical conceptualization for the burgeoning discourse on in this area. Thus, it offers researchers the opportunity to define the learning environment and assess it empirically.

Empirical Contributions

Given the theoretical contributions of this study, the data within it further the understanding of Instructional Proxemics and the relationship between classroom space and the quality of interactions which occur within it. The major empirical findings of this study include the strong interaction effect between instructor and classroom on every measure related to student learning and teacher behavior; the disparity between consistent

student perceptions across classes in the traditional classroom and inconsistent perceptions across classes in the fluid classroom; the variety of practices influenced by each space; and the perceptions of flexibility, comfort, and decenteredness in each of the learning spaces.

Space and Student Learning

On measures of students' perceived learning, the three learning measures (behavioral, affective, and cognitive) were all significantly correlated. This finding replicated the findings of numerous past studies (e.g., Richmond, 1990; Sanders & Wiseman, 2001; Witt & Wheeless, 2001), providing fodder for the belief that these factors influence various classrooms regardless of time and place. The means for these scores based on instructor and classroom can be ascertained in Figures 4.1, 4.2, and 4.3. Figure 4.3, which depicts learning loss, appears to be opposite the other two measures, yet it actually demonstrates similar findings because, as the mean score for *learning loss* approaches zero, *cognitive learning* increases.

Interestingly, all three of these measures indicated a significant and similar interaction between the instructor and the classroom. These interaction effects are meaningful given that the effect of the instructor and the effect of the classroom occur simultaneously as the instructor functions within the assigned space. All three learning measures indicate that students perceived relatively consistent levels of learning in the traditional classroom: scores from students in the versatile classroom were slightly less consistent; scores in the fluid classroom were moderately inconsistent (see Figures 4.1, 4.2, 4.3). The inconsistency of the scores in the fluid classroom may be attributed to

several explanations: (1) All instructors consistently perform in the traditional classroom because all have had a great deal of experience teaching in this type of classroom (not to mention modeling of teaching in this type of classroom over the decades in which they were students); (2) All instructors are consistent in the traditional classroom because the room dictates a specific teaching style, most notably the "sage on a stage" or other models of teacher-focused learning; (3) All instructors are consistent in the traditional classroom because they uniformly reported being "comfortable in" and "used to" this design of teaching space. In their journals, four of the five instructors listed the traditional classroom as their preferred classroom (and the one instructor who least favored the traditional classroom indicated that the traditional classroom was the most familiar room). This preference for the traditional classroom equated to consistent scores across instructors but not top scores when compared to some sections in each of the other rooms.

All three measures also indicated that the combination of Instructor C and the fluid classroom had the highest reported scores among the 15 sections on all three measures even though this instructor demonstrated scores comparable to all other instructors in the traditional (control) classroom. In addition, all three measures indicated that the combination of Instructor D and the fluid classroom had the lowest reported scores among the 15 sections on all three measures. This instructor also had comparable scores to all other instructors in the traditional (control) classroom. This is a meaningful variability, because it identifies a particular issue with the fluid classroom space identified by Instructor C in the journal: "there were stronger presentations in this (fluid) class than any one of my other classes. With that said, the weaker speeches in this class

were by far my weakest overall." A similar result happened in terms of student perceptions of learning. The highest perceptions of learning occurred in this classroom than in any other room (for Instructor C) and the lowest perceptions of learning occurred in this space as well (for Instructor D).

The inconsistency of scores in the fluid classroom across these three learning measures could be attributed to several factors, among them: (1) the variable level of distraction (depending on time of day) present in the room caused a wide range of scores; (2) instructor unfamiliarity in the room caused a wide range of scores as instructors were forced to invest in new classroom strategies, which inherently offer wider variability of teaching methods; (3) instructors' wildly different comfort levels in the fluid classroom created a wide variety of scores. The most obvious solution to explain this inconsistency would be the distractions present in the room, that is, a higher the volume of distractions present leads to lower scores – a finding that supports the Cuban (2007) assertion that this could be a major attribution for the failure of the open classroom in the 1970s, particularly since distractions were reported to be the highest in the fluid classroom (see Table 4.10). Indeed as Cuban (2007) might have predicted, the lowest mean scores for student behavioral, affective, *and* cognitive learning were all reported in this room. However, the highest mean scores for all three measures were also reported here.

Strangely, the highest and lowest scores came from Instructors C and D, the two instructors who each reported an abnormally high volume of distractions compared to the other three instructors. One must then decipher the degree in which these two cases differed, as distractions clearly did not result in consistently low results. These two

instructors shared one major complaint in their journals: in the fluid classroom, their class sessions were often interrupted by people passing through the space. Other instructors did not comment as readily about this specific distraction. Instructor C indicated using these distractions as a teaching tool for learning how to cope with audience distractions while speaking, whereas Instructor D indicated making jokes and criticisms about the room and its distractions. Perhaps as a result, students in instructor C's class reported higher behavioral, affective and cognitive learning than any other class section in any room whereas Instructor D's class reported lower behavioral, affective, and cognitive learning than any other class section in any room. Thereby, one could surmise that the level of distractions in the room does not dictate the learning occurring within it. Rather, the interaction between instructor and the classroom – how the instructor deals with distractions or other challenges of the learning space, perhaps – offers a better explanation of this inconsistency.

Space is a necessary subject of study in relation to success in the classroom. If all instructors taught all their classes in the traditional classroom, they might expect their students to report similar and consistent perceptions of learning. However, these consistent scores may be lower in comparison to the types of scores that might be expected (especially but not exclusively for perceptions of behavioral learning) in more fluid classrooms with instructors who know how to operate successfully within those spaces. This area of study has enormous potential for future research which assesses the broad reconstruction and re-imagination of spaces of learning that Oblinger (2006) has identified on campuses worldwide.

The instructor-classroom interaction was reported across all three learning perception measures, adding weight to the importance of this interaction. In addition, gender proved to be a significant variable in almost all cases. In social scientific research, gender is often an independent variable that proves to be significant to the research and, in this case, female students perceived higher behavioral and affective learning and lower cognitive learning *loss* than male students

Cognitive learning was also measured through a self-report of grades. Students in the fluid classroom anticipated higher grades than did students in versatile or traditional classrooms. This finding is compelling because it demonstrates that students' perceptions of their grades were different than their perceptions of learning loss. This incompatibility may suggest what much literature currently claims: cognitive learning is difficult to measure. However, it may also indicate that student feel that instructors would/should give more leeway in unfamiliar classrooms. Cognitive learning loss and grades have often been studied as measures which could each address the amount of cognitive learning experienced by students, although researchers argue that neither measure of cognitive learning is foolproof (Richmond, McCroskey, Kearney, & Plax, 1987; Richmond, Gorham, & McCroskey, 1987). The data in this specific study suggest that, for these students, even though mean cognitive learning *loss* increased to its high point in the fluid classroom, anticipated grades were *higher*, not lower, in the fluid classroom than in other classrooms. This inconsistency could be explained by the space's relationship to student confidence or teacher discomfort, both leading to grade inflation. It could also be explained by the need for continued revision to the current operational definition of

cognitive learning in instructional communication research. Nevertheless, these factors were not studied herein, but appear nonetheless valid areas of study for the future.

In sum, classroom space impacts student learning in substantial and meaningful ways and is heavily moderated and mitigated by the instructor. Traditional classroom spaces produced consistent learning results in this study. As classrooms become more flexible, their ability to influence student learning can be moderated by the instructor. Instructors who are able to function within the fluid space can achieve higher learning results than they could in traditional classrooms. However, instructors who feel hindered by the fluid space may experience lower learning outcomes there than in the traditional classroom.

Space and Teacher Behavior

Like the results concerning student perceived learning, the three measures of teacher behavior (teacher credibility, teacher content relevance, and teacher immediacy) were all correlated with one another and with each student learning measure (see Table 4.2). These correlations replicate important instructional communication research concerning the relationship between perceptions of instructor behavior and perceptions of student learning (Richmond, 1990; Sanders & Wiseman, 1990; Frymier & Shulman, 1995; McCroskey & Teven, 1999; Witt & Wheeless, 2001; Witt, Wheeless, & Allen, 2004). This also speaks to the continued need for research on the means whereby instructor behavior emerges as a potential predictor of student success.

In addition, each perceived teacher behavior demonstrated a significant interaction between classroom and instructor as well as significant main effects for

instructor. The main effect for instructor in each case was expected. The instructors for this study were selected because of their experience teaching and willingness to participate in the study. Their differences in teaching style can likely account for differences in teacher credibility, teacher content relevance, and teacher immediacy. In this case, Instructor D's overall means for each of the three behaviors were consistently lower than the other four instructors, possibly accounting for a large portion of these main effects.

The far more intriguing result is the significant interaction in all cases between room and instructor. This result parallels the similar results for student learning. Given that the classroom and instructor effects occur simultaneously during the class time, this interaction offers substantial heuristic value. If the room had no impact on the instructor, one might expect the data to indicate consistent results for each instructor across classrooms (i.e. Students in all three of Instructor A's sections would have similarly rated this instructor on a given measure of teacher behavior). However, this was not always the case. Although, each instructor taught the same material (dictated by the course syllabus) in all three classrooms on any given day, students perceived their behaviors differently in different classrooms. Instructor B maintained comparable scores across classrooms for teacher credibility and teacher immediacy. Instructor E maintained comparable scores across classrooms for teacher content relevance and teacher immediacy, and this instructor's sense of consistency was supported in the journal. The scores for the other instructors varied across classrooms on all measures.

Similar to the student learning measures, Instructors C and D demonstrated converse results again accounting for the highest and lowest scores, respectively, in the fluid classroom on each measure of instructor behavior (see Figures 4.5, 4.6, 4.7). Instructor C's scores were the highest among all classes in the fluid room for teacher credibility, teacher content relevance, and teacher immediacy. Instructor D's scores were lowest among all classes in the fluid room on each of these three measures. In their journals, these instructors both commented on the high level of distractions in the fluid room and indicated dissatisfaction with the space. However, Instructor C was perceived as more credible, more relevant, and more immediate in this space than in any other space, whereas Instructor D was perceived to be less credible, less relevant, and less immediate here than in any other space. These results identically mirror the perceived learning for students enrolled in each of these sections. Such findings suggest that student perceptions of learning and teacher behavior are very strongly correlated and intertwined, as has already been widely argued in the literature (Richmond, 1990; Sanders & Wiseman, 1990; Frymier & Shulman, 1995; McCroskey & Teven, 1999; Witt & Wheeless, 2001; Witt, Wheeless, & Allen, 2004). In addition, these findings suggest that instructors can be impacted positively or negatively by classroom space, with the instructor journals providing support for this assertion.

Instructors C and D used different tactics in terms of teacher behavior to solve what they each identified as a challenge: teaching in the fluid classroom. These teacher behaviors were both attempts to effectively utilize the assigned space and cope with the frequency of distraction. Whereas Instructor C wrote about finding solutions to the

challenges in the fluid classroom and using the space as a teaching tool, Instructor D wrote about making jokes about the fluid classroom and sharing a laugh about it with the students. Instructor C struggled to find ways to engage students in the space, calling the process "frustrating" and saying that it required much effort, while Instructor D referred to the space as a "war zone" and a "three-ring circus." Neither instructor wanted to teach in the fluid classroom again even though they both felt that they adapted to the space in a positive way. Like their coping strategies, their students' perceptions were wildly different in the fluid classroom: Instructor C was perceived as highly credible, and highly immediate, with high perceptions in content relevance. The results for instructor D were the opposite (see Figures 4.5, 4.6, 4.7). Instructor D was perceived as having low credibility, low content relevance, and low immediacy. One might infer that the instructor's ability to reframe the challenges or limitations of a room could make a difference in instructor success. Although this factor was not studied herein, constructs relating to teacher efficacy and classroom management appear to be valid areas of study for the future.

Such findings suggest that the instructor-classroom combination is an area worthy of continued study because the aim of classroom space should be (as Barnard, 1851, suggests) to advance pedagogy. The fluid classroom seems to advance appropriate teacher behavior in some cases and hinder appropriate teacher behavior in other cases. A brief examination of the teacher credibility scores may serve to advance this claim.

Figure 4.5 depicts the interaction between instructor and classroom for teacher credibility. Students perceived all five instructors as comparable in the traditional

classroom and the versatile classroom. However, the scores were more dispersed in both directions in the fluid classroom. One interesting effect pictured in this study deals with a comparison between Instructors B and D. Instructor B was the only instructor to consistently score higher than the group average while Instructor D was the only instructor to consistently score below the group average. Instructor B's consistently high scores increase in the fluid classroom, whereas Instructor D's consistently low scores decrease in the fluid classroom. This finding might suggest that teachers who score highly on teacher credibility find their perceived credibility enhanced in the fluid classroom, whereas teachers who score lower on teacher credibility might find their perceived credibility diminished in the fluid classroom. Only further research can advance this preliminary claim.

The instructor-classroom interaction and the main effect for instructor were reported across all three measures of teacher behavior, adding weight to the importance of these effects. In sum, classroom space impacts teacher behavior and can be heavily moderated by the instructor. Traditional classroom spaces produce more consistent and defined behaviors. As classrooms become more flexible, their ability to influence student learning can be moderated by the instructor. Instructors who take control of the fluid space can achieve higher perceptions of teacher behaviors than they could in traditional classrooms. However, instructors who feel hindered by the fluid space may see lower perceptions of their behaviors within that environment than in the traditional classroom.

Space and Classroom Practice

Students were asked to indicate the frequency of sitting in rows, the frequency of sitting in formations other than rows, the frequency of moving the classroom furniture, and the frequency of group work in class. Table 4.9 indicates that the classroom space did influence classroom practice such that the practices in the fluid classroom were different than the practices in the other two rooms. Students in the fluid classroom reported sitting in rows less often than did students in the other two rooms. Likewise, students in the fluid classroom reported sitting in formations other than rows more often than did students in the other two classrooms – indeed, it was often a necessity given the tables and design of the room. Students in the fluid classroom also reported moving the furniture more often than did students in the other two classrooms. All of these findings proved to be statistically significant.

The measure concerning working in groups indicated that students in the fluid classroom reported working in groups more often than did students in the other two rooms. This result was not statistically significant, but even a slight deviation on this measure is intriguing because it indicates that the instructors may have approached the lesson plan differently in different spaces.

All four of these measures jointly indicate that the classroom can dramatically change the practices inside it, even if the same instructors are teaching the same lesson plans on the same day in different classrooms. Instructor journals offer greater voracity for this claim. Instructor A wrote: "Whereas I might cover something through lecture, example, exercise in the other classes, in this (fluid) class it gets covered through a

discussion." Instructor C wrote: "In both (other rooms), this went as expected and stayed fairly academic; however, in (the fluid classroom), the class took off with the topics and really began to generate a quality discussion." Both of these instructors indicate that their experience across classrooms was different based on the classroom design. Instructor A even mentioned specific physical arrangement, writing about the students: "If I keep them in rows, they won't say anything, but if the whole class is in one big circle, they talk up a storm." These comments suggest that both students and instructors note the ways that classroom design influences classroom practice. Moreover, these comments and the student data not only indicate that the same course with the same instructor may differ in different spaces, but they also suggest that the characteristics of the learning space may be a determining factor for the practices that occur within it.

Space and Classroom Perceptions

Oblinger (2006) suggests that flexibility, comfort, and decenteredness are three of the factors that must be addressed by innovative classrooms that are "harmonious with learning theory and the needs of current students" (pp. 2.6-2.7). The present data will be assessed using this framework as a starting point.

Flexibility. This study asked students how often they moved the furniture as a measure of flexibility. As Research Question 3 demonstrated, the frequency of this behavior in the fluid classroom was dramatically higher in the fluid classroom than in either of the other two rooms (see Table 4.9). This behavior was positively and significantly correlated with student comfort, student enjoyability, and the desirability of

the room for another class (see Table 4.11). Thus, one might surmise that students enjoy working in flexible classrooms.

This finding works against the conventional wisdom of traditional classroom design in favor of a more flexible approach. Instructor B demonstrated the prevailing mindset of conventional (classroom) wisdom in the journal: "I am beginning to think that perhaps we are doing these students a disservice by having a public speaking class here (in the fluid classroom)." The tendency of this instructor to be concerned about the fluid design was supported by many others including a student in this study whose class took place in the traditional classroom: "All classrooms are the same." In addition, four out of five instructors in this study preferred the traditional classroom to the other options. This indicates that the prevailing assumptions among instructors that students prefer the typical, traditional classroom to other options and that the traditional classroom promotes the best learning outcomes.

These indicators of the conventional wisdom in classroom design are disputed by the data. Instructor B indicated concerns about student development in the fluid classroom. The data demonstrate that, for Instructor B, students' perceptions of affective learning increased from the traditional room to the versatile room and increased again from the versatile room to the fluid room (see Figure 4.2); students' perceptions of behavioral learning were lower in the traditional classroom than in the versatile or fluid rooms (see Figure 4.1); and student's perceptions of cognitive learning were comparable in all three rooms (see Figure 4.3). In addition, the students perceived this instructor having higher credibility and content relevance in the fluid classroom than in either of the

other two rooms. Student perceptions of Instructor B's teacher immediacy in the fluid room was comparable to that in the traditional classroom.

This dichotomy separating instructor perception of student success and actual student success in flexible classroom spaces is a worthwhile area of study. On one hand, such research will help to understand the instructor-classroom interaction identified on measures of perceived student learning and perceived teacher behaviors. On the other hand, this line of research would enhance researcher understanding of the cognitive and perceptual barriers that instructors, students, and administrators possess in relation to flexible classroom design. Moreover, continuation of this research program will give researchers the means whereby innovative, flexible classroom spaces can be assessed to ensure that classroom assignment becomes neither a hindrance to student learning nor an obstacle for instructors assigned to such spaces.

Comfort. Much of the reviewed literature suggested that students tend to prefer comfortable classroom spaces to classrooms that were perceived as less comfortable. Oblinger (2006) reported that student attrition reports at Indiana University-Purdue University at Indianapolis (IUPUI) indicated that students admitted dropping classes because the chairs in the classroom were uncomfortable. Educators Nair and Fielding (2007) subtitled their article: "Kids don't have to squirm to learn." Information Design theorists (Carliner, 2000; Jordan, 2000; Norman, 2005) have all indicated comfort as an important determinant for consumer appreciation of design. Education and architecture theorists Strange and Banning (2001) suggest that the relationship between the space and its aggregate (user) is crucial to an understanding of the way a space will be used.

Not surprisingly, this study found that students preferred more comfortable classrooms to less comfortable ones (see Table 4.10), yet the question was the degree in which this actually impacted student learning. Students rated the fluid classroom as more comfortable than the other two rooms and students rated the fluid classroom as more enjoyable than the other two rooms. In addition, students who had class in the fluid classroom indicated that they would like to have another class in the fluid classroom. Students in the other two classrooms also indicated their desire to have another class in their classrooms, but the strength of their response was not as large as that of the students in the fluid classroom. This evidence of their preference for the fluid classroom was confirmed by the data in the subsequent correlation matrix (see Table 4.11) as student comfort was positively correlated with student enjoyment of the classroom and desire to have another class in their assigned room.

Interestingly, student comfort was also positively correlated with several other measures: frequency of group work, frequency of moving the furniture, and ability to hear the instructor and classmates (Table 4.11). In addition, student comfort was negatively correlated with sitting in rows in class. This data suggests that student find sitting in rows less comfortable than other classroom formations. Henry Barnard (1851) might have predicted such a finding when he wrote that pedagogy should drive classroom design rather than the converse. The rows and aisles that he supported in antebellum America served very specific purposes, previously discussed. Given the changes in teaching and learning, technology, and students over the last 150 years, changes in contemporary classroom design appear necessary.

This claim is further supported by the data in Table 4.2, another correlation matrix, which demonstrates that student perceptions of comfort are positively correlated with student perceptions of affective learning, teacher credibility, and teacher content relevance. At the least, the correlation between student comfort and these perceptions of learning and teacher behaviors suggests that continuing research must be developed to better assess student comfort in the classroom, the factors which promote student comfort, and its relationship with student perceptions of learning and instructor behavior.

Instructor comfort is another factor primed for study adjacent to these trends. Instructor A wrote, "I felt that I was a stronger, more creative teacher in this (fluid) room," and, "I know how to maneuver in a classroom like this (traditional room)." When one queries which of these is an indicator of instructor comfort, the answer is both. Because of the limited number of instructors in this study, claims about the comfort level of instructors in any of the rooms would be irrelevant. However, a broader study directed at the assessment of instructor comfort could illuminate the findings of this study and supplement the journals submitted by instructors in this study.

Decenteredness. A decentered classroom is one described by Friere, Bruffee, and others of the cognitivist perspective as one not focused on the "banking" model of education. The classroom becomes a space for collaboration between instructor and student. Oblinger (2006) suggests that the decentered space is one that avoids "the message that the room has a front or a 'privileged' space" (p. 2.6). This space is one that values learning over experts.

The fluid classroom in this study exemplifies such a space. Figures 3.1, 3.2, and 3.3 speak to this difference showing that there is no clear central foci designed into the space. Figures 3.1 and 3.2 depict the traditional and versatile classroom spaces which each have a front space for the instructor. The captions of these figures indicate the perceived dichotomy between "instructor perspective" and "student perspective." This type of caption did not work for Figure 3.3 which depicts the fluid classroom. The space exists such that the perspective of "student" and "instructor" are constantly in flux based on the arrangement of furniture in the space. The space could certainly be constructed so that it has a "privileged" space, but that is not a requisite of the space. Likewise, the traditional and versatile classrooms could be set up to remove the privileged space; however, the data in Figure 4.9 indicates that the furniture in these spaces was rarely moved. Thus, one might assume that this privileged space was routinely present in both instances.

The claim that the fluid classroom is a decentered space is also advanced by two other measures from the student survey. First, the frequency of sitting in rows was dramatically lower in the fluid classroom than in the other two classrooms. Similarly, the frequency of sitting in formations other than rows was dramatically higher in the fluid classroom than in the other two classrooms. Secondly, the frequency of working in groups was slightly higher in the fluid classroom than in the other two classrooms. This finding is especially interesting given that the instructors taught the same lesson for classes in all three spaces. Instructor A directly addressed this inconsistency: "I often feel like (the class in the fluid classroom) is getting a different experience. Whereas I might

cover something through lecture, example, exercise in the other classes, in this class it gets covered through a discussion." About the versatile classroom, this instructor commented: "I am much more likely to just stay at the front of the room. It feels very weird to move around." These statements verify the claim that the fluid classroom is decentered in comparison to the other two rooms. In addition, they suggest that not only is the instructor a moderator of the space as this study has previously claimed, but the space is also a moderator of the instructor.

The results of this decenteredness are mixed. Students reported more distractions in the flexible space than in the other two rooms, and that they could better hear their classmates in the traditional and versatile rooms than in the flexible room (see Table 4.10), factors that were negatively and significantly correlated (see Table 4.11). However, the frequency of distractions was not significantly correlated with comfort or enjoyability of the space and it was not significantly correlated with the desirability of the room for another class. This set of findings may shock several of the instructors in this study who saw the level of available distractions as overwhelming. Students felt comfortable in the space and enjoyed the space even though the distractions were present.

Critics of this study may dismiss this claim by arguing that the novelty of the space created enjoyment and comfort in spite of the distractions. Conversely, one could maintain that the argument against this is that the other two rooms were renovated and equipped with new furniture before this study began. For the students, these rooms were novel as well (as they may have had courses in the previously-conceived classroom spaces). In addition, even if the novelty of the space produces greater levels of comfort

and enjoyment, novelty is likely not an adequate explanation for the aforementioned effects on learning and teacher behavior because of the disparity between perceptions of learning and teacher behavior in the fluid classroom alone.

In sum, classroom perceptions about flexibility, comfort, and decenteredness are influenced by the classroom space. The instructor journals provided considerable insight into the findings incorporated by these variables. This study is an impetus for research examining variable qualities of innovative classroom spaces. Nevertheless, these concepts of flexibility, comfort, and decenteredness are concepts that need to be specifically operationalized and applied to the study of classroom space. Future research into this research question could also include studies relating to the two other factors mentioned by Oblinger (2006): technology support and sensory stimulation. In addition, these factors are markers for assessing the pedagogy that occurs within the spaces.

Limitations

The results of this study offer several contributions for the scholarship of teaching and learning, however, they must only be interpreted within the limitations of the study. One obvious limitation of this study is the complexity of the learning environment. A field-experiment of this magnitude -- lasting several months and including a wide variety of variables that cannot be easily controlled in comparison to either a laboratory-based or a hypothetical scenario -- inherently trades researcher control for the naturalistic environment.

The relatively small number of instructors is another obvious limitation for this research. Whereas this study employed experienced and talented public speaking faculty,

the small number of instructors (five) does not allow their perceptions to be generalized to the larger category of all faculty, or even all public speaking faculty. This limitation was necessitated by the design of this study, and thus each instructor's feedback was treated as a single case study. This certainly does not detract from the meaningfulness of their effort, but rather demonstrates unique insights into each of their classrooms. If replicated with a low number of studies, researchers should consider asking instructors to write journal entries about specific topics so that their journals might be able to be formally coded for similar feedback. Popular instructor topics in this study included distractions, comfort level, (de)centeredness, level of flexibility, and pedagogical effectiveness. These or other topics could be asked as specific questions that would elicit specific responses from all instructor-participants.

The researcher also noted a few possible control variables that could be studied in future research. Although Glascock and Ruggiero (2006) demonstrated that both instructor race and instructor gender can impact instructor behavior, neither was assessed as a control variable due to the relatively small number of instructors. These factors could be important to assess in future research on the learning environment and instructor behavior. In addition, the present study did not ascertain whether these five instructors had any previous experience with non-traditional classrooms. This variable could play a role in the instructors' ability to successfully maneuver in the space and deal with the variety of distractions present in the fluid classroom. These distractions could also be considered a variable in the study because they occurred infrequently and differently based on the time of day the instructor taught in a given classroom. Thus, in similar

research, care should be taken to ensure comparable levels of distraction among classes meeting in the same space.

The chosen methodology for this study also provided limitations. This study employed a single survey for students and semester-long journals for instructors. Thus, the researcher was able to obtain a breadth of information from a large number of student-participants and in-depth information from a small number of instructor-participants. This methodological choice provided the researcher with data that offered the greatest utility for scholarship on this topic. However, the chosen methodology is one of many that must be employed to be able to postulate long-term generalizable trends for researchers of Instructional Proxemics. Other methodologies (e.g. focus groups, on-site observations, large-scale surveys, and individual case studies) would offer different insights into the student and instructor experience. In addition, studies into proxemics have involved time-lapse and longitudinal observations indicating the frequency of use of a particular type of space for particular purposes. This type of research may also aid researchers of Instructional Proxemics in establishing a baseline for the typical use of instructional space in the classroom.

Directions for Future Research

This study advances major questions relating to the interaction between instructor and classroom space. How does the instructor moderate the effect of classroom space? How is the instructor influenced by the space? What are the factors that influence this effect? In many ways, the evolution of the learning environment (and its relationship to technology and other modern developments) makes this work foundational, requiring

future research as a necessary component to advancing this scholarly area in meaningful ways.

First, this study should be replicated in communication studies courses other than public speaking and in other fields and disciplines. Instructional communication is not a study of the communication classroom, but rather a study of communication in the classroom. Thus, replication of this study in a variety of classes can add to the present discussion. One result of this replication may indicate that different fields require different pedagogical approaches. This may be true even within an individual course. Instructor B commented about the desire to use different classrooms on lecture days than on student speech days. Different pedagogical strategies, even within the same class, may warrant changes to the classroom space. Innovations in classroom furniture and modifiable classrooms are beginning to allow such flexibility in the learning space. These types of spaces in various disciplines should be assessed to add to the conversation about the importance of space in classroom practice.

In addition, this study could be advanced using other methodologies to assess student and instructor perceptions: focus groups, interviews, on-site observations, large-scale surveys, and individual case studies. Whereas the researcher chose to exclusively use student surveys and instructor journals in this study, many methodologies from both qualitative and quantitative approaches would provide valuable data to use in the development of Instructional Proxemics both in theory and in practice.

Future research into the instructor-classroom interaction should be addressed. Factors which impact instructors will likely impact the instructor-classroom interaction.

These factors may include past-experience teaching in certain classroom designs; supplemental teacher training for various classroom designs; past observation of classes held in various learning spaces; and individual instructor competence. The factors of teacher efficacy and teacher comfort in or preference for particular classrooms may also shed light on this interaction effect. Some instructors in this study indicated great excitement about teaching in innovative classrooms; others did not. A better understanding of the barriers to teaching in innovative settings will also further research into the classroom-teacher interaction. These barriers can be physical or perceptual barriers that create tension for instructors trying to use the spaces of learning to which they are assigned. A line of research into the types of internal and external barriers faced by teachers in innovative classroom settings will contribute to this understanding. In addition, longitudinal and design-based research may be an opportunity for researchers to help instructors familiarize themselves with different learning environments, thus both identifying and overcoming the barriers to teaching in innovative settings.

Moreover, this study has proposed Instructional Proxemics as a conceptual starting point for research into the spaces of learning. As Instructional Proxemics becomes more defined in the research, it will likely incorporate understandings of space, physical layout, visual design, artifacts within the space (including instructional technology), and new conceptualizations of mediated learning spaces. Wireless Internet and wireless teaching tools have opened the door for flexible and decentered classroom beyond the traditional classroom. Research on technologized classrooms (Pedretti, Mayer-Smith, & Woodrow, 1998; Wood & Fassett, 2003; Guerrero, Walker, & Dugdale,

2004; Li, 2007) and mediated classrooms (Carrell & Menzel, 2001; Benoit et. al., 2006) are adding to this discourse in the literature, and Instructional Proxemics holds a wide array of applications for understanding not only the physical classroom, but also these spaces of learning in both multimodal and virtual forms.

Conclusion

Overall, the findings in this dissertation suggest several important implications for instructors, educational administrators, and designers of spaces of learning. First, a new approach to the scholarship of teaching and learning is offered in the form of Instructional Proxemics. This area of research brings information design and instructional communication into a larger educational conversation. This dialogue contains heuristic value for research into models for assessing the "instructional environment" as defined by McCroskey, Valencic, and Richmond (2004) and research assessing innovation therein. In short, the spaces of learning matter -- in many more ways than most scholars could or would conceive.

Secondly, this study models a means whereby innovation in classroom design can be assessed in comparison to traditional classroom designs. The innovations include the new ideas and techniques reported by Oblinger (2006, pp. 2.6 – 2.7) -- flexibility, comfort, sensory stimulation, technology support, and decenteredness -- as well as future innovations arising from shifts in students, method of instruction, and technology. The shifts will continue to be important to researchers in instructional communication and related fields concerned with effective strategies of teaching and learning.

In their journals, many of the instructors also indicated their feeling that students would prefer the traditional classroom setting. Perhaps this was true at the point of the semester in which the journal entry was made, but by the time the end-of-term survey was conducted, this conventional wisdom was not supported. Moreover, these students come from different and more contemporary educational backgrounds than their instructors. Jamieson (2003) indicated that colleges and universities are falling behind K-12 educators in considering the impact of space on learning. According to Nair and Fielding (2007), students might actually prefer more comfortable classrooms over less comfortable ones. Junco and Mastrodicasa (2007) suggest that students have demonstrated a generational change in terms of their educational focus. These trends cause educators to necessarily re-interpret spaces of learning, and some educators are already doing so.

Thus, scholarship addressing the relationship between Instructional Proxemics and student learning is increasingly important as schools and universities are embarking upon expensive and dramatic renovations of classroom buildings like those chronicled by Oblinger (2006). The MIX lab at Denison University, the residential living-learning classrooms in Marianist Hall at the University of Dayton, and the open classrooms used in the SCALE Up program at North Carolina State University are only three of the many innovative classroom concepts currently in use. This research is an attempt to frame the study of these innovative strategies so that these spaces of learning can be assessed and designed in a way that promotes student and instructor success. Furthermore, it provides

a survey document (Appendix D) which can be used as researchers begin to assess student learning and its relationship to the spaces of learning.

In 1851, Henry Barnard wrote that the design of classrooms should follow the pedagogy to be implemented therein. Over a century and a half later, classrooms are changing (Oblinger, 2006) as educators once again recognize Barnard's claim. During this study, Instructor C "resolved to try and make sure my mindset is accepting of all the class environments and is thinking of ways to best utilize and overcome challenges versus feeling surprised and paralyzed by them." Utilizing classroom space effectively is a clear goal for instructors; and changes to the traditional design should be both innovative and pedagogically sound. Nevertheless, designing and re-designing the most effective classroom spaces for instructors should be the continued goal of research concerning classroom space. Every time innovators advance toward that goal, teachers and students become less hindered by the design of their spaces of learning.

APPENDICES

Appendix A

Institutional Review Board Approval

CLEMSON
UNIVERSITY

August 22, 2007

Dr. Andrew Billings
Communication Studies
408 Strode Hall
Clemson University
Clemson, SC 29634

SUBJECT: Human Subjects Proposal **# IRB2007-198 entitled, "Instructional Proxemics"**

Dear Dr. Billings:

The Institutional Review Board (IRB) of Clemson University reviewed the above-mentioned study using Expedited review procedures and has recommended approval. **Approval for this study has been granted as of August 17, 2007.**

Your approval period is **August 17, 2007 to August 16, 2008**. Your next continuing review is scheduled for June 2008. Please refer to the IRB number and title in communication regarding this study. Attached is a handout regarding the Principal and Co-Investigators' responsibilities in the conduct of human research. The Co-Investigator responsibilities handout should be distributed to all members of the research team.

No change in this approved research protocol can be initiated without the IRB's approval. This includes any proposed revisions or amendments to the protocol or consent form. Any unanticipated problems involving risk to subjects, any complications, and/or any adverse events must be reported to the Office of Research Compliance immediately. Please contact the office if your study has terminated or been completed before the identified review date.

We appreciate your assistance in complying with federal regulations and institutional policies. You may contact the Office of Research Compliance at 656-6460 if you have any questions.

Sincerely,

Laura A. Moll

Laura A. Moll, M.A., CIP
IRB Administrator
Office of Research Compliance

THOMAS GREEN CLEMSON 200
1Nov-2007
A Life and a Legacy

OFFICE OF RESEARCH COMPLIANCE
221 Brackett Hall Box 345704 Clemson, SC 29634-5704 864.656.1525 FAX 864.656.4475 www.clemson.edu/research
Institutional Review Board: 864.656.6460 Institutional Biosafety Committee: 864.656.0116 Animal Research Committee: 864.656.4355

Appendix B

Participant Consent Form

Consent Form for Participation in a Research Study
Clemson University
Classroom Atmosphere Questionnaire

Description of the research and your participation

You are invited to participate in a research study conducted by Dr. Andrew C. Billings and John A. McArthur, Department of Communication Studies. The purpose of this research is to better understand student and instructor perceptions of the classroom environment. Your participation will involve responding to a brief survey about your attitudes related to your COMM 250 (Public Speaking) course. The survey will also ask questions specifically about your instructor. Your instructor will not have access to these surveys or to your individual responses.

The amount of time required for your participation will be approximately 15 to 20 minutes.

Risks and discomforts

There are no known risks associated with this research.

Potential benefits

This research may help us to understand how classroom atmosphere impacts student and instructor learning.

Protection of confidentiality

Names of participants will not be attached or associated with any of the surveys obtained in this study so that participant confidentiality will be maintained. Your identity will not be revealed in any publication that might result from this study. Your instructors will not have access to these surveys at any time.

In rare cases, a research study will be evaluated by an oversight agency, such as the Clemson University Institutional Review Board or the federal Office for Human Research Protections, that would require that we share the information we collect from you. If this happens, the information would only be used to determine if we conducted this study properly and adequately protected your rights as a participant.

Voluntary participation

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Contact information

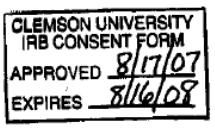
If you have any questions or concerns about this study or if any problems arise, please contact Dr. Andrew C. Billings at Clemson University at 864.656.1567. If you have any questions or concerns about your rights as a research participant, please contact the Clemson University Institutional Review Board at 864.656.6460.

Consent

I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Participant's signature: _____ Date: _____
A copy of this consent form should be given to you.

This form is valid only if the
Clemson University IRB stamp of approval is shown here:



Appendix C

Participant (Instructor) Consent Form

Consent Form for Participation in a Research Study
Clemson University
Classroom Attitudes Questionnaire: Instructor Consent

Description of the research and your participation
You are invited to participate in a research study conducted by Dr. Andrew C. Billings and John A. McArthur, Department of Communication Studies. The purpose of this research is to better understand student and instructor perceptions of the classroom environment. Your participation will involve inviting your students to respond to a brief survey about their attitudes related to your COMM 250 (Public Speaking) course and to you as an instructor. In addition, you will be asked to journal about your experiences in the study classrooms.

The amount of time required for your participation will be approximately 15 to 20 minutes per week throughout the term.

Risks and discomforts
Students in this study will be asked to evaluate your teaching practices and the overall classroom environment. The information obtained by the researchers will remain confidential and will not be used in any matters relating to re-appointment, promotion, tenure or any other matters involving personnel decisions.

Potential benefits
This research may help us to understand how classroom atmosphere impacts student and instructor learning.

Protection of confidentiality
Names of participants will not be included with any of the surveys obtained in this study so that your confidentiality will be maintained. Your identity will not be revealed in any publication that might result from this study.

In rare cases, a research study will be evaluated by an oversight agency, such as the Clemson University Institutional Review Board or the federal Office for Human Research Protections, that would require that we share the information we collect from you. If this happens, the information would only be used to determine if we conducted this study properly and adequately protected your rights as a participant.

Voluntary participation
Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Contact information
If you have any questions or concerns about this study or if any problems arise, please contact Dr. Andrew C. Billings at Clemson University at 864.656.1477. If you have any questions or concerns about your rights as a research participant, please contact the Clemson University Institutional Review Board at 864.656.6460.

Consent

I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Participant's signature: _____ Date: _____
A copy of this consent form should be given to you.

This form is valid only if the Clemson University IRB stamp of approval is shown here:

CLEMSON UNIVERSITY
IRB CONSENT FORM
APPROVED 8/17/07
EXPIRES 8/16/08

Appendix D

Participant Survey

Classroom Atmosphere Questionnaire

Thank you for agreeing to respond to this questionnaire. Circle the number that most accurately reflects your thoughts on the question. Please respond honestly and accurately as your responses will be kept confidential. Your responses are extremely valuable to this research and we thank you for your time.

Rate your likelihood of using the skills you learned in this course in the future.

Likely	1	2	3	4	5	6	7	Unlikely
Impossible	1	2	3	4	5	6	7	Possible
Probable	1	2	3	4	5	6	7	Improbable
Would	1	2	3	4	5	6	7	Would Not

Rate your likelihood of enrolling in another course with similar content.

Likely	1	2	3	4	5	6	7	Unlikely
Impossible	1	2	3	4	5	6	7	Possible
Probable	1	2	3	4	5	6	7	Improbable
Would	1	2	3	4	5	6	7	Would Not

Rate this course overall.

Good	1	2	3	4	5	6	7	Bad
Worthless	1	2	3	4	5	6	7	Valuable
Fair	1	2	3	4	5	6	7	Unfair
Negative	1	2	3	4	5	6	7	Positive

Rate the content of this course.

Good	1	2	3	4	5	6	7	Bad
Worthless	1	2	3	4	5	6	7	Valuable
Fair	1	2	3	4	5	6	7	Unfair
Negative	1	2	3	4	5	6	7	Positive

Rate the behaviors you learned in this course.

Good	1	2	3	4	5	6	7	Bad
Worthless	1	2	3	4	5	6	7	Valuable
Fair	1	2	3	4	5	6	7	Unfair
Negative	1	2	3	4	5	6	7	Positive

How much did you learn in this course?

Nothing	1	2	3	4	5	6	7	A lot

How much would you learn in this course if you had the ideal instructor?

Nothing	1	2	3	4	5	6	7	A lot

Please continue to the next page 

Rate your professor.

Intelligent	1	2	3	4	5	6	7	Unintelligent
Untrained	1	2	3	4	5	6	7	Trained
Inexpert	1	2	3	4	5	6	7	Expert
Informed	1	2	3	4	5	6	7	Uninformed
Incompetent	1	2	3	4	5	6	7	Competent
Bright	1	2	3	4	5	6	7	Stupid
Cares about me	1	2	3	4	5	6	7	Doesn't care about me
Has my interests at heart	1	2	3	4	5	6	7	Doesn't have my interests at heart
Self-centered	1	2	3	4	5	6	7	Not self-centered
Concerned with me	1	2	3	4	5	6	7	Unconcerned with me
Insensitive	1	2	3	4	5	6	7	Sensitive
Not understanding	1	2	3	4	5	6	7	Understanding
Honest	1	2	3	4	5	6	7	Dishonest
Untrustworthy	1	2	3	4	5	6	7	Trustworthy
Honorable	1	2	3	4	5	6	7	Dishonorable
Moral	1	2	3	4	5	6	7	Immoral
Unethical	1	2	3	4	5	6	7	Ethical
Phony	1	2	3	4	5	6	7	Genuine

My instructor...	Never	Rarely	Less often than not	Sometimes	More often than not	Often	Very often
Uses examples to make the content relevant to me	1	2	3	4	5	6	7
Provides explanations that make the content relevant to me	1	2	3	4	5	6	7
Uses exercises or explanations that demonstrate the importance of the content	1	2	3	4	5	6	7
Explicitly states how the material relates to my career goals or life in general	1	2	3	4	5	6	7
Links content to other areas of content	1	2	3	4	5	6	7
Asks me to apply content to my own interests	1	2	3	4	5	6	7
Gives assignments that involve the application of content to my career interests	1	2	3	4	5	6	7
Helps me understand the importance of the content	1	2	3	4	5	6	7
Uses his/her own experience to introduce or demonstrate content	1	2	3	4	5	6	7
Uses student experience to introduce or demonstrate content	1	2	3	4	5	6	7
Uses discussion to help me understand the relevance of the topic	1	2	3	4	5	6	7
Uses current events when teaching a topic	1	2	3	4	5	6	7

Please continue to the next page

My instructor...	Never	Rarely	Less often than not	Sometimes	More often than not	Often	Very often
Looks at me while teaching	1	2	3	4	5	6	7
Gestures while teaching	1	2	3	4	5	6	7
Turns his/her body toward me while teaching	1	2	3	4	5	6	7
Smiles while teaching	1	2	3	4	5	6	7
Often moves around the classroom while teaching	1	2	3	4	5	6	7
Chats with students before and/or after class	1	2	3	4	5	6	7
Nods encouragement when students answer questions	1	2	3	4	5	6	7
Shows a lot of facial expressiveness during class	1	2	3	4	5	6	7

How often did...	Never	Rarely	Less often than not	Sometimes	More often than not	Often	Very often
The class sit in rows?	1	2	3	4	5	6	7
The class sit in formations other than rows?	1	2	3	4	5	6	7
The class work in small groups during class?	1	2	3	4	5	6	7
The class move the furniture in the room during class?	1	2	3	4	5	6	7

Rate these statements in relation to the room in which you have class.	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
This classroom was comfortable	1	2	3	4	5	6	7
I could hear the instructor well	1	2	3	4	5	6	7
I could hear other class members well	1	2	3	4	5	6	7
This classroom was enjoyable	1	2	3	4	5	6	7
I was often distracted during class	1	2	3	4	5	6	7
I would enjoy another class in this room	1	2	3	4	5	6	7
I was comfortable giving my speeches in this room	1	2	3	4	5	6	7

Please continue to the next page

Compared to other classrooms, this classroom...

Is less comfortable than other classrooms	1	2	3	4	5	6	7	Is more comfortable than other classrooms
Has fewer distractions than other classrooms	1	2	3	4	5	6	7	Has more distractions than other classrooms
Is less enjoyable than other classrooms	1	2	3	4	5	6	7	Is more enjoyable than other classrooms
Makes it harder to hear the instructor than other classrooms	1	2	3	4	5	6	7	Makes it easier to hear the instructor than other classrooms
Makes it harder to hear my classmates than other classrooms	1	2	3	4	5	6	7	Makes it easier to hear my classmates than other classrooms
I would rather take a class in another classroom	1	2	3	4	5	6	7	I would rather take a class in this classroom
I would rather give speeches in another room	1	2	3	4	5	6	7	I would rather give speeches in this room

Were there aspects of this classroom that made this classroom more enjoyable than other classrooms in which you have taken classes this term? If so, explain.

Were there aspects of this classroom that made this classroom less enjoyable than other classrooms in which you have taken classes this term? If so, explain.

Please continue to the next page

Offer any other feedback about this classroom.

Circle the grade you received or expect to receive in this course on:

your informative speech	A	B	C	D	F
your group speech (discussion forum)	A	B	C	D	F
your persuasive speech	A	B	C	D	F
your final exam	A	B	C	D	F
the course overall (on your transcript)	A	B	C	D	F

Section Number	
Gender	Male Female
Classification	Fresh. Soph. Jr. Sr.
College	□ Agriculture, Forestry, and Life Science □ Architecture, Arts, and Humanities □ Business and Behavioral Science □ Calhoun Honors College □ Engineering and Science □ Health, Education, and Human Development
Age	18 19 20 21 22 23 24 25+
Ethnicity	White Black/African American Other
Have you taken a college level communication class before?	Yes No

Thank you for taking the time to complete this survey. Your responses are greatly appreciated!

Appendix E

Instructor Questionnaire

Thank you for agreeing to be part of this research. During this study, please keep a journal (digital or physical) in which you can respond to the following statement.

Indicate any observations about teaching practices, student responses, or classroom successes/issues that you relate directly to the physical classroom space in which you teach. These observations may include (but are not limited to) differences between the 3 classrooms on a given day, the success/failure of activities/assignments, or general observations about classroom climate.

Please journal at your convenience, but especially when you notice or attribute a specific instance in which your lesson was shaped by the space you occupied.

You will be asked to submit your journal entries at midterm and at the end of the term.

Appendix F

Script for Survey Administration

Good morning/afternoon. Thank you for your participation in this research about Classroom Atmosphere. On the survey, which will only take about 15 minutes of your time, you'll be asked direct questions about your experiences in this class. The results will be used to improve classes at Clemson and other universities.

Your participation in this survey is very important, but it's also voluntary. All your answers will be confidential. The researchers will have no way to track your survey, or how you answered the questions, back to you. In addition, your instructor will not see this survey or your responses. So, it is very important that your answers are based on **what you actually think or do**. Please try to answer the questions as honestly as you can.

If you finish before the others in the class, please turn in your survey and consent form and wait patiently and quietly until everyone is finished. Thanks to all of you for participating in this survey. The information you provide will be very important to this and other courses at Clemson and beyond. Thank you.

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