ABSTRACT OF CAPSTONE

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The Graduate School
Morehead State University
April 9, 2014
FACULTY PERCEPTIONS OF LEARNING SPACES

Abstract of capstone

A capstone submitted in partial fulfillment of the requirements for the degree of Doctor of Education in the College of Education at Morehead State University

By
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April 9, 2014
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ABSTRACT OF CAPSTONE

FACULTY PERCEPTIONS OF LEARNING SPACES

This project researched faculty perceptions of learning spaces and their possible impact on student persistence at two community colleges in Kentucky. The researchers found through literature review, surveys, and interviews that learning spaces that enhanced student engagement and collaboration could positively impact student persistence. The research product is an online learning space repository that contains frameworks, toolkits, blueprints, photographs, and technologies that can be used in creating ideal learning spaces.

KEYWORDS: learning spaces, student persistence, active learning, community colleges.
FACULTY PERCEPTIONS OF LEARNING SPACES

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DEDICATION

This paper is dedicated to our family and friends. The paper would be remiss if it did not recognize our wives, Melissa Czarapata and Betty Jo Friskney as well as our families who allowed the commitment of the past three years to the completion of our Doctoral degree. A special thanks to the rest of cohort II, this experience has been long, grueling, but most of all fun.
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VITA – PAUL B. CZARAPATA
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Chapter 1

Introduction

Background of the Study

To the citizens of the Commonwealth of Kentucky and around the world, higher education is about dreams. Whether you are a displaced coal worker in Appalachia or the first in your family to attend post-secondary education, it is all about achieving a degree or certificate that enables the student a better life. Many institutions of higher education are facing increasing costs, decreasing levels of state and federal funding, and declining enrollments creating a potentially toxic environment that could put the dreams of students in danger. Administrators are looking for ways to reduce overhead, eliminate underserving/irrelevant programs, cut back on new construction, and put refurbishments on hold.

In addition to cutting budgets and ending unprofitable programs, another major initiative that has gained attention in higher education are formalized student persistence programs focusing on keeping the students already in attendance. Student persistence is defined as the "ability of an institution to retain a student from admission through graduation (diploma or certificate) or transfer (Seidman, 2005). Persistence and retention tend to be used interchangeably and can cause confusion, and in our research we will use persistence as often as possible except when citing other research.

These programs can take the form of software systems, dedicated coaches, and faculty outreach programs just to name a few. Efforts to identify causes of declining persistence rates have proven elusive leading to many qualitative and quantitative studies on the topic. In an effort to stop students from leaving school, some institutions have turned to emerging pedagogies and
the development of new templates for learning environments otherwise known as learning spaces. Historically, the study of learning spaces in higher education has not attracted much attention of scholars or researchers. Traditionally a role filled primarily by facilities planners and architects, learning space design is a topic that has recently gained the attention of educators and librarians as research shows the benefits of designing learning commons and active learning classrooms. Oblinger (2005) shows in her research that a learning space, whether in the library or a traditional classroom, can have a definitive impact on learning. The researchers theorized that a well-designed learning space may be able to positively impact the collaborative and engaging opportunities a student has in the classroom developing a sense of belongingness and connection with students, faculty and the institution. The researchers were able to present literature that ties this sense of belonging ultimately to increasing student persistence rates. The researchers believe that space matters and can ultimately have a positive or negative impact in the mission of retaining the students an institution already has.

The researchers identified two terms in establishing relationships that result in identification with cohorts or a community college. The first of the two terms is interactions; the researchers define interactions to mean the outcome of a dialogue with a fellow student or a relationship with the professor teaching a course. Interactions also include the outcomes of the student to the course content. The researchers define collaboration as the outcome of many interactions that result in the student identifying with a program of study. The researchers recognize interactions are possible without collaboration. An example would be a lecture in a traditional community college classroom. Interactions that result in collaboration are often found in classrooms that are student centered. A good example of this would be problem or project based instruction in an open learning space. Collaboration is often limited or nonexistent in a
lecture based classroom. Tinto’s (1997) research suggest belongingness is necessary to improve persistence, the researcher identify collaboration as necessary for students to identify with fellow students.

Students attending a college or university build many relationships with fellow students, faculty, staff, and the institution itself. Observations at many colleges and universities today validate the assertion that many classrooms have remained the same for centuries, a traditional pedagogical approach with the teacher lecturing and the students having the strict role of the information receiver. Increased pressure to lower college costs has resulted in administrators and facility planners encouraging large lecture classrooms with a single professor. This push to reduce cost has made it nearly impossible in some instances for an instructor to engage with their students. The traditional college classroom is lecture-based with the faculty member at the front and students in rows, often defined as the scholarly academic instructional methodology (Schiro, 2013). Students’ frustration with higher education has resulted in federal and state legislation requiring colleges to demonstrate their effectiveness in placing students in meaningful jobs after degree or certificate attainment. This requirement for accountability has resulted in colleges and universities reviewing alternatives to their traditional practices including pedagogy and learning spaces.

The publication of research analyzing learning spaces in both the United States and the United Kingdom initiated an academic discussion of learning and spaces in higher education (Oblinger, 2005; Joint Information Systems Committee, 2006). Although several hundred articles, peer reviewed research and a number of books on the topic were written by the spring of 2013, the field is in a comparatively early stage of development. Topics common to the studies were: influences of technology, collaborative study, social learning, and flexible learning
environments. Bennett (2006) contends instructional technologists often start the design of learning spaces with service and operational considerations rather than with questions about the character of the learning we want to happen in the space.

The capstone focused on five areas; learning spaces research, academic interest in learning spaces, evaluation of learning spaces, ideal physical and technical attributes of learning spaces, best practices, and the potential relationship of learning space design to student persistence.

**Statement of the Problem**

The study of learning spaces at community colleges is largely absent from the research literature available today. The absence of literature is puzzling because community colleges have been early adaptors in constructing and teaching methods in nontraditional classrooms. A recent study by Steelcase at Richland Community College in Dallas, Texas attempts to address creation of optimum learning spaces within these institutions (Steelcase, 2013). Learning specialists, researchers, and facilities planners have launched a broad range of investigations to address the questions being raised by the new research on learning spaces and their impact on student outcomes. These investigations run the gamut from a few rigorous designed, conducted, and analyzed research projects to a more anecdotal description of experiments and projects undertaken to test specific classroom configurations. In addition, there are a number of articles that review the existing literature and provide a philosophical approach of teaching and learning success in higher education. The question of how the physical environment affects teaching and learning is rooted in the connection between, space, design, psychology and technology. This has been referred to by some as the sociology of space (Urry, 2004). The way we think about space
matters, it inflects our understandings of the world, our attitudes towards others, our politics (Massey, 2005). The spaces we live, work, play, and learn have impacts on the way we go about our day-to-day lives and interact with others.

Student persistence and academic success is of great concern across all of higher education. The Kentucky Community and Technical College System (KCTCS) is no exception. KCTCS is the largest provider of postsecondary education in the state having served more than 140,000 unduplicated credit seeking students across the Commonwealth in 2013 (KCTCS, 2013). System-wide learning space initiatives have not been proposed at KCTCS in the past, but would likely stand a better chance of funding if ties to current system initiatives such as increasing persistence rates could be attained.

Research Question

1. Can an online learning spaces repository for instructors, architects, administrators, and facilities planners be developed that can facilitate an optimal classroom planning process, which reflects faculty members' concerns on how to increase student engagement and improve student persistence rates?

Purpose of the Study

Higher education institutions are seeking opportunities to stabilize if not increase collapsing budgets. Focus has turned to new and innovative ways to positively impact student persistence rates. Tinto (1997) argues that a sense of community within the classroom can positively impact student persistence rates. The researchers hypothesize that well planned learning space designs could potentially have a positive impact on these rates by enhancing the
ability of students to interact and collaborate with one another and faculty. Intentional or not, the form, functionality, and finish of a space reflect the culture, behaviors, and priorities of the people within (Doorley & Witthoft, 2012). By designing with collaboration in mind, a classroom can encourage communication rather than inhibit it. A room design can be made flexible enough to aid in more effective communication and group activities. Research studies available to faculty and facilities planners are anchored by many qualitative studies consisting of surveys and interviews. The problem is that higher education does not yet have an established body of knowledge on the design of learning spaces that can guide those who must make decisions on most appropriate classroom designs.

By turning focus to the impacts of learning spaces the research community has the opportunity to align space planning, social science and pedagogy for the purpose of addressing a fundamental concern of the higher education mission: assessing what helps faculty teach and students learn. Learning spaces at higher education institutions are often identified with either the traditional classroom or the library (Bennett, 2006). Learning Spaces are typically classified as either formal or informal learning spaces. Informal learning spaces are lobbies, study halls, outdoor areas, hallways, and libraries. Formal learning spaces are typically restricted to the classroom a course is taught. Learning spaces should not be overlooked as an important contributor to student achievement and success. An attractive learning environment, the way furniture is arranged, the lighting used, the ability of wall to absorb sound and floor properties have been identified to affect student achievement (Tanner, 2000).

The end product of this Capstone was the creation of an online repository dedicated to learning spaces that assist faculty, facility planners, and administrators in the design of appropriate classrooms, libraries, and informal spaces. The online repository was based on a
thorough review of available literature, semi-structured interviews, and a detailed survey to be conducted with faculty and presidents at two KCTCS community colleges. The online repository contains toolkits, detailed photos, plans, ideas, and links to additional information resulting from information collected through interviews, surveys, and the literature review. The goal of developing the site was to identify optimum learning space designs that might positively influence student persistence rates. The site provides examples of best practices, most recent research, and current projects in learning space design in order to give faculty, architects, administrators, and facilities personnel ideas when refurbishing or creating a new learning space. The hope of the researchers is that they create the foundation of a one-stop shop of learning spaces design information.

The researchers believe this site will help faculty to select the appropriate classroom that can optimize student engagement and collaboration potentially resulting in improved student persistence rates. The online site is a living digital repository and has the functionality to allow thousands of professionals around the world to contribute and comment. The researchers used a faculty survey instrument created for the capstone project and included intensive faculty interviews using the faculty interview questions used in the capstone project. This optimal classroom model will likely vary, sometimes drastically, depending on the topic being taught. For example, a highly technical course such as welding would need much more hands-on time in a laboratory workshop than an art history course and need a vastly different learning space.

Many changes have taken place in the past decade with delivery methods of instruction, technology, and how students access information to acquire knowledge. Even with the explosion of online and hybrid courses, traditional classrooms continue to be the primary focus of community college instruction. The traditional classroom content delivery method continues to
be a lecture delivered by the instructor, and students taking notes while questioning the instructor to ensure they are accurately understanding the content.

A recent modification of the traditional classroom is the flipped classroom, where lectures are given online prior to class which allows dedicated classroom time to collaborate and discuss versus lecturing. The traditional standard rows and aisles of seating are not particularly conducive to collaboration. It is easier to communicate with someone when you can see their face versus simply listen to them because they are sitting in front of you or behind you. In recent years, instructors have introduced collaboration into the learning environment by using problem-based or project-based discussion resulting in a new classroom model defined as an active learning classroom.

The age of the Internet has introduced new sources of information used by students in acquiring knowledge. It is commonly said that we live in the “information age”, where modern technologies make it almost possible to use the Internet to gain instantaneous access to an incredible amount of information on virtually anything (Amedeo, Golledge, & Stimson, 2009). Information resources traditionally housed within higher education libraries are now available online by various Internet resources such as ERIC, EBSCO, Academic Search Premier and Google Scholar. YouTube, a video repository, has become a repository for many faculty lectures and discussions of learning spaces research.

Classroom lectures from many colleges and universities on a myriad of topics are available from a simple Internet search and Massively Open Online Courses (MOOC) afford anyone access to courses from leading universities. Technology enriched learning environments are available to most students with the introduction of mobile computing devices, Wi-Fi everywhere and constantly decreasing cellular communications costs. Many students own a
smartphone with access to rich Internet resources, students toting both a laptop and tablets in conjunction with their smart phones are growing in popularity. New communications technologies are bringing broadband even to the most remote and poor regions of Kentucky. Higher education institutions are augmenting the traditional classroom with the adoption of e-Learning technologies such as digital projectors, Smartboards, course capture and wireless Internet services. Information previously only available on campuses in the library is now available to students anywhere, at any time.

Libraries have already experienced a similar transformation with students (Beard & Penny, 2010). Traditionally, libraries served as a portal to scholarly information resources, and students were required to visit the library to access their rich academic databases. However, ubiquitous Internet access has significantly altered many students’ study habits by removing the requirement that they visit the library in person. Libraries initially began offering online access to scholarly databases from student residences and later expanded this service to the general public. More recently, other information resources have become available to students through free Internet services such as Google Scholar or Khan’s Academy. Today libraries provide access to digital resources allowing students the ability to perform complex searches across disparate collections of research.

How should higher education decision makers plan for learning spaces in the future? Is it possible that the traditional lecture classroom will continue to be the primary learning spaces in the 21st century, or will the impact of technologies and ease of information access change the learning environment? Will state and federal legislation focused on accountability result in colleges implementing alternatives to the traditional classroom instruction. Will the weak
demand for employment combined with the rising cost of higher education require academic leaders to offer innovative instructional models?

The information resources of today have exposed students to alternate learning environments that link the digital education realm with the physical. If a student is unable to understand a classroom lecture, search services such as Google enable quick access to alternate lectures online allowing the student to be exposed to different learning experiences. Education publishers such as Pearson and Cengage provide online videos, presentations, and digital textbook supplements to instruction in a traditional classroom. An example of this is Arizona State University’s adaptive courseware project involving Pearson Publishing and Knewton. Adaptive learning companies such as Knewton are combing their analytical resources with publishers to offer personalized learning experiences.

How will such a wide availability of learning resources impact classroom instruction in the future? What impact does this have on the traditional classroom and the services provided by the library? Will changes in learning spaces allow a college or university to positively impact persistence rates? Will the traditional lecture classroom continue to be the mainstay for offering instruction? Will libraries have a role in the Internet age? If changes must occur in the classroom or the library, what are the best models for the future? The literature review analyzed current research and identified relevant issues.

Limitations of the Study

The scope of this study is limited to higher education learning spaces, specifically those delivered at KCTCS. This case study focused on two KCTCS colleges to determine if it is appropriate to further test at all 16 Community and Technical colleges across Kentucky. The
research resulted in the creation of an online learning spaces repository that identifies best practices in learning space design to enhance student engagement and potentially student persistence rates. The literature review was limited to learning spaces in higher education and attempted to identify research literature of learning spaces in a community college. The capstone reviewed current research related to a broad range of learning spaces, reflecting the current understanding that learning is meant to take place in classrooms or library spaces. The capstone did not address learning spaces in Kindergarten through high school. Web-based learning is a form of distance education using computers to access the Internet and tools for both navigating the World Wide Web (WWW) and for communicating and sending data over the Internet (Miller, 2004). This capstone did not address emerging learning spaces defined as eLearning or blended classrooms. The researchers plan to consider those areas for exploration after this project. The Case Study focused on learning spaces at two KCTCS institutions. The emphasis of the study focused on physical classroom learning spaces. The research analyzed the impact of learning spaces on student engagement resulting in improved persistence.

The research attempted to identify whether changes to the traditional lecture based classroom might improve faculty satisfaction in instructional methodology and results in improved student engagement. The capstone analyzed faculty perception of learning spaces at KCTCS by surveys and exhaustive interviews. The study identified the faculty perception of active learning methods to instruction in the classroom.

**Significance of the Study**

Our vision for this capstone was to develop an online learning spaces repository to assist faculty, facilities managers, and instructional designers in designing learning spaces with clear
recommendations for components based on best practices and observations in higher education. This online site can continually evolve as further study is done to incorporate best practices and evidence-based designs that can positively impact student persistence. Higher education learning spaces have remained lecture based for centuries while technology has introduced many changes into the lives of students. The capstone identified issues that impact learning spaces at KCTCS and analyze if the issues will affect how learning spaces are created in the future. The goal of this capstone was to understand how learning space design could enhance student persistence rates. The research analyzed the intersection of learning spaces, technology and pedagogy to identify changes that positively impact students’ experiences. The research also analyzed the traditional practices of lecture instruction in higher education to determine if current practices should continue or if alternative methods of instruction should be implemented to enhance the learning environment.
Chapter 2

Literature Review

Introduction

The focus of this literature review is to identify and gather information on how the physical design of learning spaces affect the activities and outcomes that occur within the space, evaluating existing bodies of research, and providing direction for future research. Learning spaces in higher education has been a little researched field of study. The consideration of space is often not associated with teaching and learning. A vast majority of college and university buildings are simply functional standard units, constructed to the designs and standards of other comparable buildings of their place and time.

The literature review examined current research in learning spaces to establish a baseline for planning higher education learning spaces. The review identified key physical attributes of the learning space, reviewed pedagogical methods faculty use for instruction and how learning spaces might positively impact student persistence rates, showed successful frameworks and toolkits used in designing learning spaces, and identified best practices in design.

Learning Spaces Research

Teaching and learning are two sides of a coin. The most accepted criterion for measuring good teaching is the amount of student learning that occurs. Many learning theories used in the physical classroom situation, including learning in a community, collaborative, scaffolding, and scenario learning have been adopted and validated (Tsai, 2011). Active learning and collaboration in the classroom can be difficult in a traditional classroom configuration. For
example, it is not particularly easy to collaborate in teams using a traditional rows/aisles classroom layout. Before we discuss the literature of learning spaces, it is imperative that we review the catalyst bringing focus to these spaces – how higher education students are learning.

Literature on teaching overflows with well-researched methods for faculty use in presenting content and skills to enhance the opportunities for students to learn. Literature is equally filled with suggestions of what not to do in the classroom. However there is little guidance on what teaching methods match up best to what skills and or content that is taught. Can the configuration and components of the physical classroom assist in this process? Do specific disciplines require a specific style of learning space? Can a change in teaching a subject in a specific type of learning space improve student engagement resulting in improved persistence rates? Students often have little expertise in knowing whether the method selected by an individual instructor was the best teaching method or just a “method”, or simply the method the teacher was the most comfortable with. (Doyle, (n.d.))

The time when faculty in higher education could simply follow the teaching method that they experienced as students may be waning. As federal and state budgets decline there has been a reduction of teaching resources resulting in the spotlight on optimal teaching methods. Further, greater focus on teaching quality has elevated the debate on teaching methods and learning spaces. Finally, developments in technologies for communicating and disseminating information have had a significant impact because teaching has historically been an information sharing activity. Students expect the faculty to be a subject matter expert in addition to being aware of the content available in online academic resources.

To address issues of teaching and learning in higher education, the literature review addressed the delivery of instruction and the potential to optimize the physical learning
environment by manipulating classroom components in an ideal combination. Higher education has traditionally used lectures as the primary method of instruction, but this has begun to slowly evolve. Universities experienced significant growth in enrollments in the late 1940’s and 50’s with the support of the G.I. Bill that created a program to pay for the continuing education of veterans resulting in a massive spike in the students attending college. Universities responded to the growth demand by adding faculty and expanding buildings. Federal and State budgets were increased to meet the growth demands. Universities expanded from small classrooms to large lecture halls to meet the student load requirements. Faculty used lectures as the primary method of instruction and began to rely more heavily on teaching assistants to work with students due to the high student to instructor ratio.

Today higher education is being transformed by limited growth, reduced funding from federal and state budgets, a demand for accountability and access to information traditionally found only at libraries and now available online. Lecture in a traditional classroom learning space as the primary method of instruction is being questioned as the most effective method of instruction. Faculty are being asked to consider alternative instructional methods to improve student engagement as access to information resources online expand, and students continue to adopt technologies for classroom use. The literature review focused on the changes experienced in the traditional lecture classroom and determined if changes would improve student success.

Scholarly Academics make “subject matter,” which they conceive to be the essence of the academic disciplines, their central concern when creating curricula. In doing so, other concerns about society, the learner, and the learning process become of secondary importance (Shiro, 2013). The traditional higher education classrooms used the Scholarly Academic ideology as the primary method of instruction. The Scholarly Academic model reflects the academic governance
model found at every postsecondary institution. Instructors are considered the subject matter experts and students are considered vessels that need to acquire knowledge. Lecture based instructional teaching methods meet the requirements of delivering subject materials and are familiar to the faculty member. The Scholarly Academic model is focused on the subject matter and places high importance on the content making up a majority of the curriculum and placing little responsibility on the learner. The expert in the Scholarly Academic model is the professor. Today’s university classrooms reflect the wide adoption of this teaching style as the primary learning delivery for instruction. Increasingly instructors are using active, group, and participatory teaching methods, and are offering students opportunities to opt in to more creative assignments requiring the use of advanced technologies in support of multimedia projects (Hutton, Davis, & Will, 2012).

A debate began in the 20th century regarding the role of the student in the learning process. Educators began to question only using a subject matter approach to instruction in higher education. The debate was a result of work done by John Dewey, Jean Piaget and Lev Vygotsky that focused on how students learn (Dewey, 1966; Piaget, 1952, Vygotsky, 1978). The result was the concept of student centered learning that put the student at the nexus of the learning rather than the subject matter. The goal of student-centered learning is to ensure the student is involved in the learning process, to take a self-directed approach to acquiring knowledge (Bennett, 2007b; Chism, 2006; Jamieson, 2003). Traditional instruction is driven by the curricular requirements and revolves around the faculty. Student centered instruction revolves around the learners and addresses their interests and knowledge while including them in the instructional development process. This instructional style is often referred to as active learning instruction (Brooks, 2011). Today’s higher education students familiar with this
learning style encourage faculty to evolve their interest in delivering classroom instruction. Students are questioning if a traditional classroom lecture is the most appropriate way to learn subject matter material.

The debate on the most effective method of classroom instruction and the student’s learning style is being revisited with the availability of resources online. Today’s undergraduate student has access to the most recent subject matter in their area of study. Historically, faculty acquired and distributed the subject matter to students. Today students are able to find online academic resources to meet the requirements of their coursework with a few mouse-clicks. A search of any subject matter topic on YouTube or Massively Open Online Courses (MOOCs) offers students access to relevant information offered by many leading professors. Students are not satisfied with only acquiring information in the classroom but are asking that faculty assist them in internalizing the new information into knowledge. Today’s college students want learning experiences that are connected, experiential, immediate, and social (Lomas & Oblinger, 2006).

Many faculty members are questioning the most appropriate method of instruction for students. It is evident that subject matter centered instruction will continue to be the primary method of instruction in higher education. The debate tends to be in the delivery of the instruction. Should it continue to favor the scholarly academic model of learning or should instruction be influenced by a student-centered approach to learning? Both methods of learning are available to the faculty to use.

The influence of student-centered learning is initiating a debate on how faculty should deliver instruction in the classroom; this literature review addresses the question of the importance of addressing learning styles in the classroom. Are past practices of university best
practices for the future? Are learning theories impacted by the method of instruction? Is it possible to change the method of instruction to improve the ability of the student to learn and therefore move them to degree completion?

Learning spaces can convey an institution’s philosophy about teaching and learning. EDUCAUSE, a higher education information technology consortium, introduced the debate on learning spaces with their publication of Learning Spaces in 2005. The book offered a description of learning spaces at various colleges and universities and the impacts that were observed. Oblinger (2005) states that leaders in higher education need to understand how decisions affecting learning space design impact student success, and suggests that good learning space design supports an institution’s mission of enabling student learning. There is established evidence that learning space design does matter and can improve student learning in comparison to a traditional classroom (Brooks, 2012). Moving from classrooms to learning spaces requires a conceptual shift and the discipline to put learning ahead of traditional instruction methods. Early learning space research targeted college libraries as well as the traditional classroom. Research articles propose that student competence is developed in active, exploratory, and social settings (Bennett, 2007a; Boys, 2011; Chism, 2006; Cox, 2011; Oblinger, 2005).

Chism’s (2006) research suggests that learning scenarios occur regardless of how spaces are arranged. Chism argued that learning is facilitated when spaces are designed with learning in mind. The research suggests institutions align the physical environment with institutional priorities and goals for student success. Advances in learning theory have implications on the way learning takes place; the emphasis is on active construction of knowledge. The common theme of learning spaces highlights the impact of collaboration and social learning in 21st century learning environments (Oblinger, 2005; Chism, 2006).
Whether or not learning spaces are truly important to student satisfaction and success is a point of contention with researchers. Neither Solomon and Rooney (2006) nor Thomas (2008) agree with Chism (2006) about the level of importance a space can have in the learning environment or the need for a formal design process. These researchers feel that learning organically occurs and that the space it occurs in is a lesser concern. However, Sanoff (2000) contends the physical environment can also affect learning, ideas, values, attitudes and culture and if properly planned, positive learning environment will affect the learning process.

Solomon and Rooney (2006) state that a learning space can grow organically without assistance. An example given is an informal setting such as a break room where employees frequently congregate and share information. These informal settings become learning spaces at times because they are suited for collaboration and learning. At other times the space may not be ideal, and if that design is revisited it may be possible to alter the space and positively impact learning.

College and University libraries have seen their roles change greatly over the years with the staggering amounts of resources available online. Students no longer need to come to the library to find books, magazines, or microfiche yet they still come on premise to study, collaborate, do homework, and engage in group projects with peers. Because of this, libraries have received much attention in the research of learning spaces. Bennett (2007a) expanded the study of learning spaces by reviewing the commitment of libraries nationwide to learning spaces. To accomplish this, he surveyed and analyzed the methods of sixty-six university libraries investing in learning spaces as they created what are commonly known as learning commons. His survey recognized that rapid change in information technology created uncertainties about the value capital delivers in higher education’s investment in learning spaces. Bennett questioned
if learning was primarily considered in the construction of learning spaces. The survey addressed the areas of uncertainty by focusing on three approaches to designing learning spaces: the services/instructional approach, the marketing approach, and the mission-based approach.

The service/instructional approach addresses benefits students receive in learning spaces from the perspective of the librarian. The marketing approach views what is useful to students from their perspective. This collaborative process engages the students of the college or university, and seeks their input on optimal arrangements. The mission-based approach focused first on the instructional mission and second on the needs of staff and students. Bennett’s survey identified that the greatest return in designing the information common learning space is recognition of the collaborative approach to shaping services that help students and faculty face the uncertainties arising from the rapid changes in technology.

Learning spaces have been shown to impact student engagement (Brooks, 2012; Steelcase, 2013). Student preferences have changed in recent decades with the influence of social networking and information resources available on the Internet. Oblinger (2005) states that many students embrace collaborative study and active learning in higher education. Massachusetts Institute of Technology (MIT) researchers who assessed their Technology Enabled Active Learning (TEAL) project found that the deployment of an active learning curriculum in redesigned spaces performed better than lecturing techniques in a traditional classroom in terms of reducing failure rates and increasing conceptual understanding (Brooks, 2012). Unfortunately, many of today’s traditional classrooms are not equipped to support the active learning environment favored by students or faculty. Oblinger (2007) states that today’s students have attitudes, expectations, and constraints that are different than those of ten years ago. These
expectations at times are not lived up to in a traditional industrial learning space of rows and aisles.

Learning spaces reflect the learning approach of the time they were established, so spaces designed in the 1950’s frequently do not match the preferences of students or faculty today. Oblinger’s research shows that a learning space can be a change agent in higher education, and that a different type of space is required to meet today’s students’ learning requirements. Colleges and universities are encouraged to spend time understanding learning and then design relevant spaces. Increasingly, spaces are becoming flexible and networked in order to have the capability of combining formal and informal activities in a seamless environment that can be physical or virtual. Integrating the tools and techniques of virtual learning with physical space design could alleviate problems identified in research conducted by Fielding (2001), claiming the traditional classroom is no longer a viable space for learner-centered activities

Learning space designs can vary in complexity depending on the project scope and resources available to the instructor. This resource availability typically dictates the depth a designer can plan changes to the physical learning environment. Radcliffe (2008) shows that instructors have numerous studies to draw on for assistance in design and gives examples of several comprehensive frameworks for best practices in learning space design. These frameworks have been created exclusively for use in the design of learning spaces incorporating pedagogy, space, and technology needs. As with any profession, the more experienced a designer is, the better the end product will be and typically for less cost than if designed by a novice. This may lead some institutions to seriously consider consultants for learning space design projects simply because they will likely incur less cost and a better end product. Full-time design
companies can simply have the economies of scale likely not present in a higher education institution.

Educational professionals may not realize that well designed learning spaces are not restricted to new building construction nor are they necessarily expensive. Research by Black & Roberts (2008) gave real-life examples of low cost classroom space redesigns producing meaningful improvements in student experience and knowledge retention. These improvements were made possible by simply rearranging furniture into collaboration-friendly designs such as round tables and hollow squares. The shape the seating forms in the room drives the level of collaboration. For example, if the face of a classmate is visible it is easier to communicate with them. Fisher (2005) argues the physical learning space layout works best when it can be adjusted based upon the type of teaching being performed. An adjustable physical space relies on easily reconfigurable furniture such as wall partitions, tables mounted on rollers, and portable seating. Learning space design can take many shapes, but many of them include technology augmentation and produce higher student grades versus a non-enhanced space with all other factors equal (Brooks, 2011).

Today’s researchers continue to study students’ preferences for learning spaces by focusing on virtual or physical spaces that result in engagement (Cox, 2011). Cox’s research was a small-scale exploratory study of seventy-five students; the primary data source consisted of six in-depth interviews with third-year undergraduate students. Students were asked to respond to a dozen photos to determine the preferred learning space and study practice. The results indicate that students do not have a preference in the type of learning space, but students did prefer collaborative spaces that were technologically equipped. Results indicate that a student’s
residence is inferior to a learning commons space for study, suggesting students prefer to be with others while studying even if they are studying independently.

Bennett (2011) continued his research on students’ preferences regarding university learning spaces by studying the impact on learning behavior a space might have. The survey evaluated learning behavior and learning spaces by asking students to complete a questionnaire based on the National Survey of Student Engagement. The questionnaire identified learning behaviors that are important to students and reviewed non-classroom spaces important to fostering learning behavior. Survey responses suggested a misalignment between learning behaviors identified as important and the campus spaces that should be an asset in achieving the mission of instruction. Results were inconclusive that any learning space was more important than another in improving learning behavior. Faculty and student respondents rarely identified any learning behaviors, except collaborative learning and studying alone, as being distinctively supported by campus spaces.

Research in learning spaces requires higher education institutions to understand the factors that must be addressed to improve the impact of learning spaces on student engagement. Learning space research focused on space and place in the changing context of post-secondary teaching and acknowledged elements of the learning environment that have largely been treated in isolation from the developments in pedagogical practices (Jamieson, Fisher, Giding, Taylor, & Trevitt, 2000). The study suggested that college and university architecture must do more than appeal aesthetically to users, and that the idea that formal teaching and learning takes place needs to be acknowledged by administrators and be the primary consideration in the design of new buildings.
All stakeholders need input in the design process, not just the administrators and facility planners, but faculty and students as well. Drawing on the experience of the authors, the connection between pedagogy and learning spaces is examined from an educational and architectural perspective to highlight the necessary multidisciplinary approach to creating learning environments. Successful learning space design requires the input of all stakeholders. Colleges and universities are complex environments established to meet the demands of teaching and research (Bickford, 2002; Jamieson, Fisher, Giding, Taylor, & Trevitt, 2000). Research reveals a description of how stakeholders in the building process come from different institutional cultures and have different requirements that are often conflicting. Bickford (2002) proposes a cross-functional design team that encourages competing needs and interests to be harnessed to create learning environments that support learning. The research recommends a design team that includes faculty, students, administrators, facilities managers and architects to ensure all viewpoints of the learning space are addressed. The creation of learning spaces calls for new ways of campus collaboration and leaving behind the specialist approach.

Bennett (2007b) continued his research of spaces that support learning. Bennett’s research focused on non-discipline specific spaces where students take control of and responsibility for their learning. Historically the design of learning spaces centered on operation and service considerations rather than learning. Bennett proposed six design questions that would guide decisions when a higher education institution establishes learning spaces. The questions require thought be given to why are we building the space, will the space encourage students to spend time studying, does the design encourage collaboration/social learning, will the space encourage student/teacher collaboration outside the classroom, and will the space enrich educational experiences? Evaluating the questions is important throughout the building program.
Further research by Radcliffe (2009) followed Bennett and offered frameworks for the designing of learning spaces. He proposed a pedagogy-space-technology framework to guide the design process through influencing the conceptual design in addition to post-occupancy evaluation of discrete learning environments. Radcliffe’s question-based framework aids stakeholders with an approach to the creation, operation and evaluation of new learning spaces. The sequencing of the items in the framework is intentional and important. In this framework pedagogy, space, and technology influence each other in a reciprocal fashion. While all three elements are interdependent in a cyclical manner, the question remains what element do you start with? The framework suggests starting with pedagogy, then space, and finally technology.

Interest in learning spaces in the United Kingdom resulted in several case studies that discussed the outcomes of universities creating learning spaces from a holistic approach. Weaver (2006) explored the relationship between creating physical learning space and changing conceptions of learning/teaching to enable student-centered learning. St. Martin’s College created the Learning Gateway to demonstrate the impact of learning spaces on student success (Weaver, 2006). The Learning Gateway is a framework for providing a holistic view of the learner and the institutional support required for students to flourish. The Learning Gateway combined the technological and social elements of the blended learning model by establishing a set of pedagogical principles based on the constructivist theory of learning. St. Martin mapped digital media and furniture options to the framework resulting in a student-centered learning environment.

Jankowska and Atlay (2008) detailed the University of Bedfordshire project of renovating classroom space into a “creative space” that emphasizes social learning, classroom space and creative space. The study explored the impact of teaching in a specially designed
learning space on student engagement. A survey of forty-three faculty and thirty-nine students measured perceived influence of the user experience. The survey results document student satisfaction with the new environment, reporting an improved student experience, and inferred that visual and aesthetical aspects combined with technology had the greatest impact on student opinion. Students and faculty agreed the space was excellent for multiple uses and enabled teamwork and collaboration.

**Academic Interest in Learning Spaces**

The creation of learning spaces favored by students reflects many of the principles of active learning. Creating learning spaces highlighting collaborative study, social learning and engagement, requires adoption by faculty to be successful. The research suggests the absence of faculty input is often the result of centralized planning by a central facilities group that is unaware of emerging learning theories or simply under a timeline to get a design completed.

Literature reviews document campus classrooms, lecture halls, tutorial rooms and other formal places of learning have changed little for centuries (Jamieson, 2003). Attempts to create new teaching and learning facilities have often resulted in celebrated architecture that proved to be educationally problematic. Jamieson argues the design and development of appropriate on-campus learning environments should be a priority for academic leadership. Academics’ participation in planning a learning space allows faculty to contextualize the learning process as they see it through their eyes. His research encourages universities to create learning spaces that encourage multiple contrasting experiences, spaces that are flexible and encourage exploration and relationship building. His example is the collaborative common spaces developed in libraries often referred to as information commons.
Spaces are influenced by learning artifacts, faculty use concrete and abstract learning artifacts to construct multiple representation of expert knowledge for students (Ching, Levin, & Parisi, 2004). The artifacts studied were inscriptions, gestures, tools, furniture, technology, sound and temperature. The study videotaped the classes of seven instructors at the College of Education at the University of Illinois at Urbana-Champaign. The study analyzed the artifacts relationship to the pedagogical goals in higher education. Findings noted all instructors used multiple artifacts in classroom instruction. Data analysis suggested technology artifacts are insufficient to capture the complexity of teaching practices. The researchers also acknowledged the longitudinal study needed require further research.

Kolb, Kolb, and Lewin’s (2005) research examined the theory of experiential learning to explore how information can be used to enhance learning in higher education by drawing upon the foundational theories of John Dewey and Kurt Lewin. Experiential learning gives experience a central role in theories of learning and development. Experiential Learning Theory (ELT) is the process of creating knowledge through the transformation of experience. ELT was developed following Lewin’s plan for the creation of scientific knowledge by conceptualizing phenomena through formal, explicit, and testable theory. The authors argue the enhancement of experiential learning in higher education is achieved through the creation of learning spaces that promote growth-producing experiences. The authors found that art students learned completely differently from managerial students and necessitated a different physical learning space. The establishment of unique spaces for students to take responsibility for learning greatly enhances their ability to learn from experience.
Evaluation of Learning Spaces

Understanding the importance of learning spaces requires rigorous evaluation and input from all stakeholders. Hunley and Schuller (2006) proposed a formal needs assessment program before charging into the design phase. Hunley and Schuller argue three issues must be addressed in learning space assessment: does it focus on teaching and learning, does it identify the specific requirements of the audience, and does it recognize that learning can take place outside the classroom? Assessment must integrate the evaluation of teaching methods and use of learning space. Their research argues academic and co-curricular program pedagogical approaches used by faculty become critical elements affecting learning space assessment. The research recognizes the fact that learning space assessments need to target the facilitation of student interactions with faculty in formal and informal environments. Brand (2009) contends that the physical environment can interfere with the frequency and quality of social interaction. Brand goes on to give recommendations such as windows increasing social desirability of a space, configurations that allow face-to-face orientations to encourage more social interaction, and that enhanced collaboration is possible in a properly planned space.

Other research focused on technology-rich learning spaces and explored approaches to evaluation (Roberts & Weaver, 2006). The need to evaluate technology-rich learning spaces by exploring approaches and tools from a practitioner perspective is particularly highlighted as critical. Effective evaluation considers inputs, outputs, and outcomes that provide both a quantitative and qualitative approach to assessment. The framework proposed evaluates accountability, development and knowledge. Two case studies of technology-rich learning spaces were presented with accompanying evaluation models used to evaluate if objectives were met. The authors concluded that a sound theoretical framework must underpin rigorous
evaluation in order to understand the complexities of the success of the student experience (Roberts & Weaver, 2006).

**Physical Attributes of the Learning Space: Lighting, Color, and Temperature**

Whether sitting in a large lecture hall, underneath a tree, or in front of a computer screen, students are engulfed by environmental information, all of which may or may not assist in learning (Graetz, 2006). There is significant research available regarding the positive correlation between a well-designed classroom and a positive educational experience. Much of this research focuses on K-12, but the principles are so general in nature they translate well to higher education learning spaces. Educational facilities can enhance or inhibit teaching and learning with the inclusion or exclusion of key learning space attributes. The relationship between learning and the design of instructional spaces within schools is well documented in professional literature (Streifling, 2003). Much of this would seem to be common sense to the average person because we all know what makes us uncomfortable in any physical space. If a classroom is too hot or too cold, has no means to shield external noise from distracting learners, or simply does not have good lighting the learning space becomes an inhibitor to learning.

When designing a learning space it is important to consider the people who will occupy the space long after the architects and construction crews are completed. The researchers believe that user-centered design (UCD) must be incorporated in the planning process. UCD is a broad term to describe design processes in which end-users influence how a design takes shape (Abras et al., 2004). In this particular instance students and faculty would be incorporated into the design process in some way, shape, or form. Best practices in UCD methodology have been historically based on two key ideas: (i) placing the users at the center of the design and
evaluation activities; (ii) evaluating intermediate results that come from the process of design (Rizzo & Cantù, 2013). To use UCD during the planning phase of the learning space, the designer would involve the users of the learning space and implement an iterative process for evaluation of the space. This evaluation would come mid-way through the project to ensure expectations were being met.

Every object, color, texture, and spatial configuration, as well as their selection and placement, has educational significance (Taylor, Aldrich, & Vlastos, 1998). Taylor and Enggass (2009) contend that architects become educators when they design potent learning environments. They go on to suggest that their version of the perfect learning environment would be similar to a children’s museum that merges hands-on learning with all of the elements of professional design. Taylor, et al (1998) state that a well-provisioned classroom supports the curriculum and the teachers by acting as a regenerative research and resource center. Students get excited about learning; they are not bored or turned off.

A consideration easy to take for granted when designing a room is the lighting. Sleegers, Moolenaar, & Galetzka (2013) reported that three Dutch studies found that lighting affected the ability of a student to concentrate. This research was in conjunction with Philips lighting by whom all three were paid, but the research was provided quantitative data regarding the impact of light whether natural or artificial. While not every room can have natural light, there are some things a designer can do to introduce good light into the classroom. Martel (2011) tells a troubling story regarding the most common lighting system used in schools. Cool-white fluorescent bulbs (which are used in nearly all classrooms) cause bodily stress, anxiety, hyper-activity, attention problems and other distress leading to poor learning performance. Poor lighting is bad for students and it appears that the go-to status quo option of the white fluorescent
light needs to be revisited. Martel (2011) goes on to say that schools, classrooms and other work environments where people spend time learning and working under simulated sunlight (full spectrum lighting and color) experience less stress and anxiety, improved behavior and attitudes, improved health and attendance, and increased performance and academic achievement.

In addition to lighting, the colors used in a learning space can be positive or detrimental depending on the color pallet selected. Dagget, Cobble, & Gertel (2008) stated that research has demonstrated that specific colors and patterns directly influence the health, morale, emotions, behavior, and performance of learners, depending on the individual’s culture, age, gender, and developmental level, the subject being studied, and the activity being conducted. They go on to recommend a particular color pallet by subject such as blue, green, or teal for a biology class and amber, blue, or yellow for history. The distinction to make here is that choosing a bad color palette can make a room suboptimal than if you used no color at all. This concept is sometimes referred to as functional color schemes which are not measured by aesthetics but by research evidence which supports their use in the classroom (Birren, 1988). Color can elicit emotional, physical, and even social changes in people which is another reason it is so important to consider when designing a learning space. Engelbrecht (2003) states that a functional color scheme should strive to meet three goals: supporting the functions and tasks within the building, avoiding over and under stimulation, and creating positive emotional and physiological effects.

In addition to lighting and color, actual room temperature and relative humidity has been shown to impact student concentration by limiting attention spans and productivity when a room is either too cold or too hot (Trane, 2012). A student attempting to learn in a frigid room or in a furnace is likely going to be distracted because they are not comfortable. Classrooms either need manual control of the temperature given to the faculty in the classroom or the ability to quickly
have the room temperature altered by facilities personnel. A study at a high school in Oregon took cohorts of students and gave the students exams in rooms that were sixty-one, eighty-one, and seventy-two degrees with the warmest room scoring 72% on the test, the coldest 76% and the ideal room temperature of seventy-two scoring 90% (Hadfield, 2013).

**Best practices for creating learning spaces in new buildings**

Libraries’ success in establishing learning spaces has resulted in many colleges and universities exploring the need to expand the concept to study spaces and classrooms. Leather and Marinho’s (2009) article introduces a template for building classroom buildings for the 21st century. The process requires faculty to articulate a values statement that includes its mission and the goals for student development. The second step recognizes millennial students’ needs are different and pedagogical strategies have improved and therefore must be the primary drivers in providing space that meets the student’s instructional needs. The third recommendation requires the provost’s office to appoint faculty as participants in building programming to ensure the academic agenda is realized. Finally, the design team must consider how technology will encourage academic collaboration between and among faculty and students.

Butler Community College established a team of students, faculty, administration, and a corporate partner to create a framework for developing learning spaces as a strategic initiative to improve student engagement and retention (George, Erwin, & Barnes, 2009). The college applied the framework in building a new student union building that included four classrooms. The community college’s institutional research department followed with a study to determine student’s experience from the new learning space and if the college achieve the planned outcomes for the rooms. The survey measured preoccupancy and post occupancy responses from
students and faculty. Results indicated positive experiences in the learning studio and greater levels of student engagement and satisfaction.

The Queensland University of Technology performed a study with the aim of enhancing student success and retention (Menzies & Nelson, 2012). The study showed among other items, that providing institutional financial and human resource support for physical and virtual learning spaces increased student persistence and academic success through the use of peer communities and learner centered engagement opportunities. In order for students to have rich engagement experiences with fellow peers, they need appropriate physical space to do so in both their informal and formal learning spaces.

Student technology labs are often viewed as learning spaces. Brett & Nagra (2005) examined the relationship between open-access labs and students’ approaches to self-study. Today’s traditional open-access labs are large structured computer rooms with restrictions on talking, eating, and drinking. The University of Wolverhampton recognized the limitations of the traditional approach to creating labs and created a design team to establish a social learning space model to encourage collaborative learning. Results gathered from observations, questionnaires, and structured interviews found that 62.5% of the students indicated the environment is a key factor in developing collaborative learning spaces, students are not affected by allowing talking, eating or drinking while studying, and 82.5% of the students indicate the nature of the environment was a key aspect of a student’s choice to study in a room (Brett and Nagra, 2005).

Hall (1990) tells us that furniture arrangement has a distinct relationship to the degree of conversation. This observation aligns with the amount of focus that learning spaces are receiving today. Students need spaces furnished in a manner that promotes discussion and exchanging of
ideas. Learning space design need not be exotic or expensive to be impactful. Doorley & Witthoft (2012) explain that ordinary casters have been revolutionary in changing collaborative spaces at Stanford University. It is not how expensive the room is, it is the design of the elements. A twenty-five dollar round table from a big-box store can be just as effective as a commercial round table in a pinch.

In addition to the furniture, providing flexible technology rich spaces that encourage collaboration and socialization should be seen as a way of supporting a learning environment. Understanding the college and university learning space is an important element in understanding how these institutions work in terms of teaching and learning. Current research suggests campus and building design needs to give consideration to the social underpinnings of learning and the importance of collaborative study space. Emphasis has been placed on enriching spaces with technology to create learning spaces. Brown & Long (2006) identify personal response systems, videoconferencing capabilities, floor plans that foster face-to-face contact among students, technology that supports the sharing of computer screens, and virtual whiteboards all are changing the learning dynamic in the classroom as an alternative to the traditional simple transmission model of teaching.

Learning spaces with technology do not necessarily result in improving learning, but can provide tools to support the learning process. Focus must be placed on encouraging faculty to be active participants in creating learning spaces. A majority of the research of higher education learning spaces has focused on the investments of college and University libraries in learning commons. Teaming faculty, librarians and technologists provides a first step in understanding the requirements of establishing successful learning spaces.
Persistence, Pedagogy, and Learning Spaces

Retaining students until degree completion has long been a problem in higher education (Tinto, 1987). With competition amongst both for-profit and public institutions increasing, state and federal funding decreasing, and drops in the number of high school graduates the need to keep students already attending the institution has become paramount. As previously mentioned, persistence is defined as the "ability of an institution to retain a student from admission through graduation (diploma or certificate)” or transfer (Seidman, 2005). Student persistence is a real problem and Braxton, et al. (2004) state that approximately 45% of students enrolled in two-year colleges depart during their first year, and approximately one out of four students departs from a four-year college or university.

The most basic element of student persistence efforts is installing support measures to keep the students already in attendance at the institution and intervening at appropriate times before they are lost. Christie, et al. (2004) and McGinnis et al. (2000) states there are many reasons that students leave college including financial, course availability, and satisfying their personal goals. The laundry list of possible reasons a student might drop out of school do not end there. Tinto (1987) argues a lack of engagement with their classmates and faculty is a notable problem and has a direct correlation with persistence. Menzies & Nelson (2012) found that providing institutional financial and human resource support for physical learning spaces increased student persistence and academic success through the use of peer communities and learner centered engagement opportunities. This rich engagement experience with fellow peers needs appropriate physical space to do so in both informal and formal learning spaces.
Tinto is one of the most prolific writers in the field of student persistence in higher education (Breier, 2010). Tinto has support for his theory in the research of Braxton (2000) which found that students do not typically leave college because of bad grades, they leave due to lack of engagement on campus. For the commuting students at a community college, the classroom is often the only opportunity for interaction with other students and faculty and perhaps their only engagement with the institution. A positive student experience in the classroom is frequently associated with reduced student attrition and higher student learning outcomes (Matthews et al., 2011). If this is the only interaction an institution has with a student, it makes the learning space an important consideration in improving student persistence rates. A learning environment consists of the physical and digital setting in which learners carry out their work, including all the tools, documents and other artifacts to be found in that setting (Zitter & Hoeve, 2012). These learning environments become an extension of the institution.

Astin (1975) contends that residency during school and extra-curricular activities have direct ties to student persistence rates. These extra-curricular and dormitory activities outside of school help to establish deeper ties between the student and the institution. Obviously there is nothing a community college can do if they do not have residence halls such as the institutions at KCTCS, but it does allude to the importance of taking advantage of every minute they are on campus whether in the classroom or simply socializing in a lounge area. The point the researchers would like to emphasize is that every interaction a commuter student has on-campus is all that more important. There is a great importance for a person to feel a part of the college and to have fellow students to associate with both in class and out of class. If a student feels alienated in an environment and they are not mandated to attend college, what would keep them there? Students who have negative (or lack any) interactions and experiences tend to become
disillusioned with college, withdraw from their peers and faculty members, and ultimately, the institution (Lau, 2003). When students find themselves alone on an island, they do not stay enrolled in school.

In his research Reynolds (2007) found a positive association between the campus environment and the impact on student recruitment and student persistence. The analyses suggest that institutional characteristics and facilities have a direct correlation with a student’s decision, both initially and after enrollment. Many community colleges are nonresidential with students who are older, employed while in college, and have multiple obligations constraining their involvement which makes increasing persistence difficult to achieve (Tinto & Russo, 1994). Some students have families themselves and it is not uncommon for a single parent to come back to community college when starting or resuming their education. If the classroom is the sole area of interaction a student has, it becomes all that more important to design the learning space properly for optimal interactions.

The importance of the instructor cannot be overstated in these interactions of forming community. Many students are anxious when they first enter a course and anxiety can be reduced through the efforts of faculty by taking the time to initially walk students through exercises (Curry, 2005). Engagement in the community of the classroom becomes a gateway for subsequent involvement in the academic and social communities of the college for new students in particular (Tinto, Goodsell, & Russo, 1993). Engaging with others in the classroom begins to form the perceptions and relationships the student has with the institution. The greater the student’s involvement or integration in the life of the college, the greater the likelihood that they will persist (Tinto, 1997).
There is a growing recognition that student learning is enhanced when students are actively involved in learning and when they are placed in situations in which they share learning in some connected manner (Astin, 1997). This is the sweet spot of collaborative learning designs that have shown increases in student persistence at Richland College in Texas and the University of Maryland at Baltimore County (Narum, 2013). This connected manner can take the form of collaboration, which in this context is simply the interaction of students and faculty with one another in and out of the classroom. Amirul (2012), Hall (1990), and Matai (2007) argue the design of the physical environment has a significant effect on the behavior of students and in turn, can form a particular social organization. Cooperative learning uses group discussions, group projects, and group presentations that have been found to increase not only persistence but also student satisfaction and cognitive skills (Cooper, 1995).

Similar in ways to cooperative learning, active learning is a dynamic, student-centered, task-oriented learning process, involving the active participation of both faculty and students in the classroom (Matthews, 1996). The communication is bi-directional and active participation is typically mandatory due to interactive discussions for the duration of the face-to-face class time. Active learning calls for collaborative, problem-based, or experiential learning and has also been shown to have a positive impact on student persistence rates (Silberman, 1996). Simply put, the research shows that collaborative and engaging instructional techniques in the classroom can increase student persistence. Tinto (1987, 1993) goes further and argues that a sense of belonging and integration is a core facet in his theory of student retention. Recently, updated research has called for the modification of Tinto’s theory to take into account commuter colleges and universities. Braxton et al. (2014) call for five propositions to take into account parental
education level, motivation to graduate from college, the costs of college attendance, support from significant others for college attendance, and need for social affiliation.

As shown in the research, student centered instructional pedagogies such as active learning rely heavily on student and faculty collaboration within a learning space. Collaborative learning spaces offer unique opportunities to experiment with seating and with new audio visual technologies (Bayly, et. al., 2010). Collaboration can occur nearly anywhere - in the classroom, libraries, and general common areas within the College or University. Participation in a collaborative or shared learning group was shown to enable students to develop a network of support that helped bond students to the broader social communities of the college while also engaging them more fully in the academic life of the institution (Tinto, 1997). When students collaborate with others in solving problems or mastering difficult material, they acquire valuable skills that prepare them to deal with messy, unscripted problems they will encounter daily during and after college (Kuh, et. al, 2010). Students are partners in the classroom, involved in collaborative methodologies of finding knowledge, searching in their own learning styles and, with the teacher, creating learning environments (Perkinson, 2009).

The review of the literature suggests the design of a learning space has direct impact on the ease of collaboration within it and create social organizations. This social organization can be the basis of the feeling of belonging within a group. A room layout with the traditional rows and aisles configuration is not as easy to collaborate in versus a large circular, groups of circular tables, or hollow-square seating configurations where students can see and interact with one another more readily. Tinto’s (1997) research on learning communities at Seattle Central Community College showed that student collaboration in the form of learning communities enabled the development of a student support network which encouraged peer engagement and
participation; this in turn had a direct impact on student persistence. What research has consistently shown is that collaborative teaching methods can have a direct impact on persistence. Kreie, Headrick, & Steiner (2007) produced research that students who took the same course in a team-learning collaborative environment were significantly more likely to persist past the first semester. Whiteside, Brooks, & Walker (2010) presented data indicating that students found the Active Learning Classrooms at the University of Minnesota effective at promoting teamwork and collaboration.

Libraries have taken the challenge head-on in showing their institutional value to administrators in increasing persistence levels. Hagel et al. (2012) cite partnering with faculty, catering to at-risk groups, providing appropriate technologies, anticipating response to student persistence trigger points, and working in partnership with support areas throughout the institution to ensure integrated support. Crook and Mitchell (2012) in their research amongst learning spaces in a University library theorize that there is a social ambience that students appear to gain inspiration or reassurance from merely being in a library learning space with other students in a shared predicament – in this case study. As mentioned previously in this literature review, libraries are transforming in their usage. In many cases, students no longer need to come to the library to find a particular book or journal - but they come to the library to work with their classmates, study with friends, or seek assistance in searching online resources.

Well-planned learning space design can positively impact the ease and effectiveness of interaction and collaboration amongst teachers and students. More effective interactions and collaborations have been shown to positively impact student persistence. With these two statements, one can logically assert that learning space design has the potential to positively impact student persistence rates.
Best Practices in Collaborative/Active Learning and Learning Space Design

Active learning is a relatively recent change to the higher education classroom. Historically higher education instruction was in lecture-based classrooms that supported the faculty member being the subject matter expert and the students being passive learners. The constructivist theory of learning encouraged higher education faculty to question the traditional approach to instruction. A result of this was an emphasis in active learning principles. Active learning involves several key principles that are focused on student-centered instruction. Active learning involves the active construction of meaning by the learners. Simply stated, the student builds new knowledge on previously learned knowledge (Weimer, 2012).

The difference between lecture based instruction and active learning instruction is the acknowledgement that “learning facts” and “learning to do something” is shown as two different things and that the learner’s knowledge is increased in a collaborative learning environment instead of learning alone. To encourage exploration in active learning, universities have experimented with different active learning classroom techniques (Brooks, 2012). The following is an example of best practices of active learning classrooms in higher education.

SCALE-UP

North Carolina State University (NCSU) introduced the concept of the SCALE-UP classroom. The term is an acronym for “Student-Centered Active Learning Environment for Undergraduate programs.” The SCALE-UP classroom is a learning environment that facilitates collaborative learning in a studio-like setting. A typical SCALE-UP classroom at NCSU has eleven tables with nine chairs at each table (Beichner, 2008). Every table in the room has a
laptop computer for students to use to access relevant information. Large monitors are strategically mounted on outside walls in the classroom to project student work or instructional material. The choice of grouping was the result of experimenting with multiple models to determine the optimum learning environment. The end result allows each table to have three groups of three students working on class modules that are approximately fifteen minutes each. All instruction focuses on the student’s hands-on activities encouraging social learning. Early deployments of the SCALE-UP classroom involved physics instruction but have been expanded to include math, biology, astronomy, engineering and literature. To date over two-hundred universities have developed variations of the SCALE-UP active learning classroom.

**TEAL**

Massachusetts Institute of Technology (MIT) introduced a second active learning classroom with the Technology Enabled Active Learning Project (TEAL). The TEAL classroom focused on employing software based simulation and visualizations in an active learning environment designed to encourage student collaboration and problem solving. (Brooks, 2012). Similar to SCALE-UP classrooms TEAL classrooms are equipped with round tables to encourage collaboration, laptop connections, personal response systems and large monitors and marker boards around the circumference of the room. Similar to the SCALE-UP classrooms the TEAL classrooms at MIT are equipped with twelve tables with nine chairs at each table. TEAL classrooms have a central demonstration table in the center of the room allowing faculty and students the ability to project visual information in the classroom. Interactions between students and faculty, between students and students, and student and content are core to active learning in a TEAL classroom. The TEAL classroom allows instruction usually effective in smaller
classrooms to be used with large classrooms. A key difference between the MIT TEAL classroom and the NCSU SCALE-UP classroom is the focus on software simulations and visualizations.

TILE

The University of Iowa assumed a leadership role in developing active learning classroom with the implementation of its classrooms spaces to Transform, Interact, Learn and Engage (TILE) (Van Horne, 2012). The TILE classrooms incorporated the best practices of the NCSU SCALE-UP classrooms and the MIT TEAL classrooms. TILE classrooms are technology enriched with laptops on each round table, a central presentation site, and large monitors surrounding the classroom. Like the SCALE-UP classrooms and the TEAL classrooms all tables are round and have nine seats available for students. Due to the success of the program, the University of Iowa has committed to transforming a number of their legacy lecture classrooms to the TILE classroom format. The university has also implemented a faculty development program to ensure the benefits of the classroom are optimized for instruction (Van Horne, 2012). Faculty are required to attend training sessions prior to teaching in a TILE classroom. Emphasis is placed on encouraging collaborative instruction and social learning. The faculty member acts as a guide in the learning process. Instruction if often based on project based or problem based learning.

Classroom.NEXT

The Center of Excellence in Teaching and Learning (CETL) at Texas Wesleyan University asked the question, what happens when faculty and students collaborate on a classroom design including furniture, technology, temperature, and lighting (Collier, et. al,
2011). CETL wanted to get an answer to this question and sponsored a competition for the best student/faculty design. The room designs were to be conducive to rich interactions between student and teacher and had to fit within the confines of a designated classroom. The floor plan of the classroom also had to be flexible, allowing different table and chair configurations with minimal effort. In all, five classrooms were designed all within the confines of the same physical space. Some had informal elements such as sofas and recliners while others focused more on the instructional technology.

The ultimate winner of the contest was a design named the Radically Flexible Classroom Design (RFCD) which consisted of six tables with four chairs each, a sofa, SMART board, chairs and ottomans, coffee table, projector, mobile instructor station, and Wi-Fi internet access (Collier et. al, 2011). An important highlight from the research indicated that faculty indicated in interviews that they learned about design concepts equally from the student participants as the research literature. CETL ultimately decided to take this concept as a model to be used in future construction and will continue to monitor feedback through surveys and interviews.

Active Learning Classroom

The University of Minnesota recently opened the Active Learning Classroom (ALC) Building that continued the goal of promoting student centered, interactive student experiences (Brooks, 2012). The University of Minnesota Science Teaching and Student Services classroom building was designed using the best practices of the NCSU SCALE-UP classroom and the MIT TEAL classrooms. The classroom is similar to the others with the use of round tables that seat nine students and has projection capabilities at each table that support students’ using their own laptops to supplement the three dedicated laptops. The University of Minnesota instructional model encourages peer teaching and peer learning. Today the classroom building has fourteen
classrooms that accommodate between twenty-seven and one-hundred and twenty-six students. The classrooms are equipped with large monitors around the circumference of the room and each table has dedicated projection equipment that allows faculty to select and display selected information. As with the other models the technology assumes a support role and student centered learning is the primary goal of the instructional classrooms. The goal is to transform students from memorization of facts to learning how to think. A result was an emphasis on student interactions, one of the cores of deep learning (Brooks, 2012). The University of Minnesota completed a quasi-experimental research study to compare learning in a traditional classroom and the active learning classrooms and found that space shapes instructional behavior and space shapes on task student behavior resulting in increased student engagement and success (Brooks, 2012).

*LearnLab*

Richland Community College located in Dallas, Texas worked in partnership with Steelcase Incorporated to understand the impact of active learning classrooms in a community college environment. The Richland project used Steelcase’s LearnLab furniture that was originally installed in 2008. Four key concepts borrowed from other studies were used in the LearnLab. These included triangulation enhanced sightlines, vertical surfaces to provide information persistence, and large screens to maximize display. There are seamless transitions among learning modes, and the square room design with central door access allowed utilization of corners of the room (Steelcase, 2013). The Richland classroom was similar to the previously mentioned active learning classrooms but differed in the use of tables and the number of students at each table.
All faculty in the Richland project were required to attend faculty development sessions at the University of Minnesota. Most clusters in the LearnLab active learning classrooms had two tables of four students in each learning pod. The student classroom count was dependent on the size of the room. The classroom removes the front of the room by positioning chairs and tables into an “X” configuration. Emphasis is placed on collaboration, teamwork and an unobstructed view of projected information. Projection monitors are placed into corners to give students front row sightlines. The room is equipped with portable electronic whiteboards and monitors at each LearnLab cluster and on the walls to capture and display group work. The active learning classroom encourages students to use their personal laptop computer and utilizes wireless technologies to display group assignments and to access Internet based resources. Today one hundred and ten courses in twelve disciplines are taught in the LearnLab classrooms.

A research study in 2013 involving freshman students compared students taking a course in the LearnLab with students taking the same course in a lecture classroom. The results of the study verify that students prefer an active learning classroom; also students favored the increase in interactions that resulted in improved engagement. The study at Richland suggests that further research is necessary for community college classrooms. The successful outcomes of the qualitative studies at the University of Minnesota and Richland Community College establish a baseline for future research.

Past Literature Reviews

Temple’s (2008) literature review addressed how higher education learning spaces supports teaching, learning and research. The literature concludes the connections between design and use of space in higher education is not well understood and has not attracted the
attention of researchers. The literature review highlights the decisions on the designs of learning spaces have been the responsibility of facilities management resulting in current buildings projects that often lack collaborative student workspace and minimal consideration given to learning models. His review of literature challenges universities to give greater consideration to the impact of social learning and collaborative study by encouraging input from faculty. Temple’s literature review validates that libraries are providing leadership in transforming traditional spaces into learning spaces.

A literature review by Savin-Baden, McFarland, and Savin-Baden (2008) used an interpretative meta-ethnography, a qualitative approach to manage a large range of literature in a way that presents an analysis of findings of data across all studies and interprets results in relation to themes that emerge. Findings indicate that issues of pedagogical stance, learning spaces and notions of improvement can help locate themes that are strong influences on areas of teaching and learning practice.

Learning spaces’ effects on student success and persistence is a subject in need of further research. Community Colleges need to place emphasis on what happens in a learning space before it creates the learning space. A next step is to create a framework that faculty can use in determining the appropriate learning space for courses. To accomplish this, a study of learning spaces in KCTCS was undertaken to determine if the selection of an appropriate learning space can result in improved student success and can increase student persistence.

The literature reviewed has shown us strong evidence supporting the link between learning spaces and the ability to enhance collaboration and interactions between students and faculty. Research was also shown the tied student persistence rates to feeling connected with students, faculty and the institution. Collaboration and in-class activities with other classmates was cited
as a means to this connection for students. Collaborative interactions can be enhanced by a well-designed learning space, and ultimately could lead to an increase in student persistence rates.
Chapter 3

Methodology

Introduction

Community colleges have a more complicated and arguably difficult student persistence pathway because they are likely to attract students who are less-college ready than those who are able to attend the four-year sector (Hagedorn, 2010). KCTCS has focused significant human and financial resources on student persistence efforts including early warning systems, collaborative teaching styles, learning space designs, and targeted email messages. KCTCS could raise roughly one million five-hundred thousand dollars in revenue for each one percent of additional student persistence. These revenue additions could be used to forego tuition increases, invest in student services, or add to financial aid opportunities.

Community Colleges are focusing on preemptive measures to assist in mitigating students dropping out, sometimes never to be seen again in higher education. As faculty and staff explore ways to increase student persistence, we are proposing the attention be focused on learning spaces in KCTCS colleges. Based on a review of the literature, faculty experience and feedback, can an online repository be developed that helps administrators and facility planner’s design learning spaces assisting in the mission of increasing student persistence rates?

Determining the impact of a learning space required researchers to gather the attitudes, experiences, and opinions of instructors in the classroom. Without an understanding of these experiences, the researchers’ efforts to develop an instrument that could be used to assist in the creation of an optimal learning space would be difficult. The goal of the researchers is to develop an online instrument that can be used in the future for all KCTCS new construction and
remodeled classrooms and eventually outside of KCTCS as we refine our findings based on research and topical literature.

The literature presented suggests that features in physical learning spaces have been shown to positively impact teaching and learning. The literature review indicates classroom design principles have been shown to foster collaboration amongst students and their teachers. Collaborative or team learning is shown to be significantly more effective than lecture methods in student engagement and student persistence (Kreie et. al., 2007). This capstone seeks to determine if this positive impact translates to retaining the students choosing to come to KCTCS. This Case Study researched learning spaces within a Community College setting to determine if objects such seating, lighting, technology, room configuration, etc. manipulated in the physical classroom can lead to greater levels of student engagement and persistence

**Justification for Methodology**

Researchers have the choice of conducting quantitative, qualitative, or mixed-methods based studies. The researcher selected a qualitative case study methodology to collect the richest data. A case study is a research approach that is used to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context (Crowe et al., 2011). This capstone gathered high quality in-depth information using qualitative methodologies commonly associated with case studies. In general, case studies are the preferred method when (a) adding insight into how and why questions are being posed, (b) the investigator has little control over events, and (c) the focus is on a contemporary phenomenon within a real-life context (Yin, 2009). The researcher used a survey and individual interviews to gather a more complete view of faculty perspectives.
Case studies are descriptive and provide insight into the phenomenon under study (Merriam, 2001). Qualitative research is underlined by the experience of interacting with subjects, in this case the faculty using a classroom. Without their input, this study would not have the needed feedback to determine what faculty has observed in the classroom and what they would like to see changed. Qualitative research methods are distinguished from quantitative methods in that they do not rest their evidence on the logic of mathematics, numbers, or statistical analysis (Meyer, 1988). Case studies, such as experiments, are generalizable to theoretical propositions and not to populations or universes.

Research Sample

KCTCS is comprised of sixteen colleges across the Commonwealth of Kentucky. Two colleges within the KCTCS system have been identified that actively promote active and collaborative learning styles as well as lecture based instruction. This allowed the researchers multiple perspectives while still being able to keep the scope to a reasonable size. The population of this case study was full time and adjunct faculty who have taught face-to-face classes at these institutions.

Research Design / Data Collection Methods

Data was collected through a survey and individual semi-structured interviews. The review of literature was used extensively to identify questions we should ask faculty to gather their feedback in relation to the classroom environment and student persistence. The needs analysis was initiated by gathering faculty input in relation to learning spaces in the classrooms in which they teach through the use a survey instrument (See Appendix A). To validate and to
constitute reliability of a survey, the survey was subjected to a review by experts and a pilot test (Tomal, 2003). A panel of experts constituted of knowledgeable practitioners in the learning space and learner-centered teaching field determined if the survey questions are valid and appropriate for the study. All members of the expert group have earned doctorates in their related fields.

The members of the doctoral committees of the researchers were used to determine if actionable information can be attained and identify potential shortcomings of the survey. After piloting the survey the researchers reconvened the expert panel to determine if the group identified significant gaps in coverage of the survey. If significant gaps were found, the researchers planned a second questionnaire that would be developed and piloted. The data collected from the survey was compiled and analyzed with the end product was sent to an expert peer reviewer for his input.

In addition to the survey, it was necessary to delve deeper into the collected data by the use of interviews with faculty members from both colleges (See Appendix B). In all forms of qualitative research, some and occasionally all of the data are collected through interviews (Merriam, 2001). The researchers used the survey to ask the anonymous faculty members to email either researcher if they are interested in an interview. We offered an incentive of a random drawing of four $50 gift cards. The interviews were semi-structured with pre-determined questions. The researchers selected twelve interviewees, six from each college. This number was chosen based upon the research of Guiest, et al (2006) which found that descriptive saturation occurred within the first twelve interviews, and the basic elements for meta-themes were present as early as six interviews. Based upon their research of qualitative methods, the researchers chose to use a semi-structured interview technique. The semi-structured interview falls between
the highly structured and completely open interview methodology. In this particular format, neither the order of the questions nor the exact wording is determined ahead of time (Merriam, 2001). This provided the researchers latitude to dig deeper into areas that were important in construction of the online repository. This interview approach allowed the researchers to let conversations naturally flow from one question to the next rather than be rigid and scripted.

**Research Product**

After performing our research on physical learning spaces the researchers created a learning spaces online repository that is used to design optimum learning spaces in both formal and informal settings. This includes classrooms, libraries, and even common areas where students congregate. We envision a live collaborative site that facilities planners, faculty members, and administrative staff can reference and use it to determine a thoughtful learning space that optimizes student interactions and leads to increased persistence rates.

The product of our research is an online repository of learning space research, toolkits, blueprints, infograms, and high quality images. The researchers believe the technology of choice is an Internet presence named Pinterest. Pinterest is a popular social network bookmarking system, and while it was predominantly designed for photos and images it can now link to nearly any multimedia object (videos, audio, etc.).

Pinterest creates a crowdsourcing opportunity to invite other community college faculty to contribute to our board as well as easily share other pages from within Pinterest that might be related. The researchers plan to promote the repository by presenting at University Business Technology, EDUCAUSE, and the Association for Educational Communications and Technology (AECT) conferences to encourage adoption. Because it is not particularly easy to
guide individuals to groups of Pinterest boards, the researchers’ have created a web site, which links to the boards created. The website is located at the following URL: http://learningspaces.info.

Validity & reliability

This case study would be meaningless if we did not seek to identify and address issues of validity and reliability. Our ultimate goal is to develop an end product that can be used reliably across the Commonwealth of Kentucky at KCTCS locations and beyond as we venture into further studies subsequent to this project. To maximize validity and reliability the researchers used four methods: multi-site analysis, thick description techniques, member checking, and expert panel review.

Multiple Site Selection

The researchers opted for a multiple-site case study to gather more data in an attempt to show the case study may be generalized/transferable to more than just one college. This helped the researchers form an opinion as to whether or not learning space manipulation leads to increased student engagement at other college campuses. The colleges are sufficiently different from each other, and do not share any staff other than a few adjunct online instructors.

Thick Description

Geertz (1973) argues that when we describe an event we have two choices, to cover the bare details or to offer a much fuller elaboration. This full and detailed elaboration is called thick description and is a technique used when documenting the results of our individual interviews.
and focus groups. Thick Description tries to rescue (extract) the meanings, actions and feelings of the people or phenomena we are observing. (Denzin, 1989). The interviews conducted with both faculty members and the college presidents allowed this deep level of interaction to provide a greater understanding of the local learning spaces.

**Member Checking**

After we interpret the interview and focus group data, we employed a method used to increase validity and reliability called member checking (Glesne, 1999). This method allows interviewees feedback to ensure what the researchers have interpreted is indeed the way they wanted to construe their feelings and/or opinions. Member checking is not without risk, interviewees may decide to rephrase large sections of the transcript in order to refine them or remove anything they now find embarrassing (Mero-Jaffe, 2011). This allowed the researchers to confirm not only the thoughts and opinions, but also the accuracy of the data collected we may have misinterpreted or simply missed during the data collection. We performed this task by emailing a transcript of the interview to the person interviewed and requested their feedback. One small change was made to the transcripts based on feedback from the interviewees. We made appropriate changes as requested by the one interviewee and heard from the remaining faculty and presidents that they had no changes.

**Peer reviews**

Peer reviews entail the use of a subject matter expert in the area being researched that is external to the project and can provide an unbiased opinion. To validate and to constitute reliability of a survey, it should be subjected to a review by experts and a pilot test (Tomal,
The role of the peer reviewer is to advise, critique, and propose alternate explanations of the data. (Lincoln & Guba, 1985). On an iterative basis we submitted our findings to the reviewers for their expert opinion and then either alter/repeat our processes or moved on to the next phases of the study.

**Threats to Validity**

The researchers identified two major threats to validity primarily due to one of the researchers being a vice-president and member of the system president’s cabinet. These two threats are the Hawthorne effect and the Experimenter effect. The Experimenter effect happens when the researcher has an unintended effect on a study (Yin, 2009). The position held by the researcher could possibly inhibit faculty members from being completely honest or forthcoming in their responses. The Hawthorne effect means that a group in an experiment changes their behavior simply to please the experimenter (Coombs & Smith, 2003). Again, this could happen because of the perceived power of the researcher within the community college system. No faculty members expressed any hesitation during the interview and all appeared to be comfortable and at ease during the interviews, however these both are legitimate threats to validity.

**Ethical concerns**

Stake (1994) states “Qualitative researchers are guests in the private spaces of the world. Their manners should be good and their code of ethics strict.” The researchers submitted their survey and interview questions for approval through the Internal Review Boards of Morehead State University, the University of Kentucky, and KCTCS. This is necessary due to the
researchers performing their Doctoral studies at the former, and being employed by the latter. Confidentiality and anonymity was ensured via the use of an anonymous survey using Qualtrics software hosted by the University of Kentucky, the use of encrypted transmission to the survey web site via the HTTPS protocol, and not having any survey fields that can be tied back to an individual including storage of originating Internet Protocol addresses. Interviews were limited to a subset of full-time and adjunct faculty members; students were not surveyed or interviewed in this case study.

Trustworthiness and objectivity are paramount to our research in order to gain the respect and open communication from faculty members in this study. As researchers, we are morally bound to conduct our research in a manner that minimizes potential harm to those involved in the study. (Bloomberg & Volpe, 2012) By submitting our work through three Internal Review Boards and taking measures to enhance reliability such as peer reviews we believe that any subjective opinions from the researchers will enhance the research.

**Distribution of Responsibilities**

The researchers worked as partners in this capstone project and while it is certainly a team effort, there are some definitive responsibilities that have been distributed. The division of responsibilities was established to ensure each doctoral candidate could complete their capstone project if something were to happen to the other researcher. The capstone is being submitted as a combined project. The researchers jointly developed the research instruments, a survey and interview questions. One researcher conducted interviews with faculty and their president at one college and the other conducted interviews with the second college’s faculty and the president. Researcher I (Friskney) wrote the initial Introduction section and researcher II (Czarapata) took
the lead on the Methodology. Both researchers were equally responsible for the review of the literature, research findings, and conclusion sections of the capstone.

The research product consists of a web site, http://learningspaces.info and four Pinterest boards. Both researchers were involved in the creation of the web site and the content posted to the Pinterest boards. The researchers plan to open the Pinterest boards to external users after their capstone project has been passed by the committee.

Summary

Student engagement is extremely important to the KCTCS system and community colleges in general. Community colleges face additional challenges due to the number of underprepared students they typically face in any given semester. Learning spaces can be designed to enhance student/student and student/faculty interactions through the use of technology, furniture, and other aspects of the physical environment. Furthermore, the literature review documents the manipulation of classroom elements such as seating, lighting, technology, and classroom configuration within a physical classroom can increase student collaboration.
Chapter 4
Research Findings

Introduction

The research question of this capstone states “based on qualitative research, can an online learning spaces repository for instructors, architects, and facilities planners be developed that can facilitate an optimal classroom planning process which can increase student engagement and improve student persistence rates?” The research goal was to use a thorough review of available literature, the data gathered in the survey, and the insight garnered from semi-structured interviews of faculty and presidents to develop an online learning space repository. Recall that student persistence in this study is defined as the "ability of an institution to retain a student from admission through graduation (diploma or certificate)” or transfer. (Seidman, 2005)

The research method used for this Case Study was qualitative and was performed with an exhaustive review of the literature, an online survey, and interviews with faculty and two college Presidents at two KCTCS colleges. The survey instrument was modeled after a survey used in a dissertation by Betty J. Perkinson of George Mason University titled Community College Facility Design: The Relationship between the Learning-Centered Paradigm and Learning Space as Viewed through the Lens of Developmental Studies Faculty (Perkinson, 2009).

Survey Construction and Results

Beyond the literature review, the researchers needed deeper insights into current classroom environments, pedagogy preferences, and demographics that simply cannot obtain any other way than surveys or interviews. The first research assessment was a survey of all faculty at
the two KCTCS colleges. The survey was created using Qualtrics, an online survey tool. The software allowed the researchers to create, issue, and analyze survey from a hosted site. The survey instrument is predominantly constructed of Likert scale questions that are grouped into categories. These categories were Personal, Teaching Strategies/Techniques, Facility Design and Students, Working with Faculty, Faculty Involvement in Planning, Classroom Instruction, Classroom Properties, and Demographics.

The researchers’ capstone committees were used as pilot testers for usability, flow, and content in the survey instrument. Based on their feedback, several changes to the survey were made to correct errors, change wording, and restructure questions. The researchers worked with a reporting expert at KCTCS to determine the faculty members at each college that teach in a face-to-face classroom. A list of emails was generated and the survey was issued via a blind-copied email to five hundred and twelve faculty members. The survey was open for two weeks with two follow-up emails sent after the initial email. A total of seventy-four faculty members completed the instrument.

The following tables show responses are broken down by Likert response of always (5), often (4), sometimes (3), never (2) and unsure (1).

*Part I. Personal*

This section captured data about the faculty member’s classroom, administrative support, and general facilities related questions. This included questions pertaining to the classroom arrangement, administrative support of new and traditional teaching methodologies, and the characteristics of the building in which they primarily teach.
The questions in Table 1 asked faculty members to distinguish between traditional lecture classrooms and collaborative classrooms. A traditional lecture classroom is defined as a room with a faculty lectern at the front of the room and the student’s desks in rows with each student having their own desk. A collaborative group/team classroom was defined as a classroom with a faculty lectern and student chairs and desks on wheels that were easily movable to allow students to form workgroups at will.

Table 1

*My College Has*

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms that allow students to create group seating arrangements.</td>
<td>19</td>
<td>19</td>
<td>35</td>
<td>5</td>
<td>1</td>
<td>79</td>
<td>3.63</td>
</tr>
<tr>
<td>Lecture classrooms.</td>
<td>42</td>
<td>18</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>74</td>
<td>4.30</td>
</tr>
</tbody>
</table>

The first question in Table 1 inquired about the classrooms at the college the faculty member teaches and whether or not they are traditional lecture classrooms or a classroom that can be configured for a collaborative engagement. Forty eight percent of the respondents stated that they either always or often had classrooms that could be configured for group seating whereas 80% of the respondents either always or often had access to a traditional classroom six percent of the respondents stated that they never had access to a room that allowed group seating arrangements. This may be due to lab-based courses such as automotive repair that only have a shop to work in with no corresponding classroom.
The second question in Table 1 was designed to determine whether the faculty member was assigned to a traditional lecture classroom at their college. Eighty one percent of the respondents indicated that their college either always or often had lecture classrooms. Only two percent of the respondents indicated they did not currently have access to a traditional classroom, this may likely be technical program faculty who have workshops or garages.

The questions in Table 2 sought the level of support faculty members felt they received from their administrators in regards to the preferred instructional method. The purpose of this question was to determine the level of support from their administrators faculty experienced when they wanted to experiment with a collaborative or flipped classroom model.

Table 2

*My Administrators Support*

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using new instructional methods, such as asking students to listen to a lecture before class and then discuss the lecture during class.</td>
<td>38</td>
<td>21</td>
<td>14</td>
<td>1</td>
<td>6</td>
<td>80</td>
<td>4.05</td>
</tr>
<tr>
<td>Lecture teaching environments.</td>
<td>39</td>
<td>19</td>
<td>18</td>
<td>0</td>
<td>2</td>
<td>78</td>
<td>4.19</td>
</tr>
</tbody>
</table>

The first question in Table 2 sought information related to the attitudes of the administrators of the faculty member and whether they supported newer instructional methods or preferred traditional lecture based pedagogies. The example given in the first question is what is commonly known as the “flipped” classroom where students view or listen the lecture outside of
class through an electronic medium such as YouTube and use face-to-face classroom time to discuss the lecture and work through problems and exercises as a class. Forty seven percent of the faculty indicated their administrators always supported using new instructional methods that required students to prepare for the classroom sessions by listening to pre-recorded lectures. Forty three percent indicated administrators often or sometimes support faculty asking students to listen to lectures before the class session and one percent indicated their administrators never supported students being asked to listen to lectures outside the normal classroom meeting.

The second question inquired about the instructors lecture teaching environments. Lecture teaching environments are simply classroom environments where students are primarily given lectures during class time and homework or group work is traditionally done outside of class. Fifty percent of the faculty replied their administrators always support lecture classroom teaching environments 47% of the faculty indicated administrators often or sometimes supported their use of a lecture classroom and no faculty indicated their administrators never support lecture-teaching environments. It is important to note that the researchers are not attempting to determine if one approach is better over the other in this research. They are strictly attempting to ascertain if the administrators have a preference for faculty.

The question listed below in Table 3 inquires whether the faculty member believes the design of the classroom can impact their instructional approach. If it indeed does alter their approach, they may not be teaching in the most effective manner. This may also lead to the faculty member being uncomfortable teaching in a new format, and may take them longer to acclimate.
Table 3

*The Design of the Building I teach in Impacts the Way I Teach*

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>The design of the building I teach in impacts the way I teach</td>
<td>15</td>
<td>35</td>
<td>22</td>
<td>8</td>
<td>0</td>
<td>80</td>
<td>3.71</td>
</tr>
</tbody>
</table>

The question in Table 3 probed the perceived impact of the learning space on the faculty member’s ability to teach in their preferred style. Sixty one percent of respondents indicated that the learning space in which they instruct either always or often had an influence on their pedagogical style. Thirty seven percent indicated that their learning space either sometimes or never impacted the way they taught in the classroom. The faculty response to Table 3’s first question indicates the building design has an impact on the teaching style used in the classroom.

Table 4 contains questions, which were designed to ascertain the age of the building where the faculty member’s primary classroom assignment was located. Based on the survey responses, some faculty members did not know how old their building was. Future surveys need to clarify the desired outcome of this question the researchers could clarify the age of the building based on asking the name of the building the faculty member worked in a drop down menu. The interview questions covering their current learning space clarified the buildings age or the time it was remodeled.
Table 4

*I Teach in a Building*

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>That is newer (less than 5 years old).</td>
<td>8</td>
<td>12</td>
<td>11</td>
<td>27</td>
<td>3</td>
<td>61</td>
<td>2.92</td>
</tr>
<tr>
<td>That has not been renovated within 10 years</td>
<td>13</td>
<td>19</td>
<td>13</td>
<td>15</td>
<td>7</td>
<td>67</td>
<td>3.24</td>
</tr>
<tr>
<td>That has not changed in the past 20 years</td>
<td>14</td>
<td>6</td>
<td>16</td>
<td>21</td>
<td>10</td>
<td>67</td>
<td>2.90</td>
</tr>
</tbody>
</table>

The first question of Table 4 queried faculty to determine if the building they were assigned classrooms that had been built in the last five years. Eight percent of the faculty indicated the building they taught in was always in this time frame. Thirty seven percent indicated the building was often or sometimes built in the last five years and 44% indicated their building had never been built in the last five years. Stated differently, over sixty of the faculty responding teach in a building that is six years or older.

The second question continued and inquired if the building had been renovated in the last ten years. Nineteen percent of the faculty indicated the building had always been built or renovated in the time period. Forty seven percent indicated the building was often or sometimes renovated in the last ten years and 22% indicated their building had never been renovated in the last ten years.

The third question followed the same inquiry and asked if the building had not changed in the last 20 years. Twenty percent of the faculty indicated the building had always been the
same in the time period. Thirty one percent indicated the building had often or sometimes not changed in the last twenty years and 31% indicated their building had never changed in the last twenty years.

**Part II. Teaching Strategies and Techniques**

The next two tables required the faculty to describe how they teach in their classroom environment. The questions in Table 5 present faculty a series of questions to determine their perception of their pedagogical presentation methods whereas the questions in Table 6 prompted faculty to describe the methods used to support collaborative group/team instruction. The response to the questions indicated faculty are comfortable in using collaborative and/or lecture methods to support instruction. The faculty generally had a negative response to the question asking if they record lectures and asks the students to listen prior to coming to class.

The questions displayed in Table 5 were designed to determine if the instructional delivery method the faculty member believes best supports the pedagogy used in their subject area. There were three options described capturing popular methodologies ranging from Active Learning to traditional Lecture based styles.

The first question of Table 5 inquired if faculty use group projects rather than lectures to facilitate their instruction. The review of the literature has shown that learning spaces can be configured in optimal arrangements to enhance group projects and collaborations. Thirty six percent of the faculty indicated they always or often use group projects and not lectures. Forty seven percent indicated they sometimes use group projects and not lectures whereas 14% of the respondents reported that they never use group projects to facilitate instruction.
Table 5

*I do the following because it best supports my subject area.*

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use group projects and not lectures</td>
<td>7</td>
<td>22</td>
<td>37</td>
<td>11</td>
<td>1</td>
<td>78</td>
<td>3.29</td>
</tr>
<tr>
<td>Lecture in my classroom</td>
<td>20</td>
<td>36</td>
<td>19</td>
<td>3</td>
<td>0</td>
<td>78</td>
<td>3.94</td>
</tr>
<tr>
<td>Record lectures and ask students to review prior to coming to class</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>64</td>
<td>2</td>
<td>77</td>
<td>2.21</td>
</tr>
</tbody>
</table>

The second question in Table 5 inquired if faculty lectures are the primary method of instruction in their classroom. The purpose of this question was to determine whether or not the faculty member preferred traditional instruction methods or was using relatively new methodologies that might be enhanced by a thoughtful learning space design. While 71% of the faculty indicated they always or often use lecture as their instructional method, 24% replied they sometimes use lectures as a method of instruction and three percent indicated they never use lecture as a method of instruction. This leads the researchers to believe that more than 25% of the faculty members are not always using a lecture-centric pedagogy.

The third question of Table 5 inquired if faculty record lectures and ask students to listen to lectures before coming to class.

Two percent of the faculty replied they always record lectures and asks student to listen prior to class. Ten percent indicated that they either often or sometimes ask students to listen to recorded lectures before coming to class and 83% indicated that they never record lectures and asks students to listen prior to attending class. Of the five faculty members that did indicate they
recorded lectures, four had between 0 and 5 years of experience and the other member had experience between sixteen and twenty years.

The questions shown in Table 6 were designed to determine if faculty assign group projects and give each student a grade or if the faculty assigns a group project and give the entire group a common grade. These tasks are commonly referred to as team projects and typically involve the students working together outside of the classroom.

Table 6

I do the following because it best supports my teaching and learning strategy.

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign groups and ask students to solve problems related to my subject</td>
<td>6</td>
<td>33</td>
<td>30</td>
<td>8</td>
<td>1</td>
<td>78</td>
<td>3.45</td>
</tr>
<tr>
<td>Assign groups and ask students to complete team projects related to my subject</td>
<td>6</td>
<td>30</td>
<td>24</td>
<td>17</td>
<td>1</td>
<td>78</td>
<td>3.29</td>
</tr>
</tbody>
</table>

The first question queried faculty to determine if they assign problems to a group of students in their subject area and the student receives an individual grade for a group project. Seven percent of the faculty replied they always assign groups and ask students to solve problems. Eighty percent of faculty responded they often or sometimes assign groups and asks students to solve problems and 10% indicated they never assign groups.

The second question of Table 6 encourage faculty to identify if they assign projects to groups allowing students to work as teams and assign a team grade. Seven percent of the faculty
indicated they always assign group projects, 38% indicted they often assign group projects with group grades and 30% indicated they sometimes assign group projects. Twenty one percent indicted they never assign group projects with a team grade.

Part III. Facility Design and Students

The questions in Table 7 explored faculty perception of where they observe students working in groups. These spaces can be broken down rather easily into two broad categories - informal, such as a hallway, or formal such as a classroom. The question is designed to understand if a college needs to design a specific space to facilitate students working in groups and/or if a college has not developed collaborative spaces where do students find space in the building to collaborate. The faculty response suggests that buildings designed for collaboration support group/team projects and second that the library is the primary space used by students for collaboration.

Faculty were asked if the space they were teaching in encouraged student collaboration on team projects in the first question of Table 7. More than half of the respondents felt that either always or often, their students had spaces to accommodate group work. Thirty three percent of the faculty responded their building always have collaborative spaces designed for group/team instruction. Sixty percent of the faculty indicated their building often or sometimes had space designed for group/team collaboration and three percent indicated their building never had space designed for student collaboration.

The second question queried faculty perception of students using the student lounge for collaboration, 43% responded students used the student lounge. Over 90%of the respondents felt that their students had access to a student lounge for group/collaborative work. 47% of the faculty indicated that students often or sometimes used the student lounge for collaborative
projects and three percent of the faculty indicated that students never use the student lounge for collaborative project.

Table 7

*Students have space on campus*

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>That is designed to accommodate group work or planning, with or without faculty</td>
<td>26</td>
<td>25</td>
<td>22</td>
<td>3</td>
<td>2</td>
<td>78</td>
<td>3.90</td>
</tr>
<tr>
<td>To work together in a student lounge</td>
<td>34</td>
<td>22</td>
<td>15</td>
<td>3</td>
<td>4</td>
<td>78</td>
<td>4.01</td>
</tr>
<tr>
<td>To work together in a hallway</td>
<td>21</td>
<td>15</td>
<td>24</td>
<td>13</td>
<td>5</td>
<td>78</td>
<td>3.44</td>
</tr>
<tr>
<td>To work together in the library</td>
<td>36</td>
<td>17</td>
<td>14</td>
<td>8</td>
<td>3</td>
<td>78</td>
<td>3.96</td>
</tr>
</tbody>
</table>

The third question in Table 7 is asking faculty for their perception of student use of an informal learning space such as a hallway. Less than half of the respondents felt that students either always or often used these spaces. Forty seven percent of the faculty indicated that students often or sometimes used the hallways for collaborative projects and six percent of the faculty indicated that students never used the student lounge for collaborative projects.

The fourth question of Table 7 asked faculty if students go to the library for collaboration on group/team projects. Sixty seven percent of the faculty members responded that students either always or often worked in the library. Forty six percent of the faculty indicated students always visit the library for collaboration projects while 21% of the faculty indicated that students often used the library. Seventeen percent of the faculty responded that students sometimes visit the library for collaboration on projects. Eight four percent of the faculty replied that students
always, often or sometimes use the library for collaboration on projects and 10% of the faculty indicated that students never visit the library for collaboration on projects.

Part IV. Working with faculty

This section of the survey captured the faculty experiences regarding lecture based instruction, group/team learning, possible impacts to student persistence, and the specific classroom space. Student persistence in this survey was defined to the faculty members as the "ability of an institution to retain a student from admission through graduation (diploma or certificate)” or transfer (Seidman, 2005). Faculty were asked to indicate their primary instructional method in Table 8 by indicating their preference for lecture and group/team teaching methods.

Table 8

While working in my subject area, I use the following as the primary instructional method

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>17</td>
<td>30</td>
<td>14</td>
<td>7</td>
<td>4</td>
<td>72</td>
<td>3.68</td>
</tr>
<tr>
<td>Group/team collaboration</td>
<td>8</td>
<td>37</td>
<td>20</td>
<td>6</td>
<td>3</td>
<td>74</td>
<td>3.55</td>
</tr>
</tbody>
</table>

The first question of Table 8 inquired if the space faculty teach in was designed to support lecture instruction. Sixty four percent of the faculty responded the space they teach in always or often was designed to support lectures. Nineteen percent of the faculty responded the primary space they teach in was sometimes designed to support lectures and nine percent of the faculty indicated the primary space they teach in was never designed to support lecture.
The second question of Table 8 inquired if the faculty’s primary teaching space was designed to support group/team collaboration. Sixty percent of the faculty responded the space they teach in always or often was designed to support collaboration. Twenty seven percent of the faculty indicated the space they teach in was sometimes designed to support group/team collaboration and eight percent of the faculty indicated the space they teach in was never designed to support group/team collaboration.

The questions in Table 9 asked the faculty whether lecture-based or collaborative classroom space can potentially increase student persistence rates. The researchers feel it is important to reiterate they have no plans to make any judgment on the chosen instructional method. The researchers are asking whether faculty have personally experienced either method impact student persistence in a positive manner. The first question of table 9 asks faculty in their perception if student centered collaborative instruction is effective in improving student engagement and student persistence. Seventy four percent of the faculty responded that group/team collaboration always or often improves engagement and student persistence. Twenty one percent of the faculty responded that student collaboration sometimes improves student engagement and persistence and two percent responded collaboration never improves student engagement and persistence.

The second question asks faculty in their perception if lecture instruction is effective in improving student engagement and student persistence. Fifty four percent of the faculty responded that lecture instruction always or often improves engagement and student persistence. Thirty eight percent of the faculty responded that lecture instruction sometimes improves student engagement and student persistence; and five percent responded lecture instruction never improves student engagement and student persistence.
Table 9

In my experience, I have found that the following is effective in improving student engagement and student persistence in my subject area.

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student-centered group/team (collaborative) instruction</td>
<td>20</td>
<td>36</td>
<td>16</td>
<td>2</td>
<td>1</td>
<td>75</td>
<td>4.00</td>
</tr>
<tr>
<td>Lecture instruction</td>
<td>6</td>
<td>34</td>
<td>28</td>
<td>4</td>
<td>1</td>
<td>73</td>
<td>3.58</td>
</tr>
</tbody>
</table>

The purpose of the questions in Table 10 was to identify the faculty’s perception of the space they teach in, inquiring if it were designed for lectures or collaborative instruction. This helped the researchers get a better conception of the current learning spaces at the campuses of the two institutions being researched.

Faculty were asked in the first question of Table 10 if their primary classroom space was designed to support lecture instruction. Fifty five percent of the faculty responded their classroom space was always designed to support classroom instruction. Forty percent of the faculty responded their classroom space was often or sometimes designed to support lecture instruction and four percent indicated their classroom space was never designed to support lecture instruction.
Table 10

In my opinion, my classroom space

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is designed to support lectures</td>
<td>41</td>
<td>18</td>
<td>12</td>
<td>3</td>
<td>0</td>
<td>74</td>
<td>4.31</td>
</tr>
<tr>
<td>Enables student-centered group/team instruction</td>
<td>15</td>
<td>26</td>
<td>28</td>
<td>6</td>
<td>0</td>
<td>75</td>
<td>3.67</td>
</tr>
</tbody>
</table>

The second question was designed to determine if the primary space a faculty taught in was designed to support student-centered group instruction. Twenty percent of the faculty responded their classroom space was always designed to support student-centered group instruction. Seventy one percent of the faculty responded their classroom space was often or sometimes designed to support lecture instruction and eight percent indicated their classroom space was never designed to support student-centered collaborative instruction.

Part V. Faculty Involvement in Planning

The questions in Tables 11, 12 and 13 asked the survey respondent about their role in the classroom planning process and to select the physical characteristics of their classroom. Questions were asked of both lecture-based and collaborative classrooms to determine if the learning space was appropriate for the subject they were teaching. The questions in Table 11 query the involvement the faculty member had in designing the classroom. Based on the responses, it is evident that there has been relatively limited involvement in the planning process by the respondents of the survey. Involvement did not vary significantly between question 1 and question 2 in Table 11 regarding involvement in the last five or ten years.
Table 11

*Faculty have been involved in planning and designing learning spaces in buildings*

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renovated in the last 10 years</td>
<td>4</td>
<td>10</td>
<td>17</td>
<td>11</td>
<td>32</td>
<td>74</td>
<td>2.23</td>
</tr>
<tr>
<td>Built in the last 5 years</td>
<td>4</td>
<td>13</td>
<td>11</td>
<td>11</td>
<td>36</td>
<td>75</td>
<td>2.17</td>
</tr>
</tbody>
</table>

It should be noted that both questions in Table 11 had an unusually high number of unsure survey responses. The researchers do not know if it would be particularly easy to forget if you have been involved in a classroom planning process or that they simply were not involved. Both of these questions may need modification in future surveys to ensure the faculty understand the question asked and the age of the building. The researchers plan to design future surveys with dropdown menu choices to ensure faculty are not confused about the question. The results suggest faculty do not perceive they are proactively involved in classroom planning. Five percent of the faculty responded they have always been involved in building renovations in the past ten years compared to 14% of the faculty who indicated they had never been involved in planning and designing the learning spaces in the past ten years. Thirty five percent of the faculty responded they had been often or sometimes involved in planning learning spaces.

The second question in Table 11 continues to inquire about faculty’s perception of their involvement in designing their learning space. Five percent of the faculty responded they have always been involved in designing learning space in buildings that have been built in the last five years compared to 14% of the faculty who indicated they had never been involved in planning
and designing the learning spaces. In buildings less than five years old 31% of the faculty responded they had been often or sometimes involved in planning learning paces in buildings that had been built in the last five years.

The questions contained in Table 12 and Table 13 inquired into the appropriate technology, furniture and network connectivity. The questions sought information from the faculty as to the requirements for a traditional lecture classroom and to the requirements for a student-centered collaborative classroom. The question inquired into the differences of perception a faculty has in teaching in each type of classroom environment. There was not a significant difference in faculty respondent’s perception of the physical classroom, the required technology, and furniture or network connectivity in teaching in each classroom environment. Table 12 is focused on lecture classrooms equipped with necessary technology equipment.

The first question of Table 12 is inquiring about the availability of appropriate technology in lecture classrooms. Eighty nine percent of the faculty respondents indicated that appropriate technology was either always or often available in the lecture focused classrooms. Only two percent of faculty indicated that their classrooms never had appropriate technology available.

The second question asks about the availability of movable furniture that can make it easier to reconfigure the classroom as needed. Forty nine percent of faculty reported that they either always or often had movable furniture such as chairs and tables with wheels. Nearly 40% of the respondents indicated that they sometimes had access to movable furniture and six percent indicated their rooms never had furniture that was easily movable.

The third question asked about wireless network access and seeks to determine the availability of Internet access in the classroom or lab space. Seventy six percent of faculty
responded they either always or often had wireless access in their classrooms. Six percent of faculty indicated they never had access to wireless network access and one percent were unsure of this access. Lack of wireless access was repeatedly commented on in the interviews, but the survey results seem to conflict with this.

Table 12

*The lecture classrooms are equipped with*

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate technology (presentation support)</td>
<td>39</td>
<td>28</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>75</td>
<td>4.39</td>
</tr>
<tr>
<td>Movable furniture (i.e. chairs/tables with wheels)</td>
<td>20</td>
<td>17</td>
<td>29</td>
<td>5</td>
<td>3</td>
<td>74</td>
<td>3.62</td>
</tr>
<tr>
<td>Wireless network connectivity</td>
<td>39</td>
<td>18</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>75</td>
<td>4.19</td>
</tr>
</tbody>
</table>

The questions in Table 13 focus on collaborative classrooms and whether they are equipped with necessary technology equipment, movable furniture, and wireless network connectivity. With this information the researchers wanted to see what was currently available and what may be an opportunity for improvement. In the interviews, many of the faculty considered appropriate technology to be mainly wireless internet, but it also included projectors and SMART boards. The researchers will enhance this question with specific examples in the future.
Table 13

The student centered group/team (collaborative) classrooms are equipped with

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate technology (presentation support).</td>
<td>35</td>
<td>21</td>
<td>11</td>
<td>3</td>
<td>5</td>
<td>75</td>
<td>4.04</td>
</tr>
<tr>
<td>Movable furniture (i.e. chairs/tables with wheels).</td>
<td>22</td>
<td>21</td>
<td>20</td>
<td>5</td>
<td>7</td>
<td>75</td>
<td>3.61</td>
</tr>
<tr>
<td>Wireless network connectivity</td>
<td>40</td>
<td>14</td>
<td>9</td>
<td>5</td>
<td>6</td>
<td>74</td>
<td>4.04</td>
</tr>
</tbody>
</table>

The first question in Table 13 queried faculty to determine if the classroom is equipped with appropriate technology is available to support collaborative instruction. Forty six percent of the faculty indicated that classrooms were either always or often equipped with appropriate technology to support collaborative instruction. This contrasts with lecture based classrooms where faculty responded that 89% of classrooms had appropriate technology. The researchers feel this may be due to a collaborative classroom needing technology not required in a traditional lecture based room. Only three faculty members responded that their collaborative classroom never was equipped with the appropriate technology equipment to support collaborative group/team instruction.

The second question in Table 13 asks if the classroom is equipped with moveable furniture, 29% of the faculty responded that their classroom always had movable furniture, when combined with often 57% indicated their classroom had movable furniture. Only four percent indicated their collaborative classroom never had movable furniture.
The third question asks if the faculty member’s classroom has wireless network connectivity. Fifty-four percent indicated their classrooms always had wireless network connectivity, when combined with often 72% of the faculty indicated their classroom had wireless networking connectivity. Only six percent of the faculty indicated their classroom never had wireless connectivity.

Part VI. Classroom Instruction

In this section the researchers asked for feedback on collaborative and group/team instructional needs in the classroom. Even if the primary means of instruction were lecture based, there are likely instances in which the instructor had the class collaborate. These questions are designed to identify data about the prevalence of collaborative teaching methods.

Faculty members were asked to select how often they assigned collaborative work outside the normal classroom setting in Table 14. The question offered the researchers an indication of the degree of student-centered collaboration expected by faculty.

Table 14

Collaborative group work outside of normal class meeting hours is typically a requirement of the class I teach

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative group work outside of normal class meeting hours is typically a requirement of the classes I teach.</td>
<td>1</td>
<td>14</td>
<td>33</td>
<td>23</td>
<td>0</td>
<td>71</td>
<td>2.90</td>
</tr>
</tbody>
</table>
Only one percent of the surveyed faculty indicated they always required students to complete collaborative group work outside of the normal classroom hours. Nineteen percent of the faculty indicated they often assign collaborative group work outside of normal classroom meeting hours and 46% of the faculty indicated they sometimes give collaborative group work outside of typical classroom hours. Thirty two percent of the faculty indicated they never give collaborative group work outside of typical normal class meeting hours.

The questions in Table 15 continued to focus on the survey respondents perceived requirements of a collaborative instructional environment. The question required the faculty to indicate the degree of physical change a classroom needed to support student-centered collaborative instruction. Did the space need to be designed differently to adequately support collaborative instruction or was it possible to make modifications to a traditional classroom by only changing the furniture. Faculty indicated that a different space was desirable but indicated they were able to facilitate collaborative instruction in a traditional classroom setting.

The faculty were asked to determine in the first question of Table 15 if they thought a student-centered group/team (collaborative) classroom needs a different space layout than a faculty using primary lecture instruction. Fifty six percent of the respondents indicated that a different layout space is either always or often necessary in a collaborative classroom. Thirty six percent of the faculty replied that it was only sometimes necessary to have a different space layout. Two percent indicated that a different layout space is never required if you are leading group/team (collaborative) instruction verses primary lecture space.
Table 15

In my experience, a student-centered group/team (collaborative) classroom needs

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A different space layout than a faculty using primary lecture instruction</td>
<td>18</td>
<td>24</td>
<td>27</td>
<td>2</td>
<td>2</td>
<td>73</td>
<td>3.74</td>
</tr>
<tr>
<td>Only technical enhancements of a primarily lecture or traditionally designed facility</td>
<td>2</td>
<td>14</td>
<td>45</td>
<td>4</td>
<td>5</td>
<td>70</td>
<td>3.08</td>
</tr>
<tr>
<td>Only the traditional, instructional space design.</td>
<td>0</td>
<td>11</td>
<td>33</td>
<td>22</td>
<td>4</td>
<td>70</td>
<td>2.73</td>
</tr>
</tbody>
</table>

The second question in Table 15 asked faculty their opinion as to only technical enhancements being necessary to use group or team (collaborative) instruction in a classroom versus using primary lecture instruction. Sixty four percent indicated sometimes that technical enhancements are necessary, compared to 22% of faculty who stated that technical enhancements are always or often necessary. Seven percent of the faculty indicated that technical enhancements are never necessary when using group/team instruction verses using primary lecture instruction.

The third question seeks input regarding the traditional instructional space design of rows and aisles are required for student-centered group/team (collaborative) classroom instruction. No faculty response to the third question indicated they could always could teach group/team (collaborative) instruction in a lecture classroom. Sixty three percent of the faculty indicated that
they could often or sometimes use group/team collaborative instruction in a traditional classroom. 31% indicated they could never use a lecture classroom for group/team collaborative instruction.

Table 16 is designed to determine the degree a faculty member perceives a classroom needs modification to be considered a collaborative instructional environment. A collaborative room can mean different things to different people and the goal of this question was to determine how much technology may play a role in the mind of the instructor.

Table 16

_A student-centered group/team (collaborative) classroom building needs_

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only traditional space with modifiable walls and movable furniture.</td>
<td>1</td>
<td>11</td>
<td>49</td>
<td>5</td>
<td>6</td>
<td>72</td>
<td>2.94</td>
</tr>
<tr>
<td>Only traditional space with movable walls, furniture, and technological enhancements.</td>
<td>15</td>
<td>15</td>
<td>31</td>
<td>7</td>
<td>6</td>
<td>74</td>
<td>3.35</td>
</tr>
</tbody>
</table>

The first question of Table 16 was designed to elicit faculty perception of what defined a collaborative classroom. Did the classroom need only a traditional space with modifiable walls and moveable furniture, or were there additional factors necessary? One percent of the faculty indicated that they could always use traditional space with modifiable walls and movable furniture. Eighty three percent of the faculty indicated that they could often or sometimes use a
traditional space with modifiable walls and movable furniture. Only seven percent of the faculty indicated that they could never use traditional space with modifiable walls and movable furniture is required to provide collaborative group/team instruction in a traditional classroom with modifiable walls and movable furniture.

The second question of Table 16 asks faculty if only traditional space with moveable walls, furniture and technological enhancements are required for a student-centered group/team (collaborative) classroom. Twenty percent of the faculty indicated that you always need a traditional space, with furniture and technological enhancements to facilitate group/team (collaborative) instruction. Sixty one percent of faculty indicated that often or sometimes a traditional space, with furniture and technological enhancements are required for group/team (collaborative) instruction. Nine percent of faculty indicted you could never use traditional space with movable walls, furniture and technological enhancements to provide group/team (collaborative) instruction.

Part VII. Classroom Properties

The researchers intent in this part of the survey was to record the physical properties of the learning space. These properties include lighting, both natural and artificial, and the ability to control either via means such as switches, shades, or rheostats. In addition to the lighting, the researchers wanted to collect data such as color, textures, temperature, seating, personal space, and excessive external noise, which could prove distracting. The researcher’s review of the literature identified all of these items to have influence, both positive and negative, in a learning space.
The questions in Table 17 are designed to determine the respondent’s perception of the physical characteristics of their classroom. The question asks the faculty to answer questions about their classroom space based on seven categories. The purposes of the questions are to determine if elements known to distract or enhance learning are present in the room.

The purpose of the first question in Table 17 was to determine if faculty believes their classroom has appropriate and controllable lighting that they know how to use without assistance. Sixty four percent of the faculty indicated they always or often have a classroom with the appropriate and controllable lighting they know how to operate. Eighteen percent indicated they sometimes have a classroom with the appropriate and controllable lighting that they know how to operate and 16% indicated they do not have a classroom with appropriate and controllable lighting.

Table 17

In my opinion my classrooms has

<table>
<thead>
<tr>
<th>Question</th>
<th>Always (5)</th>
<th>Often (4)</th>
<th>Sometimes (3)</th>
<th>Never (2)</th>
<th>Unsure (1)</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate and controllable <strong>lighting</strong> that I know how to operate.</td>
<td>29</td>
<td>19</td>
<td>14</td>
<td>12</td>
<td>0</td>
<td>74</td>
<td>3.88</td>
</tr>
<tr>
<td>Ample natural light (windows/skylights) which can be controlled if necessary by faculty (for example: window treatments, blinds, or shades).</td>
<td>18</td>
<td>13</td>
<td>24</td>
<td>19</td>
<td>0</td>
<td>74</td>
<td>3.41</td>
</tr>
<tr>
<td>Colors and textures that are appropriate for learning</td>
<td>24</td>
<td>22</td>
<td>17</td>
<td>9</td>
<td>2</td>
<td>74</td>
<td>3.77</td>
</tr>
</tbody>
</table>
A comfortable temperature or the ability to quickly change it without the need for facilities personnel. 13 15 25 21 0 74 3.27

Comfortable seating for both students and faculty. 15 20 31 8 0 74 3.57

Plenty of space between seating areas for students to move about the room if necessary without overly distracting the class. 13 20 20 21 0 74 3.34

No excessive noise for external sources 12 27 21 14 0 74 3.50

The second question was designed to determine if a faculty’s classroom has ample natural light that can be controlled (via window treatments or shades) if necessary by the faculty. Forty one percent of the faculty indicted they either always or often have a classroom that has ample light that can be controlled by the faculty. Thirty two percent indicated they sometime have a room that has ample natural light that can be controlled by the faculty. Twenty five percent of respondents indicated that their classrooms never had natural light that they could control if necessary. The researchers do know there are many rooms without skylights that do not have outward facing windows which likely account for the relatively high number “never” respondents.
The third question explored the faculty’s perception of the classroom colors and textures appropriateness for learning (wall/ceiling color, flooring, and non-distracting contrasts). Sixty one percent of the faculty indicated that their classrooms always or often have the appropriate colors and textures. Twenty three percent of the faculty indicated their classrooms sometimes had the appropriate colors and textures and 12% indicated their classroom never had the appropriate colors and textures.

The fourth question of Table 17 sought feedback on the comfort level of their classroom’s temperature and whether or not they have the ability to change the temperature without facility member assistance. Seventeen percent of the faculty indicated they always have the ability to change the temperature with the need for facilities personnel assistance. Thirty seven percent indicated they often or sometimes have the ability to change the temperature without the need for assistance from physical plant personnel and 28% indicated they never have the ability to change the temperature with the assistance of facilities staff.

The fifth question asks faculty if their classroom has comfortable seating for both students and faculty. Forty seven percent indicated that their classrooms always or often have comfortable seating for students and faculty. Forty one percent of the faculty indicated their classrooms sometimes had comfortable seating for students and faculty and 10% of the faculty indicated their classrooms do not have comfortable seating for students and faculty.

The sixth question asks faculty if students have plenty of space between seating areas for students and faculty to move about the class without creating distractions. Seventeen percent of the faculty indicated their classroom always had the appropriate space for students to move about without distracting the class. Sixty four percent of the faculty indicated their classroom often or sometimes had the appropriate space for students to move about without distracting the class.
Twenty eight percent of the faculty indicated their classroom never had the appropriate space in their classroom for students to move about without distracting the class.

The final question of Table 17 determine if the classrooms used by faculty are free of excessive noise from external sources. Sixteen percent of the respondents indicated they always had a room free from noise whereas 22% of the faculty indicated their classroom was always bothered by excessive noise from outside the classroom. Sixty four percent of the faculty indicated that their classroom was often or sometimes affected by noise outside their classroom.

**Part VIII. Demographics**

Four demographical categories were captured in this survey, these were: subject taught, the college the instructor taught for, length of service as faculty, and age. In addition, a line was added for them to add their email address if they would be willing to be interviewed by the researchers. The required faculty to identify the subjects they teach in Table 18. Of the seventy-four responses 27 faculty (31%) gave a response to the question. In retrospect, future analysis of learning spaces by the researchers will likely change this survey question to a fixed list of subjects that are taught by the college to get more feedback. Table 18 is the subjects the faculty self-reported teaching in:
Table 18

*I teach the following subjects*

- IECE assessments and infant/toddler development
- English
- Developmental Writing (ENC 90 and ENC 91)
- Integrated Reading and Writing (IRW 095)
- English Composition, Literature
- Visual Communication
- Foundations of College Writing (ENC 91)
- English and Reading
- Nursing Assistant
- Geology: Lecture and Lab
- MAT 110: Applied Mathematics
- Biology
- Radiography courses
- Radiography
- Construction Technology
- Clinical Experience I, II, III, Field Internship
- Developmental Mathematics
- MAT 55 Pre-Algebra and MAT 65 Algebra
- Nursing
- Criminal Justice
- Principles of Marketing
- Diagnostic Medical Sonography
- Various Professional Development courses; Principles of Management & Applied Management Skills
- MUS100 Introduction to Music
- MUS222 The History & Sociology of Rock Music
- Nursing
- Reading
- Introduction to Computers, Database Design, Web Design
- Chemistry

*Demographics*

Of the 74 responses, 53% indicated they had been faculty for up to five years, 26% indicate they had been a faculty member for six to ten years, 5% indicated they had been a
faculty member for 11 to 15 years, 4% indicated they had been a faculty member for 16 to 20 years, and lastly 10% indicated they had been a faculty member for more than twenty years. The graph illustrated in Figure 1 identifies the teaching experience of the faculty members who responded to the survey.

![Graph showing years of teaching experience](image)

*Figure 1. Years of teaching experience*

In Figure 2, twenty-one faculty (28%) indicated they were less than thirty-five years old, fifteen (20%) indicated they were between thirty-six and forty-five years old and 50% indicated they were greater than forty-six years old.
Interview Results

Interviews were conducted with 14 faculty members, 7 from each institution. In addition to the faculty interviews (See Appendix B), the researchers felt it was appropriate to interview the Presidents of both colleges (See Appendix C). All of these interviews were conducted by telephone in the month of December 2013. Researcher 1 conducted all of the interviews for the first college with Researcher 2 listening to and making any comments on his transcriptions. The recordings were made using an Apple iPhone in conjunction with an application named DropVox. All recordings were made in the lossless audio codec of mp4 to ensure no major details of the interview were left out. Researcher 2 conducted the interviews for the second college while Researcher 1 listened to and gave feedback on Researcher 2’s transcriptions. This served the researchers well as there were several occasions where corrections were made in the
transcription based on the feedback from the other researcher. This also served as a validity measure to ensure the transcriptions were completed as accurately as possible.

After transcriptions were completed, they were sent back to the interviewees to make sure we were capturing their intended feedback. Glesne (1999) describes this qualitative methodology as “Member Checking” and allows interviewees feedback to ensure what the researchers have interpreted is indeed the way they wanted to construe their feelings and/or opinions. Basically it is simply one more way to ensure validity as described in our research methodology.

While there are numerous formats that have been used in qualitative research that involved both surveys and interviews, the researchers feel the data are best presented in this chapter question by question so comparisons and contrasts can be made in context of the question being asked.

Question 1

The first question was, “What are your overall thoughts regarding the learning space you predominantly teach in?” This question served to get the interviewee comfortable speaking about their classroom. Several themes emerged from the interviews including mobility/adaptability of classroom furniture, light/temperature control, and how they used their learning space.

In regards to her learning space, one interviewee spoke about her class and the difficulties in collaborating such as “So I want them to practice kind of role-playing, you know, a different technique where there’s a set of theories, or even just the discussing groups, different things that – you know, activities, that type of thing. It’s very difficult for them to really do that comfortably. The chairs roll around for the same time but the tables are – we can’t really get to
use the tables very easily. And so we’re kind of setting these like linear rows.” Another faculty member described her classroom as being “not really adaptable. It’s not really conducive to doing things like open space or trying to use some of those other formats that I might enjoy using”.

A faculty member who taught radiography made the comment “We have desks and then my desk is at the front in the room and we have an overhead projector and because of the program I’m in, I'm not crazy about having desk rows, it would be great to have a remodel where I had like 6 foot tables, long tables and chairs where you can change of the arrangement because with this program, I'm teaching them how to position patients and what positions going to get the correct image to demonstrate that anatomy.” Others simply mentioned that “the room is not really adaptable” while another lamented “it's very hard to group people together or do anything other than you know, keep people sitting in sort of this neat little rows.” One interviewer stated the classroom size was not ideal stating, “Our classroom is attached to the lab and it’s rather small” but did go on to say this about his laboratory room “I feel that it’s fairly well equipped and you know we can do business out there.”

Some interviewees had no issues with their classroom; a faculty member commented “Overall are the space is great. It inspires creativity” and another responded, “Overall, it’s been great. I don’t have any big issues at all”. One comment, which struck the researcher as particularly powerful one, was the response “I teach in allied health program. My space is specifically designed for that teaching environment so it’s very helpful and very conducive to learning and the students.” Describing the layout of his learning space, a faculty member wanted to make the point of the proximity between the classroom and any lab stating “It has four rows of chairs with probably four to five chairs in each row. Then right next to is the lab connected to the
Describing the traditional classroom he had, one faculty member thought that the that model was perfectly acceptable stating “it’s just your typical traditional, for me anyway, the ones I’ve had, have the industrial model if you will but it’s certainly conducive to what I do for my normal class.”

Physical classroom attributes such as lighting and room temperature were discussed. Some faculty members stated they either were not particularly happy with the temperatures in the room or they could not be controlled. One faculty member who overall was very upbeat about her learning space did make the comment “It's really, really cold.” Both President’s interviewed confirmed that older buildings had very basic HVAC controls and most were controlled by building maintenance personnel but at least one building that was new had temperature controls in the classroom, however they did mention that they are tackling these problems as funding priorities allow. One faculty member talked about the projector not being bright enough stating “And so having no lights on, which is pretty much the only option available to see the screen for video, is difficult because then, you know, they can’t see to take notes. They can’t – they also are more inclined to fall asleep.” Lack of window treatments led one faculty member to make the statement “in the beginning of the term now, it was still summer so we would – so we can have a lot of light coming in the windows.”

While some faculty spoke about the negatives and others the positives of their classrooms, one interviewee did not believe the learning space really mattered stating: “Well right now I don’t predominantly teach but when I do my overall thoughts are it doesn’t really matter. I have taught in a lot of different areas, a lot of different spaces and once I get students’ focus it really doesn’t matter all that much.”
Question 2

The second question was, “Can you give me a rough description of the room, furniture, technologies available, etc.?” Some of the interviewees had already touched on this topic in the first question, but this second question was intended to delve deeper into the attributes of their current learning space in order to ascertain a rich description. The discussion again turned towards easily movable furniture with a faculty member stating, “Usually they sit two chairs to a table, and there are several around they can – everything is movable. So I can move it if we need to adjust”. Other comments included “there are tables for two so it makes very easy grouping”,

Classroom furniture ranged from the traditional desk and podium reported by one faculty member as “There’s a desk in the front. There is a podium. There are movable desks with arms on them that students could move”. One classroom was described as “this is all open space and then we have other sections with different chairs like we have one section with chairs that have the table attached to them. We have a section that has like a sofa and a couple of chairs and we have another section that has tables with chairs and everything is movable so it can be changed on a whim.” Another member of faculty stated that they did not have anything out of the ordinary but in good condition: “Just typical five rows and six chairs roughly, nothing fancy, everything seems to be relatively new or at least in excellent shape.” There were some reports of rooms that were described as ok for example “I do a lot of group work so it’s okay. For that, it could be better but its okay because it’s naturally the students are studying with a partner, that there are tables for two so it makes very easy grouping.”

Technology was also a popular topic, some faculty reported satisfaction while other responses were mixed such as “I was recently able to purchase a large screen television that
I’m able to display video, presentations, DVDs, etc. but my classroom doesn’t have any data cable and is not connected to the school network.” Smart boards and white boards were prevalent in rooms with one faculty member reporting “it has a big video wall at the front and then it has the teacher’s station and it has the student’s computers underlying that and that's really neat.” Projectors were frequently listed as being available as well as white boards for class discussion.

Question 3

As seen in the review of the literature, lighting and temperature of a learning space can impact the learner either positively or negatively. The third question asks “Can you describe the lighting and temperature in your classroom? Can you adequately control either?” This question is meant to determine some additional properties in the room that our review of the literature indicates is critical to a physical space. The researcher’s review of the literature found examples of negative and positive learning outcomes dependent on both the temperature and lighting in the room. Faculty members gave mixed feedback with some having full control over both the lighting and the temperature and others having control over one or the other, one faculty member simply stated the room was “very comfortable and we can adequately control both” and another said “I'm okay with the lighting. The temperature, I'm okay with the temperature 'cause we can control that.” One president speaking about the methodology used to revamp classrooms stated “we knew we did not have enough money to make changes campus wide, so we took sections and have tried to go in and make them the very best possible.”

While some faculty members had no issues with either lighting or temperature control but typically not both, one commented, “Well, the lighting was okay but the temperature was awful. We had to have somebody come in almost every class, like even in the winter”. A faculty
member lamented about the presence of a thermostat in the room but stated “you cannot control anything. You can pretend that you are ‘cause you can actually press the button but nothing happens and usually it's very uncomfortable.” Another indicated that they had no lighting control, but very flexible temperature control stating “The lighting is pretty bright, it’s the overhead fluorescent light. We cannot control the lighting. The temperature we can control. We can control it in the classroom and in the computer lab, so we have three different temperature controls.” Both presidents interviewed responded with similar statements such as “No, it can’t be. In our newest facility, yes but not in the older ones.”

An outlier in the responses was that of an instructor of a technical class indicated that the non-ideal temperature in his lab actually prepared his students for the real-world experience of working in a shop stating “It tends to be quite hot all year round because it’s heated in the winter but we have no air conditioning in the summer which is not necessarily a bad thing. I mean we are trying to prepare students to go out to the regular workday world of construction and frequently on the job they’re confronted with climate issues that there are a lot less control that we can control in here”.

**Question 4**

The fourth question asks “*In your current classroom(s), can you describe a situation where the learning space worked well for you in engaging students in learning?*” This question was looking for any commonalities reported between the faculty and president’s interviewed. Some faculty discussed a simple design choice of having two doors in the classroom so that students “were able to come in quietly and leave quietly, not disrupting others” and another mentioned simply having windows so that “they can see out the windows so they have much
more to draw on when you're trying to come up with ideas for projects.” A faculty member discussed the proximity of his lab to his classroom stating “really the setup having the lab right next to the classroom is for us very conducive to learning and probably the best example. We’re able to have a conversation and talk and then walk right into the lab and actually show and give that example in that lab environment which is very important in the learning process.”

A bad weather day that kept half her class at home gave one interviewee her example due to having more space in the classroom to rearrange the class stating “I was able to space out the students because it was one of those, like, snowy days where like half of the students showed up and half didn’t, kind of like today. I was able to have them group up. The room was big enough so they could have their own space.” The ability to simply sit as a group in a circle was the example one faculty member gave stating “we sat around in a circle and we did a little strategy for attacking texts and then talked about it there in the circle and it was one of the most rewarding learning times we had in that particular class. There weren’t too many students and we were all in a circle. We could see each other. We trusted each other. We communicated to each other. Nobody was sleeping. Everybody was participating.” Another faculty member who used collaborative activities in her course talked about her classroom stating “In our classroom the way we have it setup as far as like an interactive collaborative experience with the tables and chair that works really well for doing group activity and you know peer review and reading, analyzing reading and just bouncing ideas off of each other.”

Technology in the classroom such as interactive polling machines was given as an example that was interactive and “works very well” even in a lecture style of room. In discussing how technology is integrated into the classroom and labs at their college one president talked about learning best practices from other institutions across the United States by commenting
“we’ve been to labs all over the country -- and that’s one of the things we do Paul. We really try to look at what things look like and what we see at other places and then how we could modify that if that works in our facility or in what we’re trying to achieve.”

Not everyone could think of specific examples where the learning space worked well. One faculty member expressed that outside of having a regular lecture classroom, he did not need much else “You know, typically for what I’ve done, if it’s just a regular lecture environment it works just fine for me. Very seldom have I needed capacity to do any kind of group work. I certainly haven’t had a need for it to be, you know, changed there.”

**Question 5**

The fifth question was a tricky one in that the researchers did not want to start a gripe session about current working conditions in the classroom, but did want to hear some of their troubles. The question stated “In your current classroom(s), can you describe a situation where the learning space did not work well for you?” The intent of the question was to find cases where the learning environment could be modified to help the problem.

As one could imagine, there were plenty of examples given ranging from age of equipment “it would be nice to have an up-to-date state of the art x-ray room” to noises in the classroom “even though I had control of the temperature, with the air conditioner, it would be loud sometimes. I have to get there early and turn it up to get the room cooled down by the time the students got there, otherwise they wouldn’t be able to hear.” Classroom temperature (or lack-there-of) was mentioned by a faculty member reporting that a student told her "I can't even type on my keyboard because it's so cold." A president gave an example of an old elementary school they were given describing it as “horrible” and needing “new audio systems in every room” as
well as “new air conditioning.” Reliability of technology was mentioned in one interview, particularly the network and learning management system as being trouble when they were not available as expected.

Movable furniture was a burden to one faculty member who commented “the seats weren’t movable. It was hard to work in groups. The tables, we couldn’t move around and make functional workgroup.” This is an example of a situation the researchers feel could be easily remedied with items such as casters attached to the existing wheels and chairs. Unfortunately, it is not easy to address the physical size of the classroom with one instructor stating “I also want to use bigger groups. And it’s – there’s not a lot of space to move around. And it – sometimes, it’d be nice to have more collaborative seating arrangements.” The small size of her classroom and large student number had one faculty member responding that “I would just say that if you have small group activities, it’s difficult to be able to move and engage in the groups simultaneously”, this sentiment was echoed by a faculty member who felt her learning space “has a rigid table and there’s not enough space for me to get -- I guess maybe because of my size, I’m not sure, but there’s not enough space for me to get between the rigid tables to talk to all the students and there’s no way to go around the other end of the table.”

The traditional row and aisle set up of an older classroom was an example given by an interviewee who stated “those spaces where everything is set up in rows and blocks and people where sort of in their own little space within that block where they really sort of isolated and it's really hard to work on that space to get them to be anything else.” One instructor wanted to try a different instruction style but could not because of her classroom space stating “I would like to do World Café model, tell stuff on some topics simply because I know they know enough as a group to share it with each other effectively. It’s really not possible to set something like that up
easily in that space at all.” A president discussing older traditional classrooms replied “Those instances where you have just your lecture classes I think those are not designed well for collaboration or the tables, the chairs, or the desk that we used to have.”

Question 6

The sixth question asks faculty “In what ways do you think your teaching is affected by the rooms you teach in?” A consistent theme in the interview responses was the ability to create a flexible learning environment to form learning groups. An example of this would be the faculty member who stated “I think definitely being able to move furniture around helps,” as opposed to comments that suggest lack of flexibility results in a suboptimum environment that elicited comments; “It would be nice to have some more flexibility but it would nice to have a new environment for them because I think my classroom doesn’t look that great and isn’t very inspiring. Another faculty member stated, “I felt like I wasn’t able to accomplish what I usually do and that’s to make a friendlier, exciting environment. The classroom is very structured and for this particular class, it good when we can move around freely. I also felt like I was lecturing.”

The interviews suggest that faculty members tried to make do with whatever classroom space is assigned. One faculty member stated, “I mean I adapt, obviously you have to adapt to the space you’re in. I do feel that it prevents you from adapting to the class if there is a time on a topic and you can sense they’re losing interest in or that another model of deliver might work, that the flexibility is not there to just switch teach models.” What was not clear in the interviews was a dialogue between faculty and the administrators assigning the classrooms. Both presidents indicated that it was important to involve faculty in remodeling or building projects. Also both suggested a smaller number of classrooms would be created to support a lecture teaching style
and a greater number of classrooms would be created that would be open, collaborative and multi-disciplinary. One president stated, “It would be a combination of traditional and collaborative classrooms. I don’t think that the traditional classroom is actually bad. I like where we are. I like a diversity of classrooms. Well, the things that I think we will do in the future are to extend the classroom into the world.”

The interviews also indicated the classroom is important to a faculty creating a positive teaching environment, one faculty member stated, “I think it improves it. I really do. It allows me to create an environment that's comfortable for the students and comfortable for me. It really does create those engagement moments because we have all the things that we need related to our program right there in the classroom as opposed to if we have to move from classroom to classroom. Another faculty member stated, “I can tell them their assignments and then we can go out into the lab and they can look up things up. The can go to their office so that they can get into groups and discuss things and do projects. The have tables so they can create things that they’re going to have to do for the projects.” Still a third faculty member states their classroom “is a very intimate classroom so it’s very easy for me to have contact with all my students. Believe me I do appreciate the small class sizes. It is not hard for me to engage the student’s attitude.” The faculty interviewed indicates the classroom is important to their success in engaging the students.

The response to this interview question resulted in the researchers being concerned that large inflexible lecture classrooms do not engage students and possibly reduce success. The question remains after the interviews are who is in charge of ensuring the classroom space and the subject taught are congruent?
Question 7

Question 7 asked faculty to describe the ideal classroom they would like to teach in

“Without regard to budget, what changes would you personally make to your classroom?” The question resulted in a large number of responses suggesting they have considered what is necessary and have formed clear opinions of the proper classroom. A constant theme was open spaces and appropriate technology. One faculty member stated their desired classroom “would be an open classroom with windows. The classroom would have round tables and would have an open area to do projections with smart boards and a lot of whiteboard space.” Another faculty member lamented, “So it’d be nice to have an environment that reflected that, and make them feel valued but I love the technology in there. I think having seating where they could have three to four in a grouping would be great,”

The ability to organize students in collaborative groups was noted with an instructor stating, “What I really like is an ability to have a classroom where you could put people in circles or groups and things like that, but the problem is I also need computer and I need computers that work.” Another faculty stated, “First thing I would update the equipment related to the lab. Our lab equipment is older and of course we would want to update it to the most current equipment to better show the students what they’ll be faced with out in the real world environment.” A similar comment by a faculty indicated “I would do away with chalkboards. I understand there is a benefit to using chalkboards as far as that goes. As far as technology goes, I like the projectors but I would rather have like Smart Board technology where I can actually draw on the actual projector screen instead of having to only use the computer.”

Faculty members repeatedly described a classroom that was flexible and had technology that they knew how to use and worked consistently. It is important to note that in the interviews
and in the survey faculty believed the colleges have made improvements in creating classroom spaces and had made investments in the appropriate technologies. This was also reinforced by comments from the presidents who stated, “We would make sure that every classroom had the appropriate technology. We would choose the modular furniture that you could move and put together and form clusters.” The presidents indicted they made significant investments in a specific program rather than providing modest improvements to all classrooms.

Another interesting theme that emerged was faculty perceiving the needs of students when considering creating a classroom. One faculty member stated, “I think that a new classroom space would be in order. I think that having the ability to be networked into the rest of the campus is necessary. So, it is not like I really need the projector but I think that in updating of the classroom is just going to make it maybe a little more comfortable for the students.” Several faculty members indicated they would update the equipment they are using to teach their courses. Lab courses were often classrooms that faculty suggested equipment upgrades, especially labs requiring special equipment for radiography courses.

Faculty appreciated the equipment available but understood the advancements in technology required a reinvestment in state-of-the-art technology students would encounter in the workplace. Another faculty member combined this thought with the requirements of mobile devices owned by students and stated, “I was never a big fan of any kind of a Smart Board technology based on how I used to teach, but a lot of the stuff now specially now where stuff that’s kind of easily to wirelessly project such as like an iPad to any kind of display is so powerful because that’s something very easy to be mobile with around the classroom.” Faculty are aware of the changing technologies and are concerned that their classrooms reflect the real world their students will be expected to work.
Some interviewees were predominantly satisfied with their current classrooms. One faculty member stated, “You know, I'm not sure that I would really make huge changes to the classrooms. I mean, I think it’s been set up well. I mean, I guess it’s the one campus I would possibly, you know, if their budget allows to put a central air conditioning versus having the window units. Other than that, I've been happy with, you know, what’s been given to me in the classroom. It was evident that faculty have become accustomed to adapting to the classroom they have been assigned, it is also clear faculty understand that improvements in the classroom will make a difference in student outcomes.

*Question 8*

Question 8 asked faculty to attempt to understand if student interaction is necessary for students to be successful in the subject taught, the question asked faculty *“Does the subject you teach rely heavily on student interaction in groups or teams?”* The answers to the question were varied and did not have a consistent theme suggesting faculty did not have a strong opinion on the issue of student interaction’s importance in encouraging student engagement and success in the subject. One president indicated faculty mirror the teaching methods they experienced while in college and did not necessarily focus on enhancing student interactions through collaboration. Answers varied from one faculty member stating that the subject did not require interactions to others that suggested the room layout was essential to encouraging interactions. Another faculty stated, “I would say it is flexible enough to get the job done. I felt like I was able to do a big job this semester. It definitely could be better but I have what I needed to succeed, which is just basically the technology”.
A faculty member who had worked at a for-profit university stated, “You know I came from a for-profit environment before I was here and I just make the classroom work, I cannot imagine a situation where the classroom would affect me (or the students) that way.” This statement was reinforced by the comment “I would feel neutral about that, I would say that I don’t think it’s hurting them and I don’t think it’s helping them” or another who stated “I can’t say that the learning space itself is a detriment at all but I can’t say that it makes a huge impact”.

Several faculty members did cite situations where the classroom had a positive impact on student outcomes because the classroom space encouraged interactions. A faculty member stated, “Getting those students to look at each other’s writing and affect the positive and negative is really important. Our classroom is definitely flexible because we can interact between our classmates.” Or another faculty who suggested, “We have developmental students and so often time many of them come to us very intimidated by our learning space because they’re not confident about computers and they’re not confident about technology but we really work with them in the first couple of weeks to get them acclimated to that. Many times those students just really take off.” One faculty member was concerned because the space limited their ability to move around stating, “The flexibility of the room limited my movement.”

This response to this question were interesting when compared to the description faculty gave to question 7 that asked about their “classroom of choice without regard to funding. Question 7 responses were weighted in favor of collaborative classrooms, open spaces, natural lighting and extensive use of technology. The answers to this question suggested faculty are accustomed to making do with whatever classroom situation and they do not feel that student interactions necessarily improve student success in their subject area. The presidents interviewed did not reflect the same observation and stated, “So, overall, I’m pretty pleased of where we are
headed in learning spaces. We still have some fully traditional activities, but coming from a technical background, technical college background, we’re a lot of hands-on.” The researchers’ concern is faculty apathy with their environment rather than requesting appropriate spaces to teach their subject matter.

**Question 9**

This question focuses on student persistence in completing their degree. The question asked faculty if their learning space contributed to students being successful. Additionally, the question encouraged faculty to determine if there was a positive effect of the learning space on student engagement. The question asked faculty, “*When a student is doing well in their classes they are more likely to persist (continue taking classes) with the college. Do you feel your learning space is helping students learn and persist?*”

The theme that emerged on this question is faculty did feel the learning space had a positive impact on student persistence. Once faculty member stated that, “Whenever we do our end of the program evaluation, a lot of the comments regarding of our program will say that it's been very positive because we incorporate so much hands-on in their learning, they feel like they're part of it.” Other faculty members commented, “We’re really able to teach the students and have them feel like they’re a part of that learning environment and they were also able to use the learning environment and to create the social interactions within the classroom,” or “I think you need a more organic-feeling space to allow them the freedom to explore ideas and play with them and debate with each other. One president agreed by stating, “I think that the room design does make it so much more conducive for them developing a partnership with someone, identifying as a part of student body making those connections to their peers, that engagement.”
There was agreement learning spaces are related to persistence by faculty and administrators. The response to this question was consistent with faculty desiring a collaborative classroom setting and presidents committed to creating a collaborative learning environment. The researchers point out even though there is agreement that interactions in the learning space improve student persistence, a large number of classrooms are traditional lecture classrooms.

A limited number of faculty had alternative opinions on what influenced student persistence. One faculty member stated that the teacher is the most important influence on interactions by stating, “If I’m there and I’m positive and I’m excited about what’s going and I’m prepared and I have something interesting for the students to do they forget about where they are.” One president agreed that the faculty were key to persistence and stated that collaboration is enhanced with, “the relationship that they (student) have with the faculty member.” Another faculty member suggested technology was just as important as the learning space in encouraging student engagement. Several faculty pointed out that technology enabled student interactions that resulted in student persistence. Even though there is a difference of opinion it is clear that faculty and presidents are evaluating the impact a learning space has on student.

**Question 10**

The final question required faculty to identify the most important element in their classroom that assists in student persistence. The question asked, “In your opinion what is the most important element of your classroom that assists in student persistence? The response to the question did not result in a primary theme emerging but faculty provided valuable insight into their perception of what elements of the classroom results in student persistence. Four interviewees indicated student interactions improved student persistence, one faculty member
stated, “I think it's their cohorts. I think it's because they're all in the group and can constantly see each other, they're always helping each other and defending each other and, you know, doing things for the other one and they're really concerned so I think it's being able to see their group,” and another faculty member agreed by stating “but I think the bigger thing is the people in the classroom.” A new faculty member stated the most important element improving student persistence is collaboration.

One president indicated the most important element in the classroom was the relationship between the teacher and the learner. There was agreement by a faculty who stated, “Again, I think it’s the teacher and the teacher’s preparation and the teacher’s attitude towards what’s going on. I don’t think that students necessarily come to school for the environment.”

Several faculties indicated that the facility should feel like a college and not a high school, one commented, “If it feels like high school and if they're doing a lot of activities that feel like the place that they didn't so well, they're going to be less likely to persist”. Two faculty members suggested that space and comfort was important to student persistence and another two indicated technology was important to a student completing their degree. A president agreed by stating that, “first and foremost is the physical environment and then second I think it is collaboration more than the technology.” The researcher noted that faculty did not mention basic technologies such as smart boards or wireless networks in response to this question.

What the Results Mean

Faculty and presidents agree collaborative learning spaces encourage student interest and interaction which research has shown can increase student persistence rates. Through the use of a survey and interviews with both faculty and presidents we have better insight to the learning spaces and pedagogies at two KCTCS colleges. The Capstone is designed to provide faculty,
architects, facility personnel, and administrators with evidence based examples of optimum learning spaces, which can be designed for increased student and teacher interaction/collaboration and lead to better persistence rates. Faculty revealed through both the survey instrument and interviews that the classroom in which they teach could be an asset or an inhibitor in teaching new and innovative teaching styles. The literature review suggests that students who have social ties and feel a part of their institution are more likely to persist. The researcher’s conclusion is optimum learning spaces increases the chances for quality interactions between students and faculty ultimately helping with persistence rates. The review of the literature highlighted instances where well designed learning spaces enhanced student interaction, teamwork, and collaboration. The capstone has also shown that collaboration, group work, and increases in faculty-student interactions can increase student persistence rates. Using the transitive property, a logical conclusion is that learning spaces can impact persistence rates both positively and negatively.

The literature review validates that little research is available to understand the impact of learning spaces on student engagement and student persistence at community colleges. The literature review did document that a number of colleges and universities are involved in understanding learning spaces. The literature review and the faculty survey identified a number of similarities; the primary being that faculty believed that learning spaces had a positive impact on students’ success. The faculty survey identified most learning spaces at community colleges were traditional lecture based classrooms. Faculty commented that they were comfortable in teaching in any environment, and some indicated the space did not matter; it was the quality of the instructor. Faculty interviews indicated interactions were valuable in students’ feeling
engaged resulting in greater student satisfaction but faculty were not aggressive in requesting the learning space they identified as their choice for instruction.

An interesting outcome was faculty did not have a preference for specific subjects being taught in a collaborative classroom model. Faculty involved with core courses, labs and studios agreed that collaboration was important to student interactions. Prior to the survey and interviews the researchers believed certain subjects would require a specific classroom model. The results of their research suggest this may not necessarily be true. The response to the survey indicated a balanced response to faculty preference using a lecture mode or collaborative mode of instruction. The faculty responses to the interviews were biased in favor of the use of collaborative learning spaces. The survey revealed faculty are willing to using emerging teaching methodologies such as flipping the classroom.

The presidents’ interviews suggest funding for new or renovated classrooms is made primarily in collaborative learning spaces. The presidents were in agreement that a community college needs both lecture classrooms and collaborative classrooms in order to be effective. The presidents interviewed also stated faculty were involved in planning learning spaces however, the response to the survey by faculty members did not corroborate this statement. The faculty response suggests they are assigned a space and they make the best use of the classroom to teach their subject. Faculty did indicate that traditional lecture classroom layouts influenced their teaching style to be lecture oriented rather than encouraging instruction based on student collaboration.

Faculty members were frustrated with the lack of control over the environment in the classroom such as lighting, temperature, and humidity. Faculty seemed to be more concerned learning space environmental issues such as lighting, temperature control and furniture posed a
greater problem to inhibiting instruction than the classroom model. Faculty were very concerned that many classrooms were too hot/cold and caused students to lose focus on the subject. Other faculty indicated that today’s classroom needs lighting that could be managed to meet the needs of presentations on screens or smart boards encouraged by digital resources. The faculty interviews revealed concern that classrooms need to have equipment similar to what a student would find in the work environment. This was most prevalent in classes such as nursing, radiology, and construction that had laboratory components. Faculty opinions suggest equipment upgrades are necessary for their instruction to remain relevant. Many faculty members indicated that classrooms need to have appropriate technology to be effective. Faculty stated that a classroom needed a teacher podium that was connected to a network, smart boards and/or screens, white boards, open space for student collaboration and wireless networks. Faculty stated the community colleges provided adequate technology support. The presidents agreed with faculty on the requirements of classrooms. The presidents stated it was important to make significant investments in a specific academic program to ensure it was state-of-the-art rather than investing smaller amounts in all classrooms.

The capstone project focused on learning spaces and did not consider the impact of social networking in the classroom. The research did not focus on the impact of social learning in learning spaces. The response of faculty to the survey and interviews led the researchers to believe faculty equated collaborative learning spaces and social interactions. Further research is necessary to understand the impact of social learning in collaborative learning spaces to determine the impact of social interactions as opposed to active learning classrooms. The researchers noted the faculty’s concern the classroom was relevant to student use of social
networking resources, mobile technologies and online resources. Faculty stated employers favor students who have skills that encourage collaboration with peers.

The research noted a lack of coordination between faculty and administrators in creating learning spaces. The presidents’ belief was faculty are involved but this was not substantiated in the faculty survey or the faculty interviews. The faculty stated that the presidents were concerned that learning spaces were adequate but there was a real disconnect between administration and faculty on the degree of involvement. The faculty member’s response to the dates their buildings were built or remodeled was confusing. Faculty did not appear to understand the overall plans for classroom instruction transformation or perhaps simply were not involved. The researchers attribute this to faculty not being involved in the capital planning process for classrooms. The literature review documented faculty typically has minimal involvement in creating learning spaces. Current learning space research states architects and facilities management have the greatest influence in creating learning spaces. The result is many classrooms are optimized for efficiency or cost and not necessarily for learning. Further study is needed to understand the difference in cost per square foot and learning per square foot to recognize if the increased cost of collaborative learning spaces is worth the investment.

Faculty demographics did not indicate age or years as a faculty member influenced their opinion on the type of classroom they preferred to teach. Faculty perceptions indicate faculty of all ages and years of experience in the classroom favored active learning classrooms that encourage group interactions. The survey indicated age and years of experience were balanced regarding the perceptions of the impact lecture or collaborative classrooms had in enabling group interactions.
The literature review, the survey and the interviews concur that student interactions improve student success. The survey and interview data state community colleges need to address learning spaces to enable collaboration that results in student engagement to improve student success. The researchers’ findings suggest establishing collaborative learning spaces can improve student engagement and positively impact student persistence. The researcher recognizes the limitations of the research project and the limited research available on student engagement and learning spaces in community colleges.
Chapter 5

Discussion and Recommendations

General Discussion

The researchers performed a thorough review of literature, issued a survey, and conducted in-depth interviews with faculty and the Presidents of the institutions. The researchers found from the literature that no set standards exist for evaluating the validity or authenticity of conclusions in a qualitative study (Check & Schutt, 2012). However, the researchers do believe that an online learning space repository for faculty, administrators, architects, and facilities planners can aid in the development of an optimal classroom planning process that can improve student persistence rates in some teaching styles. The research information gathered supports the researchers’ hypothesis that learning spaces can be designed in such a way as to enhance collaboration and group work in the classroom or library (Brooks, 2012; Oblinger, 2005; Steelcase, 2013). Additionally the literature review revealed that collaboration and group work activities have indeed shown increases in student persistence rates. Holding the aforementioned statements true, we can logically assert through the transitive property and state with confidence that well designed learning spaces can influence persistence rates positively.

The journey to understand learning spaces in a community college setting is akin to trying to find your way out of a labyrinth. This capstone focused on five areas; learning spaces, faculty involvement, collaboration, best practices in creating learning spaces, and the relation of space design to student persistence. The review of literature confirmed the study of learning spaces at community colleges is largely absent, but the researchers believe that the studies done in university classrooms and libraries are very likely transferable to community colleges. The literature review identified few qualitative studies on community college learning spaces and
only one quantitative study. The quantitative study was completed by Steelcase with Richland Community College and revealed that the LearnLab classroom design had several favorable outcomes on student learning experiences (Steelcase, 2013). The lack of studies is noteworthy because community colleges are known for providing innovative spaces to teach courses in applied and technical skills. Community colleges have a different mission, expectations, and student body than their four-year counterparts. Traditional classrooms, studios, emporium model based computer labs, and skill based technical labs are no strangers to community colleges. Because of this, the researchers expected to find an equal body of research focused on community colleges and four-year universities; however this was not the case. The lack of community college research studies does not diminish the importance of this capstone but simply highlights the need for additional research to understand the impact of the learning space on the curriculum and the persistence rates of students in completing their program of study. The researchers hypothesize that a lack of resources within the colleges to perform these studies. Whatever the reason may be, the researchers see great opportunity for future research in the community college space.

Research focus on learning spaces in post-secondary education gained momentum in the early 2000’s with two popular publications. The first was a project led by Diane Oblinger in 2005 that was published by EDUCAUSE and titled Learning Spaces. The book was a collection of unique learning spaces found at universities in the United States and reinforced her assertion that learning space, whether physical or virtual, can have a significant impact on learning (Oblinger, 2005). Concurrent with the work at EDUCAUSE, the Joint Information Systems Committee (JISC) published a report on research of learning spaces at European Universities. The two publications prompted college and university administrators, facility planners, and
faculty to ask if the learning spaces provided to their students were appropriate and relevant for teaching and learning.

This capstone project quickly recognized a defining leader in the study of learning spaces, Dr. Scott Bennett University Librarian at Yale University. Dr. Bennett asked the question, “What should happen first when a learning spaces is created?” Bennett’s writing (Bennett, 2007a; Bennett 2007b; Bennett, 2011) on learning spaces encouraged others to research the topic. An interesting outcome of Bennett’s research is the creation of learning spaces, known typically as the Learning Commons, found in many college and university libraries. The creation of learning commons, a multi-use space for computing, research, and student discussion/interaction sparked an interest in creating collaborative classroom learning spaces which replicated their advantages. A number of universities began to experiment with learning spaces, early leaders developing innovative collaborative learning spaces such as MIT and NCSU. Both universities experimented with classrooms that were based on student-centered learning. A number of universities have continued to experiment with active learning classrooms that have changed the paradigm of instruction from faculty lecture to problem or project-based instruction.

The research of the capstone at the two institutions identified similar results to the earlier research studies at the four-year universities. Faculty at the community colleges perceived that collaborative classrooms enhanced student engagement and resulted in greater student persistence. The research indicates faculty perceived their interactions with students improved when the classroom was designed to encourage collaboration. An interesting finding of the research survey was faculty indicated their method of instruction was influenced by the classroom design. The researchers believe that more flexible instructional environments may
lead to an increased use in collaborative and even flipped classroom approaches that simply are not plausible in current rooms. A classroom designed for lectures resulted in the faculty member defaulting to using a lecture approach to instruction. Conversely, a classroom designed for collaboration typically resulted in group/team instructional methods based on the interviews responses of faculty members.

The faculty and president interviews identified collaborative learning spaces as a positive influence in student persistence in their academic program. While this feedback is not based on quantitative data, the researchers feel it is important to relay in the capstone as who is better than the teacher to describe what they are seeing in the classroom? There were several faculty members who stated they do attempt to create collaborative learning experiences in all classroom environments, even if they were assigned to teach in a traditional classroom space. This can be a challenge without a flexible classroom design, especially if the furniture is not easily moved. The commitment to creating collaborative classroom space has been a relatively new phenomenon and is taking place at different speeds throughout the colleges studied. The result of the faculty survey indicates a majority of the classrooms assigned are lecture classrooms; which were an expected finding by the researchers given the age of the facilities in use. The presidents acknowledged many legacy buildings classrooms were designed to support lectures, but were quick to point out in interviews current funding for new buildings or renovations are focused on creating collaborative/technology enhanced learning spaces.

**Implications of the Findings**

The capstone research findings coincided with the research in the literature review. The survey of faculty indicated a majority of their classrooms were designed for lecture instruction.
That leaves a strong possibility that there are changes that can be made to their existing learning spaces that can complement persistence efforts. Sixty one percent of the faculty responded they are assigned to classrooms that do not allow group seating. The researchers attribute this to previous practices of building community college learning spaces, allowing facility planners and administrators to optimize the use of space to maximize the number of students assigned to a classroom. Achieving the maximum number of students per square foot became a common practice, especially when tight budgets and high expectations dictate construction deadlines. The capstone resulted in the researchers questioning if learning per square foot should be as important as students per square foot.

A concern of the researchers is the findings that faculty choice of instructional methods are so heavily impacted by the classroom space they are assigned; 50 of 80 faculty responded the space they teach in either always or often impacts their instructional method. Faculty interviews found that a majority perceived that collaborative instruction improves student engagement. The literature review showed that improvements in student engagement led to improved collaboration and student persistence. The faculty interviews revealed that instructors attempt to incorporate group work and collaborative activities into any space they are assigned; yet this is contradicted by the survey results that indicate the classroom space impacts their choice of classroom instruction. The faculty survey results corroborate this dichotomy by seven faculty responding they always use collaboration and twenty faculty responding they always used lectures. The researchers found this noteworthy because both faculty and presidents interviews indicated a preference for collaborative learning spaces. This being said, the researchers believe that both colleges see the value in collaborative learning methods and are active users of it in the classroom. It is evident further research is needed to understand the difference in responses to the
survey and the interview questions on the importance of collaboration to improve student persistence. This research needs to incorporate a greater cross-section of KCTCS colleges and investigate with more detail pedagogical preference and current learning spaces to better understand the potential increase in student persistence rates that might be possible. The researchers also recommend future research include questions that would clarify the Taxonomy of pedagogical practices of faculty. The interviews with both college presidents revealed the preference towards the creation of collaborative learning spaces versus lecture-based industrial models in new construction and remodeling efforts.

The researchers recognized the survey and interview responses did not distinguish the difference in full time faculty and adjuncts. Future research should distinguish the difference in the groups to understand if there is a difference in faculty perceptions. It is possible that the perception of a tenured full-time faculty member is different than an adjunct teaching one course. The researchers recommend that future research studies with the KCTCS community colleges clarify the background and education of each group. The goal would be to determine if pedagogical approaches to learning spaces are influenced by the professional qualifications and the status of the faculty responding to the research questions.

The survey results indicate student interactions happen most often in a classroom designed for collaboration or in the library. Understanding the nature of student interactions could give researchers greater insight into how to best build collaborative learning spaces. The results of the survey align with the literature review in emphasizing the importance of design in active learning spaces when building classroom or library space. The interviews highlight the presidents are aware of the importance of collaborative learning spaces and are working with faculty to determine what programs would benefit most with collaborative learning spaces.
When interviewed, both college presidents described their process of designing new learning spaces and both indicated the involvement of faculty was critical to the process and that it had to be a team effort. This was in conflict with the interviews and the survey results from faculty, which indicated that they are not actively engaged in planning new learning spaces. The researchers hypothesize that the engagement with faculty might happen at a higher level, for example chief academic officers and department chairs, than with each individual faculty. The literature reviews provide frameworks the college presidents could use to formalize faculty involvement (Brickford, 2002; Radcliffe, 2009; Bennett, 2007b) in the design of effective learning spaces. A small step may be to survey all faculty members and interview a subset that teaches the subjects in a given learning space to seek their feedback and opinion. It is interesting that the impetus for developing collaborative active learning spaces is often initiated by an individual rather than a formal college wide planning process. This suggests that the institutions building these spaces have a means to gather and act on suggestions of the faculty. A problem identified in the capstone is faculty prefer collaborative learning spaces but do not strongly advocate for the classroom they believe is most effective for their instruction and student engagement. A lesson to be learned here is that faculty needs to voice their opinions, even if they do not necessarily always have an official channel to give feedback through.

Faculty response to the classroom environmental conditions in the surveys and interviews document that faculty identified inadequate heating/cooling and lighting as inhibitors to student engagement and ultimately the possibility of negatively impacting student persistence. Faculty stated in interviews that poor environmental conditions in the classroom resulted in students not being engaged. Faculty also identified the classroom furniture importance in enabling collaborative classrooms. Faculty with fixed furniture that was not movable stated they used
lectures more than if they were in a classroom that easily allowed the furniture to be arranged into groups. The faculty survey and interviews indicate their classroom have adequate technology to support lecture and collaborative instruction.

Faculty interviews stated that the college ambience was important in students feeling included in their cohort and identification with higher education. This corroborates with Tinto’s (1997) research stating that students having a sense of attachment and belonging to an institution tend to persist at higher rates than those that do not feel a tie to the school. In a commuter college, it is all that more difficult to build that sense of belonging and the opportunities to succeed in this mission are further and fewer between than at a residential college or university. Faculty stated students’ engagement improved when they could identify with facilities that were different than their high schools. Faculty interviews indicated that faculty believed that student engagement was related to the interactions between students/faculty and student/students. These interactions can certainly occur in a traditional row and aisle learning space, but is it ideal? The answer is no, and that is why the researchers are shining light onto the importance of learning space design. Faculty members were in agreement group collaborative classrooms enhanced both interactions and resulted in student persistence. The faculty survey reinforced this observation when faculty identified the library, student lounges, and hallways as important to student/student interaction. These interactions can build camaraderie and friendship that again, builds ties to the institution and a sense of belonging. Conversely, faculty stated that traditional lecture classrooms inhibited interactions and resulted in student feeling alone within the college rather than a member of a cohort.

The research in this capstone leads us to believe that persistence rates could be positively impacted if KCTCS were to formalize an approach to learning space design. Faculty and
presidents need to be made aware of the impact of learning spaces on student engagement and success as well as recent developments in current literature. The researchers identified faculty involvement as key to creating effective learning spaces. College administrators and facilities planners need to formally involve faculty in planning of all renovated space or new buildings. The researchers agree the capstone can be a catalyst to a formal learning space planning process to at least start the conversation introducing a more formal process. The researchers have identified the emergence of literature that recognizes the importance of understanding learning spaces holistically including both hybrid and online learning spaces. A number of resources have emerged to support the formalization of planning learning spaces; all of these are included in the product of our research, the online learning space repository.

The researchers believe the community colleges must identify vendors that understand the importance of learning spaces and establish partnerships to develop collaborative learning spaces leveraging data based designs. Architects, furniture manufacturers, technology providers, and construction teams need to work in lockstep to provide optimum environments for our students. A good example of this is the partnerships of the Richland Community College and Steelcase, one of the largest manufacturers of office and classroom furniture. Steelcase established a higher education research team led by Dr. Lennie Scott-Webber to provide hard data for issues related to learning spaces that resulted in improved student engagement and collaboration. The researchers encourage other furniture manufactures to invest in research on learning spaces in higher education. Joint research projects endorsed by vendors and colleges will result in a greater understanding of the impact of learning spaces on persistence that will be valuable to all community colleges.
Limitations of the Capstone

The capstone was based on faculty perceptions of learning spaces at two community colleges within the KCTCS system. Seventy-four faculty members completed the capstone survey and the researchers completed intensive interviews with thirteen faculty and two community college presidents. The survey was sent to 512 faculty, resulting in a 14% response. While the responses to the survey and the interviews were adequate to validate the capstone, the researchers desired a higher rate of response. The researchers incentivized the survey respondents with a drawing for four fifty-dollar Amazon gift cards; it is possible additional incentives may have yielded an increased response.

The survey instrument was modeled after a previous study that focused on developmental education classes at community colleges. This format served the researchers well, but in retrospect could be made stronger if some of the questions, particularly around the age of buildings, were clarified. The researchers found that many of the faculty members did not know the history of their buildings and had no idea of its age, or the last time it was refurbished. Further issuance of the research survey to faculty of the remaining community colleges will increase validity and give more strength to the argument of generalizability.

The researchers used multiple site selection, thick description and member checking to ensure validity of the interview questions. The researchers’ decision to use two community colleges, rather than one, allowed the results to be generalized to more than a single college. Conducting the research at additional KCTCS colleges will likely allow the results to be generalized system wide. Thick description was used to develop and administer the interview questions. The researchers’ use of thick description allowed the interviewer to uncover a fuller description of the faculty’s perception of their learning spaces and the impact on student
engagement. The interviewers provided the interviewees with the questions prior to the interview in an effort to get them comfortable with the topic and case study. Using semi-structure interviewing techniques, the researchers did not limit the faculty to only answering the interview questions but encouraged the faculty to interact with the interviewer to uncover relevant information important to the capstone study. The researchers used member checking to ensure the information gathered in the research was accurate. The researchers also recorded the interviews, transcribed, and provided the interviewees with a written transcript to fulfill the qualitative requirements of member checking.

An additional limitation of this capstone was the use of the case study method. Generalizations of case studies extend only to the cases studied. The researchers would have to continue to repeat the case study at other KCTCS colleges to identify trends that could be generalized across the community college system. This would be a fruitful exercise to gather more data about faculty perceptions across the system, but it is a limitation to the current research.

A concern of investigator bias is recognized because the researchers created the survey instrument and the interview questions for the faculty and the presidents. The researchers recognized the problem related to investigator bias and used methods to limit the problem. The researchers created the survey instrument and the interview questions and submitted to the doctoral committee for evaluation and approval. The researchers recognize their interest in the research project could bias the interpretation of the results and took appropriate measures to use methods that would limit investigator bias. To the furthest extent possible, the researchers acted to limit any threats to internal and external validity.
Research Product

The product of our research is a website that contains links to an online repository of learning space designs, toolkits, vendors, and videos. The researchers contemplated creating a published learning guide but recognized the document would be dated as soon as it was published and would be unrealistic to maintain annually. The researchers wanted to create a document that was useful and sustainable for the education community. After discussing options the researchers believe the correct method of sharing learning space information is the social media sharing website, Pinterest. Pinterest is a social networking site for people to share photos, bookmark images, comment on posts and generate conversation around a visual centerpiece. The site affords the researchers a repository that is easily maintainable and sustainable past the Capstone project.

One limitation of Pinterest is that the boards are not easily linked to without an actual website that can serve as portal to Pinterest. To address this, the researchers created a website at http://learningspaces.info (See Appendix D). The website gives a brief definition of the Capstone research, findings, and links directly to the 4 Pinterest boards.

The researchers determined mobile access was necessary for the repository to be successful and Pinterest provides mobile application for many portable devices. Pinterest allows you to dynamically share pictures, videos, and websites through the use of boards that you place virtual pins on. Individuals on Pinterest are able to follow other Pinterest members, re-pin the posts of others, and “like” a pin, and comment on pins. The researchers believe that this medium is more effective than a guidebook that is be outdated the minute it is printed. Pinterest was selected because it has a large following and interoperates with Facebook, Google+ and Twitter. Pinterest creates a crowdsourcing opportunity to invite other community college faculty to
contribute to our board as well as easily share other pages from within Pinterest that might be related.

The Pinterest Learning Spaces site has four Pinterest boards; the boards are learning space design, learning space toolkits, learning space videos, and learning space vendors (See Appendix E). The boards were selected to represent the primary areas of the capstone project. The learning space design board provides the faculty, administrators and facilities planners’ images of learning spaces and highlights important articles. The learning space design board provides information individuals need to create a learning space classroom. The learning space toolkit provides the learning space community access to toolkits discovered during research for the capstone. The researchers recognize the limited number of toolkits but understand the study of learning spaces is in its infancy. The learning space videos board provides individuals information discovered while developing the learning space repository. The researchers selected a video board because of the success of YouTube, the researchers recognize professional want timely access to video segments available on their mobile devices. The researchers recognized the importance of video in providing faculty an alternate source of information. The fourth Pinterest board provides faculty, administrators and planners current information on furniture and technology learning space vendors.

The Pinterest social networking site is appropriate for the repository envisioned for the capstone project. Pinterest does have limitations encountered by the researchers. Pinterest is four-years old; the site has developed rapidly but does not have the maturity of Facebook in editing facilities. The researchers were limited in the ability to manipulate pinning information and to add relevant comments. The researchers plan to present the capstone results and introduce
the learning space repository at conferences such as University Business, EDUCAUSE, and the AECT to promote the site and encourage faculty engagement.

Conclusion

This capstone focused on five areas: learning spaces, faculty involvement, collaboration, best practices in creating learning spaces, and the relation of space design to student persistence. The literature review and capstone research uncovered answers to our research focus areas. A key to transforming learning spaces is leadership. The leadership can originate from interest by a single faculty member, a department or the college president, but it takes complete buy-in and awareness of the problem to make a difference. The KCTCS change management philosophy has a foundation of awareness of the problem and desire to change from all parties, without those this project would be futile.

The first focus area was learning spaces in higher education. The capstone research identified two types of learning spaces in higher education. These can be categorized from a high level as informal and formal. Informal learning spaces are hallways, lounges, outdoor benches, etc. Formal learning spaces are those in which instruction is given, classrooms and labs. These formal spaces can be broken down into two general categories, lecture classrooms and collaborative learning classrooms. The primary difference is the focus of instructional delivery and content presentation. The focus of the lecture classroom is on content and the delivery source is the faculty member as a subject matter expert. The focus of collaborative learning classrooms is student-centered instruction with the faculty member guiding the student through the learning experience. The results of the capstone research indicated faculty members are comfortable in both classroom environments. The capstone interviews revealed that a majority of the faculty
interviewed believed students achieved greater success in the collaborative active learning classroom. The literature review corroborated the faculty interviews that led the researchers to believe that KCTCS should investigate formalizing a study of learning spaces at each college in the system.

The results of the study can serve as a blueprint for new classroom buildings or renovations. The interview of the presidents stated the community college needs both lecture and collaborative classrooms; the balance of the mix should be the result of the study of learning space requirements. The faculty survey recognized the library as being the primary collaborative learning space today. It is important the library personnel develop partnerships with faculty to understand how students extend the classroom experience into the library and the role the library staff in building learning bridges between the classroom and the library. The capstone research and the literature review suggest the two community colleges should place emphasis on building technology-enriched, collaborative learning classroom spaces.

The second focus of the capstone study was faculty involvement in the planning/decision process of learning spaces. The results of the capstone research indicate faculty members do not perceive involvement in the planning process. The literature review documents a lack of faculty involvement in planning higher education learning spaces. The literature review also identified frameworks that would provide a formal process to ensure faculty involvement. A recent learning space tool kit from EDUCAUSE could provide faculty, administration, and college presidents with a roadmap for planning learning spaces.

The goal of many collaborative classroom projects is to improve student interactions by implementing student-centered teaching methodologies. Faculty members wanted students to engage in the learning process invested time and effort to ensure learning space was friendly to
collaboration and sharing. To accomplish this goal faculty became advocates for collaborative learning spaces in the classroom planning process. The researchers believe there is a need to formalize faculty involvement in capital projects that impact learning spaces. The researchers would suggest a more structured process be established system wide to address learning spaces.

The third area of focus of the capstone research was collaboration. The capstone literature review identified the importance of collaboration in improving student engagement that has been found to be a key element in student persistence. The faculty surveys and faculty interviews stated faculty believed their classroom instruction improved if the learning space allowed collaboration. Faculty stated collaboration was possible in a classroom designed for lectures, but collaboration was more successful when the learning space accommodated group seating. Faculty identified collaborative learning spaces essential to improving student engagement. Faculty perceived student engagement enhanced the opportunity for the student to be successful academically. Collaborative learning spaces identified at the community colleges were classrooms, student lounges and the library. The capstone research suggests the community college administration should look at these spaces holistically to determine if planning across collaborative spaces will improve student engagement and result in student success.

The fourth focus of the research was on best practices. The capstone survey and interview research identified successful learning space transformations but did not identify formal best practices that could be implemented throughout the community college system. The literature review did identify best practices that have been formalized at four-year universities. As previously mentioned, the researchers believe that university research can be credibly generalized to community colleges in many cases. An example of this was highlighted in the literature review of best practices implemented at the University of Minnesota’s new science
building. The building was designed to implement the best practices of the past decade found at MIT, the University of Iowa, and North Carolina University. The common theme of all the projects was student engagement resulting from improved collaboration found in active learning classrooms. These classrooms use collaborative technology, furniture, wall/floor coverings, color, and lighting to form an ideal place for learning. Richland Community College recently completed a successful active learning space project. Richland Community College teamed with Steelcase Inc. to determine if the studies of active learning classrooms at four-year colleges could be replicated at a community college with equal successes. The result was a best practice community colleges have available in establishing collaborative active learning spaces.

The final focus of the research capstone was possible ties between learning space design and student persistence. While the researchers found an absence of research specific to learning spaces and persistence, there was plenty of evidence tying persistence to collaboration, engagement, and a sense of belonging at the institution. All of these traits can be impacted by a well-designed learning space. The faculty surveys and the faculty/president interviews corroborate that faculty and presidents believe that learning spaces can impact student persistence. The faculty identified learning spaces designed to encourage collaboration in groups important to improving student engagement and collaboration. Faculty interviews and the literature review identified student engagement and belonging important to student persistence rates. Faculty stated classrooms designed to support lecture with fixed furniture inhibited their ability to engage students in collaborative projects. Faculty members stated student experience in a lecture classroom appeared to result in students feeling alone in their efforts to be successful and a possible outcome is students not persisting in their program of study. The literature review
research aligned with the capstone research in identifying space design important to student persistence.

When the question of what investments need to be made to increase student persistence, the researchers believe that analyzing existing and planned learning spaces should seriously be considered. This investment does not always equate to a large price tag. Doorley & Witthoft’s research showed that simply adding casters to desks in a classroom could have a positive impact. This is not always the case of course, but it is food for thought. Our survey instrument, interviews, and literature review found evidence that learning spaces can be designed in ways that positively impact student engagement and collaboration. The research of this capstone also found that student belonging, collaboration, and engagement appear to have positive impacts on student persistence rates. When designing a learning space using existing literature, input from key stakeholders, and available toolkits you can positively impact student persistence rates.

Recommendations for Future Research

A majority of the research studies examined in the literature review turned out to be qualitative. Further mixed-method or purely quantitative research would likely help sell business cases for learning space projects. Mixed method research uses both quantitative and qualitative data collection and analysis techniques (Gay, 1987). These techniques would show the rich data received during interviews along with the quantitative data that many in academia hold steadfast to. The researchers recognize research on learning spaces at community colleges is in its infancy and significant research needs to be conducted in the future to determine if learning spaces impact student persistence. Future research needs to focus on the impact learning spaces on student engagement and increased student persistence rates. The result of the research studies in
the literature review suggests learning spaces improve collaboration resulting in student engagement and improve student persistence. It is important to determine if the specific types of learning spaces improve student success.

The researchers recommend the capstone survey and interviews be replicated at the remaining fourteen colleges in the KCTCS system. Each college has unique programs, industry, politics, and standards of living that make them a part of home to both local and remote students across the Commonwealth of Kentucky and beyond. The replication of the study would identify programs that benefit from collaborative learning spaces and allow administrators to focus future capital funding on specific projects. The results of the study would improve the validity of the research instruments and give insight into the true impact of learning space design and student persistence. Additionally, the researchers will work to continue updating the online learning spaces web repository with the most recent information, images, and trends in design.

Outside of physical learning spaces, additional research needs to be performed on both online and hybrid (both face-to-face and online) courses. The researchers believe that learning spaces, whether physical or not, can likely impact students positively or negatively. With the momentum gathering behind flipped classroom instruction methods, the importance of online design becomes even more important. Not until these two additional learning spaces are researched can KCTCS have a holistic view of optimum design principals.
References


George, G., Erwin, T., & Barnes, B. (2009). Learning Spaces as a Strategic Priority. 

*EDUCAUSE Quarterly*, 32(1), n1.


Appendix A

Faculty Survey

Faculty Survey

Please circle the answer that describes your professional opinion on classroom instruction. Please only provide one answer per question.

Section A: Personal

1. My college has classrooms that allow students to create group seating arrangements. 1 2 3 4 5
2. My college has traditional lecture classrooms 1 2 3 4 5
3. My administrators support using new instructional methods, such as asking students to view/listen to a lecture online before class and then discuss the lecture during class. 1 2 3 4 5
4. My administrators support traditional lecture teaching environments. 1 2 3 4 5
5. I teach in a building that has been renovated within 10 years. 1 2 3 4 5
6. I teach in a newer building, less than 5 years old. 1 2 3 4 5

7. I teach in a classroom building that has not changed in the past 20 years. 1 2 3 4 5

Section B: Teaching Strategies/Techniques

8. I use group projects and not lectures because it best supports my subject area. 1 2 3 4 5

9. I lecture in my classroom because it best supports my subject area. 1 2 3 4 5

10. I record lectures prior to class and ask students to listen to the lecture prior to class because it best supports my subject area. 1 2 3 4 5

11. I assign groups and ask students to solve problems related to my subject because it best supports my teaching & learning strategy. 1 2 3 4 5

12. I assign groups and ask students to complete team projects related to my subject because it best supports my teaching & learning strategy. 1 2 3 4 5

Section C: Facility Design and Students

13. Students have space on the campus that is designed to accommodate group work/planning, with or without faculty. 1 2 3 4 5

14. Students have space on the campus to work together in a student lounge. 1 2 3 4 5

15. Students have space on the campus to work together in a hallway. 1 2 3 4 5

16. Students have space on the campus to work together in the library. 1 2 3 4 5

Section D: Working with Faculty

17. Working with faculty in my subject area I use traditional lectures as the primary instructional method. 1 2 3 4 5
18. Working with faculty in my subject area I use group/team collaboration as the primary instructional method.

**Definition of Terms:**

*Student persistence in this survey is defined as the "ability of an institution to retain a student from admission through graduation (diploma or certificate)" or transfer (Seidman, 2005, p. 14).*

19. Group/Team collaborative instruction is effective in improving student engagement and student persistence for my subject.

20. Lecture instruction is effective in improving student engagement and student persistence for my subject.

21. In your view, your classroom space is designed to support lectures.

22. In your view the space you teach in enables student centered group/team instruction.

23. The design of my classroom impacts the way I teach.

**Section E: Faculty Involvement in Planning**

24. Faculty are involved in planning and designing learning building spaces renovated in the last ten years?

25. Faculty are involved in planning and designing learning spaces in buildings built in the last five years?

26. Lecture classrooms are equipped with appropriate technology? (presentation support)

27. Student centered collaborative classrooms are equipped with appropriate technology? (presentation support)

28. The classroom furniture in the lecture classrooms is movable (i.e. chairs/tables have wheels)?

29. Classroom has wireless network connectivity?

**Section F: Classroom Instruction**
30. Group/team classrooms collaborative classrooms need a different space layout than a facility using primarily lecture instruction?

31. Group/team collaborative classrooms need only technological enhancements of a primarily lecture or traditionally designed facility.

32. A group/team collaborative classroom needs only the traditional, industrial space design.

33. A student centered collaborative classroom building needs only traditional space with modifiable walls and moveable furniture.

34. A student centered collaborative classroom building needs only traditional space with moveable walls, furniture, and technological enhancements.

35. Collaborative group work outside of normal class meeting hours is typically a requirement of the classes I teach

Section G: Classroom Properties

36. My classroom has appropriate and controllable lighting which I know how to operate.

37. My classroom has ample natural light (windows/skylights) which can be controlled if necessary by faculty (window treatments, blinds, etc).

38. I consider the colors and textures in the room appropriate for learning (wall/ceiling color, flooring, non-distractive contrasts).

39. My classroom has a comfortable temperature or the ability to quickly change it without the need for facilities personnel.

40. My classroom has comfortable seating for both students and faculty.
41. The classroom has plenty of space between seating areas for students to move about the room if necessary without overly distracting the class.

42. Excessive noise from external sources outside of the room is not present.

SECTION H: Demographics Instructions: Please type an “X” or fill in the blank.

43. I currently teach the following subjects __________________________.

44. I teach at ______________________

45. I have been a faculty member at the college for _____0-5 yr _____ 6-10 yr _____ 11-15 years _____ over 20 years

46. My age is between ___25-35 ___ 36-45 ___ 46-+. 

47. Would you be willing to be interviewed, if so please give us your email address (any personal information and answers will not be disclosed outside the researchers)

__________________________

Thank you for your participation. Results will be available upon completion of this research.

Appendix B
Faculty Interview Protocol

Faculty Interview Questions

First, thank you very much for participating in our survey. Thank you very much for agreeing to be interviewed by me. I am working with (Paul Czarapata or Doyle Friskney) on a Doctoral Capstone Project at Morehead State University in the area of faculty perceptions of learning spaces and the potential impacts on student retention (persistence).

1. What are your overall thoughts regarding the learning space you predominantly teach in?
2. Can you give me a rough description of the room, furniture, technologies available, etc.?
3. Can you describe the lighting and temperature in your classroom? Can you adequately control either?
4. In your current classroom(s), can you describe a situation where the learning space worked well for you in engaging students in learning? Describe in as much detail as possible.
5. In your current classroom(s), can you describe a situation where the learning space did not work well for you? Describe in as much detail as possible.
6. In what ways do you think your teaching is affected by the rooms you teach in?
7. Without regard to budget, what changes would you personally make to your classroom?
8. Does the subject you teach rely heavily on student interaction in groups or teams?
   a. Do you feel that your classroom is flexible enough for rich student interaction between their classmates and yourself?
9. When a student is doing well in their classes they are more likely to persist (continue taking classes) with the College. Do you feel your learning space is helping students learn and persist?

10. In your opinion what is the most important element of your classroom that assists in student persistence?
Appendix C

President Interview questions

First, thank you very much for participating in our survey, I am working with (Paul or Doyle) on a Doctoral Capstone project in the area of faculty perceptions of learning spaces and the potential impacts on student persistence.

1. What are your overall thoughts regarding the learning spaces at your College?

2. Are your classrooms the typical lecture type or do you have classrooms designed for collaboration? Do you believe the style of the classroom affects student outcomes?

3. Who is typically involved in the design of learning spaces (either new or existing)? (architects, facilities, administrators, faculty, etc)

4. Do you know if lighting and temperature can be controlled in most classrooms or is this typically a function of facilities & maintenance personnel? How important do you think environmental controls are in the learning environment?

5. Can you describe a situation where you have observed a learning space worked well in engaging students in learning? Describe in as much detail as possible.

6. Can you describe a situation where you have observed a learning space not working well in engaging students in learning? Describe in as much detail as possible.

7. In what ways do you think teaching can be affected by classroom design?

8. Do you believe a classroom affects the ability of a faculty member to be successful in teaching?

9. Without regard to budget, what changes would you like to make to the classrooms and labs on your campus?
10. When a student is doing well in their classes they are more likely to persist (continue taking classes) with the College. Do you feel the learning spaces at your college are helping students learn and persist?

11. In your opinion what is the most important element of a classroom that assists in student persistence? (i.e. seating, lighting, technology, etc.)
Appendix D

Web Site

*Figure 3 - Learningspaces.info page 1*
Figure 4 - Learningspaces.info page 2
Well-planned learning space design can positively impact the ease and effectiveness of interaction and collaboration amongst teachers and students. More effective interactions and collaborations have been shown to positively impact student persistence. With these two statements, one can logically assert that learning space design can positively impact student persistence rates. Our capstone project is titled "Faculty Perceptions of Learning Spaces". Through a survey, series of interviews, and a deep review of current literature we believe that learning spaces can have positive impacts on student persistence rates.
Appendix E

Pinterest Board Pins

Learning Space Designs Board

Flexible Learning Environments eXchange - https://sites.google.com/site/flexspacedev/
The Flexible Learning Environments eXchange – FLEXspace – is a robust, open access repository populated with examples of learning spaces. It contains high resolution images and related information that describes detailed attributes of these spaces from institutions across the globe.

A peer-reviewed, open-access journal published biannually, The Journal of Learning Spaces provides a scholarly, multidisciplinary forum for research articles, case studies, book reviews, and position pieces related to all aspects of learning space design, operation, pedagogy, and assessment in higher education.

In Sync: Environmental Behavior Research and the Design of Learning Spaces - https://www.scup.org/page/resources/books/is-ebrdls
For the past decade, SCUPer Lennie Scott-Webber has worked assiduously to comb through the latest behavioral and sociological research relating to how people interact with the built environment. She's taken what used to "sit on shelves in the ivory halls of academe" and has applied it to the physical design of interior learning spaces.
Ball State Interactive Learning Space Initiative -

http://cms.bsu.edu/about/administrativeoffices/educationalexcellence/services/learningspacesinitiative

Ball State University established the Interactive Learning Space Initiative with the purpose of strengthening learning though pedagogy, learning space design, and technology.

University of San Diego collection of learning space resources -

http://www.sandiego.edu/its/teaching/learning_spaces/external_resources.php

A collection of learning space resources including photos and templates for design

The Third Teacher - http://thethirdteacherplus.com/aboutus/

The Third Teacher+ is an educational design consultancy within the global architecture firm, Cannon Design. We’re a multidisciplinary group that looks at the whole picture, the whole ecology of learning. We design learning environments and use design thinking to strategize cultural, pedagogical and organizational change with clients.

MIT iCampus - http://icampus.mit.edu/projects/teal/

Web site with information related to the Technology Enabled Active Learning classroom at the Massachusetts Institute of Technology (MIT).

Iowa State University Innovation Center - http://media-cache-ak0.pinimg.com/originals/98/24/59/982459ddfc1495342545ae0e6e838e55.jpg
An artist’s rendering of the innovation center to be built at Iowa State University

Anderson University Residential MBA program –

http://www.anderson.edu/falls/programs/mba/residential/

The Anderson University Residential MBA program is experiential in nature and employs an intense living-learning approach where program fellows reside in a facility containing dedicated classroom space and a technology-driven small business incubator.

MIT Incubator Learning Space -

http://learningspaces.commons.yale.edu/index.php/MIT_Learning_Spaces

Photographs of learning spaces in various rooms across MIT including a class titled Introduction to Microscale Engineering.

University of South Alabama - College of Medicine Active Learning Center -

http://www.usahealthsystem.com/active-learning-center

With the exception of a few instructional wet and dry labs, classrooms in the College of Medicine were designed to support a traditional lecture style of teaching. The differences between the objectives that drive this type of classroom design versus the desirable features of an active learning facility are irreconcilable. Therefore a new room was designed specifically for active learning.

SCALE-UP Initiative at North Carolina State University - http://scaleup.ncsu.edu/

SCALE-UP stands for “Student-Centered Active Learning Environment with Upside-down Pedagogies.” The basic idea is that you give students something interesting to investigate. While
they work in teams, the instructor is free to roam around the classroom—asking questions, sending one team to help another, or asking why someone else got a different answer.

Case studies for Technology Enhanced Active Learning (TEAL) -
http://web.mit.edu/edtech/casestudies/teal.html

In the TEAL project, Belcher teamed up with Co-Principal Investigators Peter Dourmashkin and David Litster to reformat the teaching of freshman physics at MIT with a new mix of pedagogy, technology, and classroom design. They borrowed from innovations made at other universities, most notably from North Carolina State University's Scale-Up program.

Day to Day Life in a SCALE-UP Room -
http://mediterraneanworld.wordpress.com/category/scale-up/

Teaching History 101 in a SCALE-UP classroom. SCALE-UP stands for “Student-Centered Active Learning Environment with Upside-down Pedagogies.

The 21st Century is Challenging Old Notions of Learning Spaces -

The idea that students must be seated at desks working in rows is quickly becoming archaic. Technology and collaborative work environments are changing the design of learning spaces. Experts hope that the emerging paradigm will translate into improved learning spaces and influence future architectural design.

York University Commons - http://tinyurl.com/khy7rso
A photograph of the University Commons at York University showing their creative designs and unique seating spaces. Students use this space to collaborate and study with one another.


Victoria University, Learning Spaces of the Future by BVN Donovan Hill. Shortlisted for the Education category part of best of Inside Awards 2013.


This facility is an interactive demonstration classroom designed for teaching primary and early childhood students. The flexible classroom includes tables you can write on, modular furniture, an in-built kitchen, wet play areas, an irrigated indoor garden as well as a research space for students.


MAKE SPACE is a new book based on the work at the Stanford University d.school and their Environments Collaborative Initiative. It is a tool for helping people intentionally manipulate space to ignite creativity.


Dr. Lennie Scott Weber discusses the importance of mobility in the classroom. Movement enhances learning and memory, writes David A. Sousa, educator and author in his book, “Mind,
Brain, and Education: Neuroscience Implications for the Classroom” (2010, Leading Edge).

Movement brings more fuel-carrying blood to the brain, and the brain is more active when learners move around.

15 Cool High School and University Building Designs -

If all high school, college and university campuses looked like this, attendance rates would skyrocket. Some may argue that it’s what’s inside that’s important, but there’s no reason for school buildings to be bland, boring boxes. From a big open high school where students lounge on big pillows all day to a university building created by Frank Gehry, these 15 incredible campus building designs may just inspire a whole new generation of innovative architects.


The changes converging on campus are extraordinary. Amidst all the changes in education, both educators and designers of learning spaces are rethinking classrooms, libraries, hallways, common areas and other in between spaces. Learning spaces must now incorporate user-friendly technology, flexible furniture, and other new tools that support active learning. Today, every space on campus is a learning space.

University Learning Spaces - http://media-cache-ec0.pinimg.com/originals/fb/0c/86/fb0c86f5731ea9360783b35f716cd08c.jpg
Highlights movable walls and furniture for pinning ideas and group work. Literally a physical manifestation of Pinterest.

**Designing Learning Spaces in an Online World** -

[http://www.scoop.it/t/cued/p/4015253543/2014/02/03/designing-learning-spaces-in-an-online-world-student-contest](http://www.scoop.it/t/cued/p/4015253543/2014/02/03/designing-learning-spaces-in-an-online-world-student-contest)

A student contest to design the ideal learning space including common areas, formal classrooms, and labs.


A learning space designed for art educators and their students.

**Collaborative Learning Studio at Indiana University** -

[http://citl.indiana.edu/resources_files/teaching-resources1/student-building-015.php](http://citl.indiana.edu/resources_files/teaching-resources1/student-building-015.php)

According to their web site, this learning space is an innovative classroom space that leverages advanced technologies to support collaborative learning in large classes. Students can work as teams at technology-enhanced tables and have their work displayed on a 20-foot wide video wall for sharing with the larger class.

**Cisco Lab at West Kentucky Community & Technical College System** - [http://media-cache-ec0.pinimg.com/originals/46/57/34/4657347024af847dcf5f08bdadefab40.jpg](http://media-cache-ec0.pinimg.com/originals/46/57/34/4657347024af847dcf5f08bdadefab40.jpg)

A student working in the Cisco laboratory at a community college in Kentucky. The student is configuring routers with a workstation.

The About Face Collective is working to create a community rooftop garden and learning space with a twist: the creative structural elements of the garden will be designed and built by local artists and youth using recycled and reclaimed materials. Together with Skate4Cancer's "You Are What You Eat" program, Sketch Working Arts for Street Involved and Homeless Youth, and the Centre for Social Innovation, The About Face Collective will create a unique, inspiring, visually exciting space to promote urban farming, green lifestyles and integrated community engagement.

**Green building Lab at West Kentucky Community & Technical College (WKCTC)** - [http://media-cache-ec0.pinimg.com/originals/fa/7f/cd/fa7fcd0d1181af492cbda67b5dee9ee5.jpg](http://media-cache-ec0.pinimg.com/originals/fa/7f/cd/fa7fcd0d1181af492cbda67b5dee9ee5.jpg)

The green building lab at WKCTC is a learning space where students learn how to build efficiently and conserve energy.

**Learning Spaces Collaboratory** - [http://www.pkallsc.org](http://www.pkallsc.org)

The web site claims the site is a link to what we know about planning learning spaces and what we need to know. The primary goal is to inform the work of campus planning teams with responsibility for shaping, maintaining and renewing undergraduate learning environments—whether the focus be remodeling a single classroom; recycling an out-dated library; renovating for interdisciplinary STEM learning and research; redesigning the landscape/greening the campus; imagining, designing, constructing, and maintaining a major new facility; developing/implementing a multi-year agenda for shaping formal and informal learning spaces campus-wide.
Hack Your Classroom - http://thethirdteacherplus.com/index/#/hack-your-classroom/

Examples of learning spaces designed by faculty members and TheThirdTeacher design team. The picture shown is the Booker T. Washington STEM Academy.

Collaborative Work Wall - https://www.flickr.com/photos/learningspacetoolkit/7401826764/

A picture of the Taylor Family Digital Library Visualization space. This image shows a fully interactive wall of screens at a library.

Nursing Lab at WKCTC - http://media-cache-ec0.pinimg.com/originals/a1/70/60/a170608ce640b5822e4b7f06fa294f2e.jpg

A nursing lab learning space at a community college in Kentucky shows the technology needed to teach today’s nursing students.

University of Maryland Discovery Learning Center -

https://www.youtube.com/watch?v=bcuyHnVRJcE

UMBC's Department of Chemistry, the Office of Undergraduate Education and the Shriver Center worked together to create the Chemistry Discovery Center, a problem-based, high-tech learning lab (University Center, Room 201) focused on cooperative learning. Two years later, pass rates in Chemistry 101 are increasing, fewer students need to repeat the class and faculty have seen additional improvement at all grade levels. The number of majors, second majors and minors in chemistry and biochemistry is growing. And an overall improvement in group skills is also migrating to upper-level chemistry classes.
Noel Studio for Academic Creativity - https://www.youtube.com/watch?v=0Se8TpzCPoo
The Noel Studio is an innovative vision integrating writing, oral communication, and research support in one central space at the heart of Eastern Kentucky University's Crabbe Library.

Steelcase Node Classroom - https://www.youtube.com/watch?v=5Q9uMb0CG7o
Demonstrates how the Steelcase Node chair can change from one mode to the next in a classroom setting.

Example of Poor Power Placement - http://jan.ucc.nau.edu/lrm22/learning_spaces/
A photo showing a power cord running across a hallway. Power placement is an important consideration in learning space design.

MIT TEAL Room -
http://scaleup.ncsu.edu/wiki/pages/12m1C9e6/Massachusetts_Institute_of_Technology.html
The TEAL (Technology Enhanced Active Learning) project at MIT has developed a complete curriculum, including lectures with PowerPoint presentations, lecture notes, problem sets, concept questions for use with personal response polling tools, and extraordinary visualizations (applets, movies, Flash animations). These are freely available from both the iCampus project site as well as the OpenCourseWare 8.02 site. The TLT Group has written a report describing the adoption process in great detail.
Learning Spaces Studio -  
http://wiki.sln.suny.edu/download/attachments/7865020/LearningStudioResearch.jpg

A photograph of a new learning spaces studio at the State University of New York. Tables and chairs with casters and technology are prevalent.

Active Learning Classroom - http://www.classroom.umn.edu/projects/ALCOverview.html

University of Minnesota Active Learning Classrooms (ALCs) are designed to foster interactive, flexible, student-centered learning experiences, and operate using central teaching stations and student-provided laptops. The University of Minnesota ALC is a modification of the “SCALE-UP” (Student Centered Active Learning Environment with Upside-down Pedagogies) concept that originated at North Carolina State University and the TEAL (Technology Enhanced Active Learning) concept at MIT, and uses an adaptation of the Projection Capable Classrooms (PCC) technology system.


The Collaborative Learning Conversation Skills Taxonomy illustrates the conversation skills most often exhibited during collaborative learning and problem solving, based on our studies. The taxonomy is designed to facilitate recognition of active learning conversation. It breaks down each learning conversation skill type (Active Learning, Conversation, and Creative Conflict) into its corresponding sub-skills (e.g. Request, Inform, Acknowledge), and attributes (e.g. Suggest, Rephrase). Each attribute is assigned a short introductory phrase, or sentence opener, which conveys the appropriate dialogue intention.
Inside Active Learning Classrooms - https://www.youtube.com/watch?v=ljT_hoiuY8w

The new Science Teaching and Student Services building at the University of Minnesota will have 10 Active Learning Classrooms. Active Learning Classrooms allow for students to experience a more interactive and conversational educational environment. With round tables for discussion and high-tech accessories for interactivity, these classrooms will service more than 125 class sections this fall.

What is the Flipped Classroom -

An infogram that highlights the issues, trends, and opposing views of the flipped classroom, a teaching method where students watch recorded lectures outside of class and use class time for discussion.

Active Learning Classroom Photo -
http://www.classroom.umn.edu/room_photos/biosc00064.jpg

A photograph highlighting the furniture, technology, and room layout of an Active Learning Classroom at the University of Minnesota.
The Classroom Evolved: Creating an Active Learning Environment -

In the first of a new series of articles focused on classroom design, we take a look at a private high school in Florida that's borrowed ideas from two major universities to create classrooms that support interactive, hands-on learning.

The impact of classroom design on student’s learning -

To what extent can the built learning environment impact on children’s learning? Well, potentially a well designed learning environment can increase the learning progression of a primary school student by as much as 25%. That’s according to a new piece of research by Professor Peter Barrett and his University of Salford team. It’s an important piece of work which has certainly caused a bit of a stir in the UK, prompting the call for a rethink in guidelines for new school buildings, and will no doubt lead to further explorations.

Study Wheel - http://bibliotecasemrede.blogspot.com/2011/01/pecas-de-mobiliario-que-personalizam-as_24.html

An interesting furniture concept at Meadowbank Library in Scotland.

The number of children flowing into the room hasn't stopped at 30, or 35, or even at 50. On the contrary, the average "class size" is 120. The children here aren't even required to sit in a certain seat or face the front of the room, in part because there isn't really a "front" of the room. In fact, the school doesn't have any four-walled classrooms. It has large, well-designed "learning spaces" with bits of wall here and there.


Learning booths look just like booths in a restaurant except with technology enablement and video monitors. They allow students to collaborate easily while not taking much space. A tried and true example of what works one place might work in another.

60 Off-beat Schools - [http://www.trendhunter.com/slideshow/offbeat-schools#48](http://www.trendhunter.com/slideshow/offbeat-schools#48)

From a school inside a cave, to schools where you barter for tuition, to hipster-chic kindergartens, these offbeat schools from around the world defy educational norms. Some of these examples of offbeat schools show creative campuses or study areas, while others were selected to showcase a unique curriculum or method of teaching.

Flexible Learning Space - [http://wiki.sln.suny.edu/download/attachments/7865020/panel+5.jpg](http://wiki.sln.suny.edu/download/attachments/7865020/panel+5.jpg)

A design of a flexible learning layout complete with spill-out zones, sky bridge, rest rooms, and formal/informal learning space areas.

Early Childhood Center in Wassenaar - [http://tinyurl.com/k9jtk92](http://tinyurl.com/k9jtk92)
Rotterdam studio Kraaijvanger has added two new buildings to a school in a suburb of Dutch city, The Hague, with pitched roofs and rustic materials that reference the site's original role as a farm.


The learning studios at Hingaia are exciting to walk around and I can’t wait to return during the day and talk to some children about them. The design represents an important milestone in the design of learning spaces in New Zealand primary schools. In fact I’d argue that the spaces will actually redefine what future classrooms here could look like.

**Colorful Work Spaces** -


This photograph shows the power of color in an informal learning space. The bright yellow chairs really provide a nice contrast to the wall textures and floor coverings.


A photograph of a learning pod within a library allowing teams of students to collaborate in front of a screen in addition to having the ability to have private conversations within their group due to acoustical treatments.
Open Learning Spaces and the Spaces Within -


As we move into finalizing our hub designs, when we think about the spaces within, it’s about exploring a balance between open spaces where shared teaching, collaboration and group work can go on, and at the same time providing a couple of smaller breakout spaces which can be acoustically separated.

Active Learning Space -


A photograph of an active learning space at George Washington College. The space includes round tables, microphones, projectors, and monitors. Furniture includes wheeled chairs and tables that are easy to configure and move around.

Perfect Learning Starts With An Outdoor Learning Space -


We all are very much aware of the fact that outdoor plays enhance physical and mental strength. But are you aware of the fact that outdoor learning is also important as children can students can personally interact with much of what they are learning about? The outdoor learning is not confined to bookish knowledge; it can also be incorporated into art, English, math, science, and physical education.

A photograph showing a social learning space where students can easily interact amongst one another to work on projects or study together. Includes a kitchen area as well as several areas for storage of personal items.

Amphitheatre - http://media-cache-
ec0.pinimg.com/originals/66/c3/b7/66c3b7d22c221eb544a288f3fac20e39.jpg

This design is similar to the massive lecture halls commonly found on campuses of higher education. Not an ideal design for collaborative or active learning.

Lecture Style Room - http://media-cache-
eg0.pinimg.com/originals/19/bc/f4/19bcf40d1cf8474dd39d57cfb3e30472.jpg

A traditional lecture style room used for centuries with well-defined aisles and rows.

Collaborative Table Top - http://jan.ucc.nau.edu/lrm22/learning_spaces/images/informal.jpg

An example of an informal learning space design of a single table with swivel bar stools.


This illustration shows colorful and multifunctional learning spaces at the Vittra school in Stockholm, Scotland.

A significant feature to the design of McMillen High School in Plano, Texas is the creation of wide esplanade hallways that not only accommodate foot traffic but collaborative learning spaces as well.


Very awesome ideas, to make this green office work desk. Not just the green color selection, but also, it is eco-friendly furniture. Include a small bamboo tree on each part of this workplace. To make green atmosphere, natural situation, and fresh air every day. Every office worker will fresh every day with their job.

Bretford on Learning Spaces - [http://www.ryanbretag.com/blog/?p=2630](http://www.ryanbretag.com/blog/?p=2630)

“Learning spaces encourage students to participate, engage, collaborate and acquire the knowledge necessary to survive and thrive in a rapidly changing world. Learning spaces need to be both enticing and flexible, adaptive and engaging, physical and virtual. Planning, designing and providing such spaces is a significant challenge” (Bretford)


A very nice sketch of a potential floorplan in a school. The design has flow diagrams for students moving around the building and appropriate space for transitions.

Amesbury School is a new primary school, the first in Wellington for some 25 years, and will cater for 400 students. The school is to open for the beginning of term of 2012. The design proposal is a response to an aspirational and challenging brief, an absolute commitment to providing the best possible learning and teaching environment, a vision that the built environment be coherent and relevant, and the demanding site constraints.


Temper your jealousy teachers, here are thirty examples of inspirational classroom décor.

Middle School Morning Meeting -
https://www.flickr.com/photos/poughkeepsiedayschool/7937310434/in/set-721576314282122346

A great picture of a round learning space where students can sit within to read privately but still be seen by the teacher.

Active Learning Classroom at the University of Minnesota -
http://www.classroom.umn.edu/cts/assets/av4.jpg

This is another photograph of the active learning classrooms at the University of Minnesota.

Kindergarten Floor Plan - http://www.differentiatedkindergarten.com/

A floor plan for flexible grouping of children, in this case for six year old toddlers.
Transforming our Learning Environment into a Space of Possibilities -

http://myclassroomtransformation.blogspot.ca/2013/09/on-display-maureen-cicinellis-classroom.html?m=1

Maureen Cicinelli from the York Catholic District School Board has kindly shared her thought-provoking spaces of learning with our blog. Maureen is a Full-Day Kindergarten teacher at St. Cecilia Catholic Elementary School in Maple, Ontario.


In this Swedish elementary school, where each student has their own laptop, the furnishings are an extension of the school’s philosophy to stimulate children's curiosity and creativity. The sitting island furniture allow the students opportunities for both collaborative and independent time.

Learning Spaces - Toolkits/Guides


The Learning Space Rating System project provides a set of measureable criteria to assess how well the design of classrooms support and enable active learning activities.

A useful interview tool to use when gathering information on how students behave, convene, and study on campus. Survey tours provide a method for observing students in their preferred settings. The tools provides insight into amenities, aesthetics, resources, study practices, accommodations, and communities in setting outside the classroom.


Based upon proven research and informed by practical experience, this Blended Learning Toolkit will offer guidance, examples, professional development, and other resources to help you prepare for blended learning courses and programs.


A web site developed by Scott Bennett to guide to assist libraries in developing learning spaces. The web site helps colleges and universities define their aspirations for the library and make the case for investment in library space.


The Association of College and Research Libraries (ACRL) and the Library Leadership and Management Association (LLAMA) joined forces to provide a basic framework for architects, planners, and librarians embarking on the planning and design of libraries for higher education. This guide provides information for thinking about the design of new and renovated library
space, and point toward additional resources that can support, inform and enhance the academic library design process.

**Michigan State University “Rooms for Engaged and Active Learning”** -

[http://tech.msu.edu/classroom-technology/real.php](http://tech.msu.edu/classroom-technology/real.php)

Michigan State University’s web site is a guide to create active learning classrooms and provide faculty information on teaching in a collaborative classroom.

**Learning Spaces Collaboratory** - [http://www.pkallsc.org/](http://www.pkallsc.org/)

A guide to inform the work of campus planning teams with responsibility for shaping, maintaining and renewing undergraduate learning environments—whether the focus be remodeling a single classroom; recycling an out-dated library; renovating for interdisciplinary STEM learning and research; redesigning the landscape/greening the campus; imagining, designing, constructing, and maintaining a major new facility; developing/implementing a multi-year agenda for shaping formal and informal learning spaces campus-wide.

**Designing Blended Learning Space to the Student Experience** -


A chapter in Learning Spaces published by Educause. The chapter explores the space design process in the context of today's technological landscape and suggests ways the process can change to become more effective.
The TLT Group (Teaching, Learning and Technology) -
https://sites.google.com/a/tltgroup.org/1111/home

The TLT Group is a not-for-profit that helps college and university educators take advantage of changing technology so they can improve teaching and learning. The TLT Group looks to enable collaboration, support, mutual understanding and communication among key stakeholders in an institution, and use evidence to make better decisions.

JISC InfoKit on Learning Spaces - http://www.jiscinfonet.ac.uk/infokits/learning-spaces/

The JISC InfoKit provides information for educators to use to develop a vision and communicating innovative ideas on learning spaces to others, including methods of evaluation of the space. Case studies provide a wealth of practical hints and tips and is supported by a Flickr image library which shows what is possible and provides suggestions on what you may implement in establishing learning spaces.

Space Design for Active learning - http://mesacc.libguides.com/spacedesign

A guide developed by Mesa Community College as a repository for information regarding the redesign of the library classroom into an active learning classroom. This guide was created to provide access to the resources and "lessons learned” throughout the process of creating an active learning classroom.

Learning Space Toolkit - http://learningspacetoolkit.org/

A resource for designing and sustaining technology-rich information learning spaces. The Learning Space Toolkit includes a roadmap to guide the process along with tools and techniques
for assessing needs, understanding technology, describing spaces, planning and delivering support services, and assembling space, technology, and services to meet needs of a university.

Learning Spaces – Videos Board

Teaching and Learning in Active Learning Classrooms -
http://www.youtube.com/watch?v=xFIDad64j8M
A video produced by McGill University to highlight active learning classrooms. The video demonstrates how four McGill instructors in different disciplines have used the features of McGill's Active Learning Classrooms to engage students and promote active and collaborative learning.

Remake Your Class: building a Collaborative Learning Environment -
http://www.edutopia.org/remake-your-class-collaborative-learning-video
This video shows how designers and community volunteers helped a teacher at Roosevelt Middle School in San Francisco transform his crowded classroom into a space that fosters collaboration, creativity, and active student learning.

Steelcase LearnLab (Design Story) - http://www.youtube.com/watch?v=CnU58hbYN1M
The LearnLab grew out of a user-centered design process developed by Steelcase’s WorkSpace Futures group. The process begins with research to clearly understand end users and their specific needs.
Active Learning Part 3: Giving up Authority - [http://vimeo.com/75889455](http://vimeo.com/75889455)

University of Maryland History Professor Bernard Cooperman suggests that teachers have to "give up authority" in the classroom when they want their students to learn actively. Cooperman proposes that factual knowledge has become trivialized because of the easiness to access information and facts online. Students today, he argues, have to focus on learning how to make solid arguments rather than merely learning facts by heart.

Active Learning in TEAL Classrooms - [http://due.mit.edu/video/player/476](http://due.mit.edu/video/player/476)

TEAL Physics: the class MIT students love to hate. The good, the bad, and ... the rest of it. A documentary by Danbee Kim '09, Mikala Streeter '08, and Chris Varenhorst '09. [TEAL = Technology Enabled Active Learning]

Active Learning Classrooms @ the College of Biological Sciences - [http://www.youtube.com/watch?v=dWjyzT99AWo](http://www.youtube.com/watch?v=dWjyzT99AWo)

The College of Biological Sciences' lecture-less active learning classrooms.

Active Learning Classrooms: Everyone is Engaged - [http://www.youtube.com/watch?v=H7xidmVt0uE](http://www.youtube.com/watch?v=H7xidmVt0uE)

Lynda Fraser and students discuss the impact of room layout on collaboration and student engagement at McGill University.

TILE: Transforming the Classroom Experience - [http://www.youtube.com/watch?v=vvEN4jJ4WUM](http://www.youtube.com/watch?v=vvEN4jJ4WUM)
TILE classrooms at the University of Iowa are transforming the way students interact, learn and engage with coursework.

**Unique Spaces & New Technology Help UK Student Innovate -**

[http://www.youtube.com/watch?v=KITQi243HKU](http://www.youtube.com/watch?v=KITQi243HKU)

Innovative changes to UK's W.T. Young’s Library Reference Services help students create and collaborate both inside and outside of the classroom.

**Space Matters: The Impact of Active Learning Classrooms -**

[http://www.youtube.com/watch?v=OmfQesIT8WI](http://www.youtube.com/watch?v=OmfQesIT8WI)

A video by D. Christopher Brooks explaining the results of research on active learning classrooms at the University of Minnesota.

**Make Space 4 Learning – A Teacher’s Tool Kit -**

[http://www.youtube.com/watch?v=oBPNVLcvwgY](http://www.youtube.com/watch?v=oBPNVLcvwgY)

A teacher's toolkit to transforming their classroom space to meet the needs of their learners by Nathaniel Atherton.

**Robert J Beichner 2011 Prize Winner -**

[http://www.youtube.com/watch?v=MdymI61hLPY&list=PLE8C54256779B374D&index=3&feature=plpp_video](http://www.youtube.com/watch?v=MdymI61hLPY&list=PLE8C54256779B374D&index=3&feature=plpp_video)

Dr. Robert Beichner is an award-winning professor of physics at North Carolina State University and received the Prize for his work at the post-secondary level. Dr. Beichner has changed how
students learn in the science classroom not only on his home campus, but at the more than 100 institutions of higher education that have adopted SCALE-UP, an approach that uses digital technology combined with innovative teaching approaches centered on hands-on activities and roundtable discussions.

**A Library Re-Imagined: From Books Stacks to Creative, Collaborative Learning Spaces** - [https://www.youtube.com/watch?v=s_eCVtLHmEU](https://www.youtube.com/watch?v=s_eCVtLHmEU)

A tour of the Woodruff Health Sciences Center Library of Emory University with library director Sandra Franklin. The renovated space is now about connecting collaborating, and creating as much as it is about books and journals.

**Redefining Future Learning Spaces through Design Interventions** - [https://www.youtube.com/watch?v=Hbu3KhzDkqQ](https://www.youtube.com/watch?v=Hbu3KhzDkqQ)

Judy Chang and Tino Chow discuss the problems education faces today and are looking into using design thinking and implementing physical designs to help improve learning environments in schools in Providence as well it's education.

**Flexible Learning Spaces** - [http://www.youtube.com/watch?v=nmdAXWSPET8](http://www.youtube.com/watch?v=nmdAXWSPET8)

Video detailing the new learning environments in the English Department at The Cooper School, Bicester.

**Retrofitting University Learning Spaces** - [http://www.youtube.com/watch/?v=5OmatV1g8C4](http://www.youtube.com/watch/?v=5OmatV1g8C4)
Gordon Howell outlining some of the findings from "Retrofitting university learning spaces"
Australian Learning & Teaching Council project.

**Verb Active Learning – Dr. Lennie Scott-Webber -**

[http://www.youtube.com/watch?v=xnWtEqyKA4](http://www.youtube.com/watch?v=xnWtEqyKA4)

Dr. Lennie Scott-Webber speaks about the new paradigm in education at an event featuring the Verb classroom collection. Dr. Lennie Scott-Webber guides the research, education, and design applications for Steelcase Education Solutions.

**NC State University’s James B. Hunt Jr. Library -**

[https://www.youtube.com/watch?v=scyQPk6n0xA&list=PLS0FrjS9dbUYoF7P6xeWxjf9jAe4Zo7](https://www.youtube.com/watch?v=scyQPk6n0xA&list=PLS0FrjS9dbUYoF7P6xeWxjf9jAe4Zo7)

The Hunt Library is one of the most technologically immersive learning spaces in the world, give NC State students, faculty and staff access to the high-tech tools to give life to their ideas: giant video walls to display innovative campus work and be a catalyst for large-scale visualization research, videoconferencing and multimedia production facilities to encourage collaboration across locations, all in a beautiful space designed to inspire creativity.

**Pedagogy -** [http://www.youtube.com/watch?v=G1CzHRdRhTk](http://www.youtube.com/watch?v=G1CzHRdRhTk)

A discussion of the role of pedagogy and multi-literacies in the creation of learning spaces by the FLI Channel.

**Flexible Learning Spaces -** [http://www.youtube.com/watch?v=kRSJrN1h3as&feature=youtu.be](http://www.youtube.com/watch?v=kRSJrN1h3as&feature=youtu.be)
Flexible Learning Spaces provides teachers choice in ways they interact with students. Flexible furniture allows student and teachers the ability to easily rearrange the classroom.

**Visions: Next Gen Learning Spaces** - [https://www.youtube.com/watch?v=w6hRSLdx4I8](https://www.youtube.com/watch?v=w6hRSLdx4I8)

Visions takes a closer look at the work being done around The University of Melbourne on learning spaces. This video examines how we can better consider the role of design in education and how technology is just one part of the solution.

**21st Century Learning Environments** - [https://www.youtube.com/watch?v=vIKly3WnFzE](https://www.youtube.com/watch?v=vIKly3WnFzE)

A glimpse at learning spaces of the past and present, with questions about what we would like education to look like for the next century by Emma Stenfalt.

**Bridging Spaces for Learning: Education and Design** -
[https://www.youtube.com/watch?v=hF9oWbR4HPo](https://www.youtube.com/watch?v=hF9oWbR4HPo)

Ben Shapiro discusses the intersection of design and education and the role that each ought to play in the creation of classrooms and other learning spaces in a TEDx talk at Furman University.

**Learning Space - Vendors Board**

**Spectrum Furniture** - [http://media-cache-ak0.pinimg.com/originals/6b/21/95/6b2195b1cfc9a3475c7cc457d23894d1.jpg](http://media-cache-ak0.pinimg.com/originals/6b/21/95/6b2195b1cfc9a3475c7cc457d23894d1.jpg)
Spectrum furniture has a special line of collaborative workstations that are infinitely configurable. Create the perfect center console to manage your collaborative technology of choice and choose from shaped work surfaces to style a table that best suits your environment.

**Servicecaster** - [http://www.servicecaster.com/?gclid=CLji0_Y3bzc0CFcdaMgo6Q4AKQ](http://www.servicecaster.com/?gclid=CLji0_Y3bzc0CFcdaMgo6Q4AKQ)

Servicecaster is a one stop shop for making immobile objects mobile. Tables, desks, chairs, etc. can all be retrofitted with casters to provide a more flexible learning environment at a fraction of the cost for new furniture.


Connectrac In-Carpet Wireways offer discrete and elegant power and technology connectivity in open interior spaces of all kinds.


University furniture for learning centered environments that supports today’s active, learning-centered approaches, whether collaborative, social or co-curricular.

**eInstruction by Turning Technologies** - [http://www.einstruction.com/srs-overview](http://www.einstruction.com/srs-overview)

Turning Technologies provide the latest RF student response systems (clickers), including Pulse, Spark and our IR clickers. Ask a question and track immediate responses. eInstruction provides detailed reports about learner comprehension and progress around curriculum.

Computer Comforts provides furniture solutions for active learning environments.

**Smart Board** - [http://smarttech.com/](http://smarttech.com/)

Smart Board combines the touch capabilities of a SMART Board interactive whiteboard with the crisp visuals of flat-panel display technology to make course material more engaging for students.

**Higher Education Bubble** - [https://www.youtube.com/watch?v=ZAwBN2Q8L14](https://www.youtube.com/watch?v=ZAwBN2Q8L14)

Glenn Reynolds discussed the issues of the cost of higher education.

**Cisco** – [http://www.cisco.com/web/strategy/education/higher_connectedlearning.html](http://www.cisco.com/web/strategy/education/higher_connectedlearning.html)

Cisco's comprehensive solution portfolio of intelligent, network-centric solutions, including video, collaboration, and virtualization, help meet your most-pressing education imperatives for universities.


Everlast Induction Lighting provides indication lighting for educational environments.


As education needs evolved through the years, American Seating has created innovative product solutions for classrooms, auditoriums, lecture halls, cafeterias, libraries, break rooms, conference rooms and administration offices in the K-12 and college and university market.

**Knoll** - [http://www.knoll.com/knollnewsdetail/design-for-learning-spaces-in-higher-education](http://www.knoll.com/knollnewsdetail/design-for-learning-spaces-in-higher-education)
Design services for learning spaces in higher education. Knoll provides furniture solutions for all classrooms found in a university environment.


Smith System is a manufacturer of innovative products that make educational environments more healthy, comfortable and inspiring for students and educators.


Herman Miller is a recognized leading innovator in contemporary interior furnishings, solutions for healthcare environments, and related technologies and services.


KFI Seating provides chairs for all educational environments.


Today, Allsteel provides furniture design focused on innovative, easy-to-use functionality.

**Allermuir** - [http://www.allermuir.net/Default.aspx](http://www.allermuir.net/Default.aspx)

Allermuir offers a comprehensive and diverse collection of products and specialize in supplying furniture for office, conference, reception and corporate environments.

**Haworth** - [http://www.haworth.com/home/technology/workware](http://www.haworth.com/home/technology/workware)
Hayworth provides design services and furniture solutions for education environments. Haworth launched Workware, a set of technology products that supports an uninterrupted exchange of information - essential for communication and creative problem solving in groups.


Steelcase is a leading vendor in creating higher education learning spaces furnishings that offers a comprehensive portfolio of workplace products, furnishings and service. Steelcase’s Higher Education research department has performed several quantitative research studies and found that well designed learning spaces can impact student outcomes.


AGATI works with learning universities, from libraries and information commons, to cafes, student lounge areas, lab and lecture hall, AGATI tailors its furniture to accommodate the higher education.
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March, 2009-2012  Vice President Product (volunteer)
Higher Education User Group
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