The Process of Design for General Classroom Facilities in Higher Education Institutions

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

In

Higher Education

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March 17, 2017

Blacksburg, VA

Keywords: Higher Education, General Classroom Facilities, Process of Design, Grounded Theory, Visual Methods

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Abstract

This study examined the process of design for general classroom facilities in American four-year public higher education institutions. Combining grounded theory, case study methods, visual methods, and portions of the Authentic, Action-Oriented, Framing for Environmental Shifts Method (Watt, 2015), I was able to address the four research questions posed in this study. I conducted interviews with participants involved in specific general classroom facilities design/construction while asking participants to co-create a diagram of the steps of the process. The data collected from this process produced the "Train Model of Design for General Classroom Facilities."

The process begins with the specifics of the institution or college and its chosen direction. The conditions specific to the institution act as a departing station for the process. The conditions specific to the wider context function as the rails on which the train moves. The rails are held together by crossties consisting of the constant collaboration of the triumvirate and stakeholders. A triumvirate consisting of the project manager, the construction manager, and the representative from the academic department move the project through each phase of the design process. These decision-makers functions as the conductor of the train, driving the process while feeding it two distinct types of fuel: budget and time. The triumvirate must continuously monitor the fuel supply to reach the end of the process. In addition, the triumvirate continuously monitors the passengers, to incorporate their feedback into the trip.

The stages of the process function similarly to boarding and disembarking on a train. In Stage 1 you prepare to leave the station. You make a case for what travels on the train with you

and what gets left at home. You also determine the fuel needs of the train by setting the project budget and schedule. Stage 2, or Making the Space, consists of the travel to the final destination, carrying along those well-laid plans from Stage 1. The triumvirate drives the train while carefully monitoring the fuel levels. You can make a few minor adjustments once you have left the stations, based on feedback from the passengers, but drastically altering the plans is not a viable option. The type of train you drive represents the different ways in which the process can play out at specific campuses. A passenger train works differently compared to a freight train. The number and sequence of steps in the process of design will vary depending on the type of project you are undertaking (new construction vs. renovation), the available state procedures, and the timing of your procurement of a construction management firm (i.e. the different types of trains you can take). The final destination of the train is the completed general classroom facility.

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General Audience Abstract

Classrooms are an important component of the quality of education students receive at a particular institution. This study examined the process of design for classroom facilities in American colleges and universities. Interviews were conducted with people who actively engaged in designing and building new classroom facilities at public institutions in the state of Virginia. Participants were asked to make a diagram of the process as part of the interview. Data collected for this study showed that pedagogy and planning for the future needs of the institution are important guiding forces for classroom design at colleges and universities. The findings of this study coalesced in to the Train Model of Design for General Classroom Facilities. Administrators interested in building or renovating classroom facilities at their respective institutions can use this model to better understand the process and how resources can be leveraged to successfully complete a project.

Dedicated to the memory of Mr. Michael J. Kutnak Sr., Mr. Raymond F. McHugh, and Mrs. Dorothy K. McHugh. Though you may not have finished the journey with me, I know you've read every word.

Acknowledgements

I could not have done this without the love and support of my partner Alie Lyon. You were there for me through the highs and lows of this journey. For that, I am forever grateful!

I am also forever indebted to my mother and sister for their love and support. You both pushed me to be the best I could be throughout my life. Thank you for all you did!

Thank you to Dr. Steven Janosik, my chair. You allowed me to be me. You let me be as creative as I wanted and that's exactly what I needed to get this done.

To my committee, Dr. Claire Robbins, Dr. Elizabeth Creamer, and Dr. Ken Smith, thank you for your guidance and support during this process. Each of you played a critical role in my ability to design and execute my study. Thank you for supporting me through this process!

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Chapter One

Introduction

Higher education is the driving force of the American economy and results in several important public goods (Atkinson & Reed, 2000; Carnevale, Hanson, & Gulish, 2013; Davis Bell, 2014; Hazelkorn, 2013; McKiernan, 2012). Unemployment rates in the United States are lower for college graduates than non-college graduates. College graduates on average are healthier, volunteer more, and give to charity more frequently than non-college graduates. Each of these factors contributes to the long term health of the United States' economy (Davis Bell, 2014).

The jobs of today's global economy require a college level education and this trend is projected to continue into the foreseeable future (Carnevale et al., 2013; Farish, 2013; McKiernan, 2012). "By 2020, 65% of jobs will require at least some education or training beyond high school," (Carnevale et al., 2013, p. 13). Workers in the near future will need the ability to solve complex problems using new types of information. Those workers will gain the necessary skills through postsecondary education (Farish, 2013).

Given its importance to the general health of the economy, the federal government and state governments invest large sums of money in higher education (Carnevale et al., 2013; McKiernan, 2012; Mortensen, 2012). The federal government allocated $112 billion in 2012 to student loans (Delisle, 2013). In addition, as a result of higher education tax credits authorized by Congress, $6.6 billion were returned to college students across the United States in 2012 (Delisle, 2013). Through the Post 911 GI Bill, the federal government spent more than $10 billion on veterans engaging in higher education opportunities in 2013 (Glantz, 2014).

States also invest in higher education. In 2010, state and local governmental agencies spent $103.7 billion on higher education (Mortensen, 2012). This included operational funds for public institutions as well as tax credits for citizens and direct financial aid to students (Mortensen, 2012).

Calls for accountability and quality control naturally follow such large investments of money. In the context of higher education, quality is relevant in a variety of capacities (e.g. the academics offered at the institution; the learning that takes place; the overall all ranking of a nation's system of higher education; students' return on investment) (Hazelkorn, 2013, The White House, 2014). Quality related to learning receives significant attention, and for good reason (Armstrong, 2005; Hazelkorn, 2013). Graduates of higher education institutions must be prepared for the challenges of work and life. The primary way to accomplish this goal is through quality learning opportunities (New Leadership Alliance for Student Learning and Accountability [NLASLA], 2012).

Several constituencies in the United States have addressed issues of quality related to learning within higher education. At the federal level, the Obama Administration made quality a high priority within its goals for higher education (Sheehy, 2013; The White House, 2014). Under President Obama, the College Scorecard was launched by the Department of Education in 2013 (Sheehy, 2013; The White House, 2014). The goal of the College Scorecard is to make the quality of particular institutions more transparent to potential students (Sheehy, 2013; The White House, 2014).

Through the Office of Postsecondary Education (OPE), the Department of Education monitors issues related to learning and quality within higher education (United States Department of Education, 2014). The OPE is responsible for monitoring all federal accrediting

agencies (e.g. Middle States Commission on Higher Education, North Central Association of Colleges and Schools, The Higher Learning Commission, and Southern Association of Colleges and Schools, Commission on Colleges) (United States Department of Education, 2014). Accrediting agencies are the designated authorities on the quality of education provided at the postsecondary level in the United States (United States Department of Education, 2014).

Additionally, the Council for Higher Education Accreditation (CHEA) (2012) advocated for accreditation agencies and quality controls within American higher education (CHEA, 2012). One of CHEA's key principles centers on quality assurance within higher education. This body approached quality of learning through the use of standards, monitoring institutions across the country. It is the only nongovernmental organization to monitor regional, faith-based, career-based, or program based accrediting bodies. CHEA is also a major source of information for legislators in the federal government, institutional administrators, accrediting agencies, and the public on a variety of issues related to the quality of learning in higher education in the United States (CHEA, 2012).

At the state level, quality of learning in higher education is also a concern. One method to address quality concerns are policy initiatives such as the Closing the Gaps by 2015 initiative in Texas which incorporate quality assurance measures into policy effecting institutions statewide (Texas Higher Education Coordinating Board [THECB], 2010; THECB, 2014). Other states have used strategic planning tools to address quality issues, as the State Council of Higher Education for Virginia (SCHEV) has done by requiring higher education institutions in Virginia to address quality measures within their strategic plans and goals (SCHEV, 2014a; SCHEV, 2014c). Some states have tied quality concerns directly to funding levels, as in the case of the Ohio Board of Regents for the University System of Ohio (OBRUSO) and Governor John

Kasich's Quality & Value in Higher Education initiative (OBRUSO, 2014). In each case, state leaders were attempting to address important concerns related to the quality of learning taking place at colleges and universities within that particular state.

Clearly, quality within higher education is a concern at the national and state levels. It is also a concern at the institutional level. Administrators have a duty to address issues relating to the quality of learning within their own institution (Duderstadt, 2005; Hazelkorn, 2013; Pecht, 2008). However, administrators have limited resources at their disposal to do so (Duderstadt, 2005; Pecht, 2008; Smith, 2004).

Limited Resources to Address Quality of Learning

Administrators have three resources at their disposal to use when addressing issues of quality related to learning: financial resources, human resources, and physical resources. Financial resources consist of all the available money at an institution (e.g. state funding, tuition and fees collected from students, research grants) and are limited (Bidwell, 2014; National Association of State Budget Officers [NASBO], 2013). Public degree granting institutions within the United States spent a total of $296,114,046 in the 2010-2011 fiscal year, an increase of 5.24% from the previous fiscal year (United States Department of Education, Institute of Education Sciences, National Center for Education Statistics [NCES], 2012a; NCES, 2012b).

Human resources consist of the people who work at the institution (Tracey, 2003). The people implementing educational programs at a particular institution have a direct impact on the quality of those educational experiences (CHEA, 2014; Dew, 2009). A faculty member's activities have clear connections to the quality of the student learning experience. The expertise brought by faculty members and how they convey that expertise in the classroom affects the learning experience of students (Dew, 2009). The leadership of an institution also directly

impacts quality. The leaders of an institution (e.g. the board of trustees, the president, and the provost) set the standards for quality in the context of learning at each institution and influence the students' educational experience. Institutional leaders have the power to steer quality control measures as they see fit and determine the priority level of high quality learning experiences at each individual institution (Dew, 2009).

Finally, administrators at public higher education institutions can use physical resources to impact the quality of learning. Physical resources come in two varieties: the first type consists of the physical spaces found on campus (e.g. buildings, recreational facilities, residence halls, classrooms), and the second consists of all the equipment found on campus (Bady, 2013; New England Association of Schools and Colleges [NEASC], 2014). Physical resources require regular input from the other two resource categories (Bady, 2013; NEASC, 2014; Sapp, 2014). Buildings and equipment at an institution require the input of financial and human resources for purposes of planning, utilization, and maintenance. Failing to invest appropriate amounts of either financial or human resources into an institution's physical resources can negatively influence the quality of student learning at that institution (NEASC, 2014; Strange & Banning, 2001; Sapp, 2014).

The types of spaces and equipment found at a particular institution will directly contribute to the quality of learning that takes place at that institution (Fink, 2004; Harris & Holley, 2008; NEASC, 2014; Sapp, 2014; Strange & Banning, 2001). Physical space has particular significance for learning quality. Physical space, or the physical environment, has a profound effect on what actions take place in a given location and how those actions are perceived, understood, interpreted, and relayed by the participants and observers of those actions (Block, 2008; Foucault & Miskowiec, 1986; Strange & Banning, 2001; Thrift, 2006). Higher

education institutions contain a wide variety of physical spaces. However, it is the spaces specifically designated for academics that most directly impact the quality of learning taking place at an institution (Bady, 2013; Fink, 2004; Harris & Holley, 2008; NEASC, 2014; Strange & Banning, 2001). Academic spaces consist of any physical space found at a higher education institution specifically intended for learning (e.g. classrooms, laboratories, study rooms, etc.). The most basic unit of academic space is the general classroom. The Postsecondary Education Facilities Inventory and Classification Manual defines general classroom facilities as "a room or space used primarily for instruction classes and that is not tied to a specific subject or discipline by equipment in the room or the configuration of the space" (Cyros & Korb, 2006, p. 49). General classrooms facilities used for educational activities have a direct impact on the learning that takes place within those spaces.

General Purpose Classrooms and Quality of Learning

The design of the physical environment is of critical concern to institutional administrators interested in maximizing quality of learning experiences (Strange & Banning, 2001). The physical environment influences access to learning opportunities, participation in learning experiences, the types of learning opportunities offered and the overall quality of those learning experiences (Block, 2008; Hanafin, Shevlin, Kenny, & Neela, 2007; Harris & Holley, 2008; O'Connor & Robinson, 1999; Strange & Banning, 2001). By directly influencing the design of the environments and spaces in which learning take place, (i.e. the general classroom facilities of the campus), college and university administrators can harness all three resources available in one physical location to influence the quality of learning at an institution (Harris & Holley, 2008; Strange & Banning, 2001).

Problem Statement

In summary, higher education has a major impact on the United States economy (Atkinson & Reed, 2000; Carnevale et al., 2013; Davis Bell, 2014; Hazelkorn, 2013; McKiernan, 2012). As a result, both the federal government and the states invested heavily in higher education across the United States and demand quality in return for those investments (Delisle, 2013; Glantz, 2014; Mortensen, 2012). In higher education, quality has many connotations, most importantly in relation to learning (Armstrong, 2005; Hazelkorn, 2013). The quality of learning in higher education is a concern at the national, state, and institutional level (Hazelkorn, 2013; NLASLA, 2012; The White House, 2014).

Administrators at the institutional level have three main resources at their disposal to address quality of learning: financial, human, and physical (Bady, 2013; Bidwell, 2014; CHEA, 2014; Dew, 2009; NASBO, 2013; NEASC, 2014; Sapp, 2014; Strange & Banning, 2001; Tracey, 2003). Financial resources are the money available to institutional administrators (Bidwell, 2014; NASBO, 2013). Human resources consist of the people at the institution (Tracey, 2003). Physical resources consist of the equipment and the spaces and facilities found at an institution (Bady, 2013; NEASC, 2014; Sapp, 2014). General classroom facilities are one type of physical resource specifically connected to learning that has a large impact on learning quality at a particular institution (Block, 2008; Hanafin, et al., 2007; Harris & Holley, 2008; O'Connor & Robinson, 1999; Strange & Banning, 2001).

Some research exists on the design of learning environments within a higher education context. Researchers have explored whether to build new or renovate existing structures on college campuses (Blanchette, 2010; Harris & Holley, 2008; Kennedy, 2001). They have studied the design of higher education learning environments in digital spaces (Strange &

Banning, 2001). However, little research exists on the process for design of general classroom facilities at public higher education institutions. With such a direct connection to the learning that takes place at a college or university, the design of general classroom facilities is an important consideration for a variety of constituents. Yet, this topic is understudied. There is a need to understand how people at public higher education institutions approach the design of general classroom facilities. This study attempted to fill that gap by generating a theoretical model for the design of general classroom facilities at public higher education institutions.

Purpose Statement

This grounded theory multiple case study explored the design process for general classroom facilities at four-year public higher education institutions. Specifically, the purpose of this study was to develop a theoretical model to explore what factors are most influential to the design of general classroom facilities, who has a role in the process, how that process plays out in real time, and what explains differences in how the process is implemented in different settings. Grounded theory provides the most appropriate strategy for addressing my research questions.

Grounded theory methods allow a researcher to construct theories based on qualitative data collected within a study (Charmaz, 2014). The constructed theories are "'grounded' in the data themselves" (Charmaz, 2014, p. 2). The collected data act as the foundational basis for any construct or theory the researcher generates (Charmaz, 2014). Grounded theory gives researchers strategies for developing theories about the worlds they study (Charmaz, 2014).

Grounded theory has traditionally emphasized the study of processes (Charmaz, 2014). A process is a series of events connected in time that have clear starting and ending points and that lead to some form of change (Charmaz, 2014). My study focuses on the process of

design/construction for general classroom facilities in American four-year, public higher education institutions. This is a time-based process that is influenced by the context in which it operates. This is another reason grounded theory fits this research study.

Case studies allow the researcher to analyze how and why questions and develop a wider theoretical model (Abma & Stake, 2014; Baxter & Jack, 2008; Yin, 2003). By using multiple cases, I was able to draw comparisons across cases (Eisenhardt & Graebner, 2007; Yin, 2003). This yielded more robust findings, a key feature of multiple case study designs (Eisenhardt & Graebner, 2007).

I conducted interviews with people responsible for the design of general classroom facilities at different public higher education institutions that had recently constructed general classroom facilities using a "talk out loud" protocol. This allowed me to better understand what considerations influence the process of design/construction of general classroom facilities at higher education institutions in the United States. Four research questions guided this research.

Research Questions

The following research questions were used to guide this study:

1. How do those most responsible for facilities describe the steps or phases of design for general classroom facilities at public higher education institutions?
2. How do those most responsible for facilities describe the conditions specific to the institution and the wider context that contribute to the design process of general classroom facilities at public higher education institutions?
3. How are financial and human resources used/leveraged to influence the design of general classroom facilities?

4. How do those most responsible for facilities explain how the process is implemented at different institutions?

Significance of the Study

Several campus constituencies may benefit from this study. One such group included chief academic officers. Study results provided these administrators with data on factors influential to the design of general classroom facilities. These administrators have a direct interest in the quality of learning that takes place at an institution (Dew, 2009). Chief academic officers commissioning new general classroom facilities might incorporate these results into future campus projects.

Another group included chief facilities officers. This study provided these administrators with data on how financial resources affected the design of general classroom facilities. These administrators are responsible for the upkeep and maintenance of each space. Chief facilities officers could use this information when planning operations for new facilities.

A third group of constituents who benefited from this study were university architects. This study provided these people with data on factors influential to the design of general classroom facilities. This information could be used in the design of future campus spaces.

Future Practice

This study has implications for future practice. At the institutional level, data from this study could influence the composition of an institution's campus master planning committee. A campus master plan is a strategic plan that lays out the capital expenditures for an institution for a given period of time. By understanding who the key players are in the design of general classroom facilities on public college campuses, specific institutions can ensure that committees tasked with producing campus master plans are staffed with the appropriate personnel.

Findings from this study could also influence the planning process for new construction itself at individual institutions. By understanding the key steps and phases in the design/construction of new general classroom facilities, specific institutions can tailor the individual planning processes used to better reflect the key elements of overall design process. This could allow individual institutions to streamline their own processes or add in additional steps to make them more comprehensive.

Findings from this study could also influence the time it takes to complete a specific campus construction project. By understanding the role of funding and personnel in the design of general classroom facilities, administrators responsible for capital outlay projects could better plan for how and when to use the different resources available to them. This could influence how long projects take to complete in real time.

Future Policy

This study had implications for future policy. At the institutional level, administrators responsible for facilities policies could benefit from the findings of this study. The results provided those policy makers with data on the concepts and ideas influential in the design of general classroom facilities. Administrators responsible for facilities policies may use this information when crafting requests for proposals for campus construction projects.

Also at the institutional level, administrators responsible for compliance with federal regulations related to physical access could benefit from the findings of this study. The results of this study provide administrators with information on how federal regulations influence the design of general classroom facilities. Administrators responsible for compliance with federal physical access regulations could use this information when reviewing building plans.

At the state level, legislators responsible for state policy related to funding of higher education construction projects could benefit from the findings of this study. These results provide policy makers with data on how financial resources influence the design process. Legislators could use this information when distributing state funds to higher education institutions.

Future Research

This study also had significance for future research. My study examined the concepts administrators found influential to the design of general classroom facilities. Future research might explore the concepts administrators find influential to the design of other campus facilities, such as residence halls. This would expand the information available on designing physical environments within a higher education context beyond general classroom facilities.

This study used qualitative research methods. A future study could use confirmatory quantitative methods to survey administrators responsible for the design of general classroom facilities at public higher education institutions. This would help to confirm the theory generated in my study.

Finally, my study examined the design of general classroom facilities at public higher education institutions. Future research could conduct a qualitative study of the concepts influential to the design of general classroom facilities at private institutions. This would expand the knowledge related to the design of general classroom facilities beyond public institutions.

Delimitations

Delimitations exist for all research studies; this study was no different. The first delimitation related to the data. All data came from self-reported responses to interview questions. Participants had to rely on recall to answer the interview questions and to supply

candid responses. Recall depends on a participant's memory that can be incomplete, unreliable, and/or biased (Hassan, 2006). Other data collection methods could have produced different responses.

A second delimitation related to the boundaries of each case used in this study. Because boundaries define the cases, they are a critical component of the case study research design (Baxter & Jack, 2008). The boundaries for the cases consisted of public higher education institutions located within the same state (place) where new general classroom facilities were designed and or constructed on campus (activity) between January 1, 2012, and January 1, 2016 (time). These boundaries were chosen to ensure that cases used in the study were studied under similar economic and state regulatory conditions. It is possible that had the cases used different boundaries, the findings may have differed.

This study's third delimitation related to the sample. The cases chosen in this study all focused on general classroom facilities. It is possible general classroom facilities have unique considerations related to the design not found in other types of spaces. Each type of space on campus has a different use and function, creating different design demands and considerations (Fink, 2004; Harris & Holley, 2008). If different types of spaces found on campus were examined, the findings may have varied.

Organization of Study

The present study will use an alternative dissertation format offered by the Higher Education program at Virginia Tech. Rather than write traditional Results and Discussion chapters, students may write two articles of sufficient quality to be submitted for review by a refereed publication. The present study, therefore, is organized around five chapters. The purpose of the study and its significance were introduced in Chapter One. A review of the

sensitizing concepts for this study is presented in Chapter Two in the form of an annotated bibliography. Chapter Three provides a description of the methodology, including a description of grounded theory methods, the sampling technique, and how the data were collected and analyzed. Chapter Four reports the findings of the study. Chapter Five examines the methodology used in this study in detail and its impact on the findings. Chapters Four and Five take the form of stand-alone chapters ready for submission to appropriate journals.

Chapter Two

Annotated Bibliography

The Higher Education program at Virginia Tech offers doctoral candidates an alternative dissertation format. In this format students write two articles of sufficient quality to be submitted for review by a refereed publication, rather than write traditional Results and Discussion chapters. The articles I wrote for this study are based on the methods used within the study and the most compelling findings of the study. As a result, I wrote literature reviews in each of my additional articles and did not include a full literature review in this chapter.

The purpose of this chapter is to provide annotated summaries of the literature that inform this study. The citations in this chapter consist of journal articles, books, and policy documents that influenced my approach to this study. I have organized this chapter around the key themes that helped formulate this grounded theory study. A justification for this process is offered in the next section.

Sensitizing Concepts

Grounded theory methods differ from other qualitative methods in regards to literature reviews. The purpose of a grounded theory inquiry is to generate theories and models of a particular phenomenon or process from the data collected (Charmaz, 2014). To avoid being overly biased or colored by previous thought and ideas, grounded theorists conduct extensive literature reviews after collecting and analyzing their data (Charmaz, 2014).

Researchers do however use sensitizing concepts when conducting grounded theory inquiries. Sensitizing concepts consist of the ideas, background assumptions, and disciplinary backgrounds a researcher has before beginning the study (Charmaz, 2014). They "give you initial ideas to pursue and sensitize you to ask particular kinds of questions about your topic,"

(Charmaz, 2014, p. 16). These concepts provide a general framework from which to build the study and the research questions (Charmaz, 2014). The following sections of this chapter consist of the sensitizing concepts for this study and the annotated citations for each concept.

Sensitizing Concepts Related to Higher Education and the Economy

Atkinson, R., & Reed, C. B. (2000, October 4). Higher Education Helps Drive the Economy. *Los Angeles Times*. Retrieved from: https://escholarship.org/uc/item/7gz3x2wx

Higher education has a significant impact on the economy. Systems of higher education act as the connection point between a state's educational system and its economy. Today's economy is increasingly becoming information based. As a result, employers are more reliant on higher education institutions to produce qualified graduates who are prepared to work in an information rich environment.

Carnevale, A. P., Hanson, A. R., & Gulish, A. (2013). *Failure to launch: Structural shift and the new lost generation*. Retrieved from https://georgetown.app.box.com/s/8tchnjo0wq9meamwwn5f

Higher education has a direct connection to the labor market and the economy of the United States, which is changing with the current generation of students. Students are now delaying their entry into the labor market and working longer in the market once they enter. In the 21st century information economy, the phases of education, work, and retirement are no longer sequential, but expected to take place throughout one's life. As a result, the authors suggest traditional aged students must mix work with learning at earlier stages in life to help accelerate their launch into full-time careers while older adults need a less abrupt transition out of careers and into retirement that features a more flexible phase of work before full-fledged retirement.

Davis Bell, J. (2014). *Getting what you paid for: Higher education and economic development.* Retrieved from http://www.wiche.edu/info/gwypf/bell_economicDevelopment.pdf

Higher education and economic development are linked. States examine their higher education systems to train and develop the workforce of tomorrow. An educated citizenry costs less to the state and generates more economic productivity for the state's economy. As a result, states are now approaching higher education policy as investment strategies for economic growth and development. States are using a variety of policy measures to increase access and quality with the intent of have more college graduates in the end.

Farish, D. J., (2013, December 3). The jobs of tomorrow require a college degree – Or do they? [Web log comment]. Retrieved from http://rwu.edu/about/blogs/president/jobs-tomorrow-require-college-degree-%E2%80%93-or-do-they#sthash.AHgG1T0T.dpuf

The economy and job market of today has largely changed from what it was just decades ago. More middle range skill positions are becoming automated, leaving manual labor jobs and those that require a college degree. As the job market shifts, higher education is faced with the challenge of training workers for these new jobs. The workers of today's economy must be able to handle multiple forms of complex information and make meaning from it in real time. They must be flexible and able to problem solve. To gain those skills, works must attend college.

McKiernan, H. H. (2012). Higher education and the American workforce. *Trusteeship*, *20*(3), 26-31.

Higher education has a profound impact on the American economy. Colleges and universities today are training the workers of tomorrow. These institution need to meet the challenge of providing high quality degrees to an ever diversifying population. Governing boards for colleges and universities need to focus on how they can encourage completion while also maintaining

high levels of quality. In addition they should examine learning outcomes to make sure that quality educational experiences are taking place on campus. Doing so will positively affect the economic future of this country.

Sensitizing Concepts Related to Government Investment in Higher Education

Delisle, J. (2013, February 27). Putting a Number on Federal Education Spending. *The New York Times*. Retrieved from http://economix.blogs.nytimes.com/2013/02/27/putting-a-number-on-federal-education-spending/

Delisle (2013) determined that in 2012, the federal government spent $107.6 billion dollars on education. However, this is only one eighth of what was spent on social security, and only one fifth of what was spent on Medicare. The total amount spent on education was only about 3% of the $3.5 trillion budget. In actuality, the majority of the funding for education in the United States comes from the state and local level.

Glantz, A. (Reporter). (2014, July 7). Is G.I. Bill benefitting for-profit colleges instead of helping veterans? *PBS News Hour*. [Webcast]. Roanoke, VA: PBS. Retrieved from http://www.pbs.org/newshour/bb/gi-bill-benefitting-profit-colleges-instead-helping-veterans/

The federal government has committed vast sums of money toward higher education, especially in relation veterans. The new G.I. Bill has provided funding to thousands of veterans for higher education. As a result, the federal government has an interest in matters related to quality. Specifically, the federal government is investigating whether or not for-profit institutions should be eligible to receive federal financial aid. For-profit institutions received billions of dollars in G.I. Bill money and federal financial aid, yet are not producing graduates. Congress is

struggling to regulate this industry. Both the department of defense and department of education have no way to evaluate the quality of the education students are receiving.

Mortensen, T. (2012). State funding: A race to the bottom. *Presidency*, *15*(1), 26-29.

States invest large sums of money into higher education. In 2010, states invested more than $100 billion dollars. This number is down from previous years, showing a trend among states to reduce their investments. If the current trends continue, states may reduce their investment into higher education to nothing by 2059. This trend could have consequences for governance, policy, and the quality of an education received at each institution.

Sensitizing Concepts Related to Quality in Higher Education

At the National Level

Sheehy, K. (2013, February 13). How to use Obama's college scorecard. *U.S. News and World Report.* Retrieved from http://www.usnews.com/education/best-colleges/articles/2013/02/13/how-to-use-obamas-college-scorecard

President Obama's College Scorecard is an interactive tool designed to give potential students and parent critical information to aid in the decision of which college to choose. The Scorecard reports an institution's cost, rates of graduation, default rates for student loans, and the average amount borrowed by current students at that institution. However, the Scorecard is lacking on information related to employment rates for graduates or their average salaries.

The White House. (2014). *Higher education.* Retrieved from http://www.whitehouse.gov/issues/education/higher-education

The Obama administration has made quality with higher education a top priority for its postsecondary education policy. As the economy continues to grow, the jobs of tomorrow will require education beyond high school. Therefore, the American system of higher education must

strive for the highest quality learning experiences possible. The administration has focused on four main goals: making college more affordable for middle class students and families, strengthening the nation's community system, lowing costs at all institutional types, and improving transparency and accountability. By focusing on these areas, the Obama administration hopes to improve the quality of American higher education.

At the State Level

Ohio Board of Regents. (2014). *Quality & value in higher education.* Retrieved from https://www.ohiohighered.org/quality-and-value

The Quality & Value in Higher Education Initiative is one initiative proposed by the office of Governor John Kasich of Ohio. The quality of learning taking place within Ohio's post-secondary institutions is of great concern to the Governor's Office. This initiative was designed to help Ohio legislators and post-secondary institutional administrators in the state address matters of cost, quality, and access in higher education. The Governor intends this initiative to be a starting point for discussions related to quality and reform within the state's higher education system. The Governor plans to bring together higher education leaders with business and industry leaders in Ohio to begin a dialogue around what changes are needed to the current system.

State Council of Higher Education for Virginia. (2014b). *Strategic plan for higher education.* Retrieved from http://www.schev.edu/schev/StrategicPlan.asp

The State Council of Higher Education for Virginia (SCHEV) is charged with creating a strategic plan for the state in regards to its higher education institutions and the quality of learning taking place at those institutions. Virginia's strategic plan includes a mission statement, vision, and four goals for the state's higher education system. The four goals include affordable access for

all citizens, optimization of students' success for the demands of work and life, let innovation drive change and improvement, and to advance the economic and cultural prosperity of the Commonwealth.

Texas Higher Education Coordinating Board. (2010). Accelerated *plan for closing the gaps by 2015*. Retrieved from http://www.thecb.state.tx.us/reports/PDF/2005.PDF?CFID=19643632&CFTOKEN=39013598

The Closing the Gaps by 2015 (CG) Initiative developed by the Texas Higher Education Coordinating Board. CG set specific statewide goals of increasing access and participation in higher education, increasing completion rates for all levels of higher education programming, growing the number of nationally recognized programs within Texas, and increasing the states participation in federal science and engineering research programs. The overall goal of this program is to strengthen and grow the number of quality educational programs within the state.

At the Institutional Level

Armstrong, N. (2005). *The role of institutional mission and institutional effectiveness in Southern Association of Colleges and Schools reaffirmation of accreditation.* Retrieved from https://www.utexas.edu/provost/sacs/pdf/SACS%20Position%20on%20Planning%20and%20CQI.pdf

Armstrong (2005) notes the importance of an institution's mission in the reaffirmation of accreditation process. Institutional missions set the direction for a college or university. More mission statements are being written today that address the goal of improving the quality of

learning taking place on campus. This plays a critical role any institutions process for accreditation renewal.

Duderstadt, J. J. (2005). The future of higher education in the knowledge-driven, global economy of the 21st century. In G. A. Jones, P. L. McCarney, & M. L. Skolnik (Eds.). *Creating knowledge, strengthening nations: The changing role of higher education* (pp. 81-101). Toronto, Canada: University of Toronto Press.

To prepare students for a knowledge driven economy, higher education administrators have limited resources at their disposal. While it is their duty to ensure quality educational experiences that prepare students for jobs yet to be created, they must also balance the realities of limited budgets and personnel capable of meeting the challenge. Therefore, administrators must be adept at leveraging what resources they have to meet the new demands of a knowledge-based economy.

Hazelkorn, E. (2013, May 23). Has higher education lost control over quality? *The Chronicle of Higher Education.* Retrieved from http://chronicle.com/blogs/worldwise/has-higher-education-lost-control-over-quality/32321

Quality in higher education is a hot topic and no longer the sole propriety of higher education administrators. As higher education increasingly becomes the driver of national economies, governments are increasingly involving themselves in matters related to quality. As a result the traditional role of higher education administrators as the stewards of quality has been usurped. The author suggests that if administrators do not want to be totally left out of the process, they need to work together to find ways of demonstrating quality that meet the demands of an increasing number of external constituents.

New Leadership Alliance for Student Learning and Accountability. (2012). *Assuring QUALITY,*

An institutional self-assessment tool for excellent practice in student learning outcomes assessment. Retrieved from http://www.chea.org/alliance_publications/assuring%20quality-pdf%20version.pdf

Due to the importance of higher education to our economy and society, demands are being placed on higher education institutions to offer more degrees that cost less and can be earned as quickly as possible. This document is a self-assessment tool designed by the New Leadership Alliance for Student Learning and Accountability for administrators at colleges and universities to identify their strengths and weaknesses with regard to assessing the quality student learning taking place at the institution. The guide was developed using four principles: colleges must be able to demonstrate learning has occurred and that graduates are actually prepared for life beyond the institution; self-regulation is an important component of quality assurance; assessment methods must be specific to the institution; and assessment should be used as a means of improvement and not just lateral comparison. The assessment uses 29 criteria to assist administrators with a formative evaluation of the quality of learning taking place on campus.

Sensitizing Concepts Related to the Use of Resources in Higher Education Institutions

Bidwell, A. (2014, April 21). Colleges get more state funds, but rely on tuition. *U.S. News & World Report*. Retrieved from http://www.usnews.com/news/articles/2014/04/21/states-increase-higher-education-spending-rely-on-tuition-in-economic-recovery

American colleges and universities today are increasingly relying on tuition as the main source of funding. State institutions do not adjust to increasing funds from other sources by lowering tuition rates. Instead, they are relying more than ever on tuition dollars directly from students. A new normal has emerged requiring ever-increasing financial burden for students while asking

institutions to increase productivity with less input, all while maintaining high levels of quality. This requires institutions to use their financial resources in different ways from the past.

Council for Higher Education Accreditation. (2014). An examination of the changing faculty: Ensuring institutional quality and achieving desired student learning outcomes. CHEA Occasional Paper. Washington, DC: Institute for Research and Study of Accreditation and Quality Assurance, Council for Higher Education Accreditation.

The faculty found at higher education institutions today is vastly different from that of previous decades. Most faculty members are non-tenure track and receive little institutional support. In addition, the traditional three rolls assigned to faculty (teaching, research, and service) are now disaggregated into individual positions. Research has demonstrated that this change in faculty has negative consequences for quality. Institutional and student outcomes are negatively impacted by this arrangement. Due to accreditation's role in quality assurance within higher education, the authors suggest accreditors focus more attention on the changes in support and composition of institutional faculty.

Dew, J. (2009). Quality issues in higher education. *The Journal of Quality and Participation, 32*(1), 4-9.

Leadership has a dramatic effect on the quality of education found at higher education institutions. A leader's vision sets the course for the institution and drives what takes place there. The attention leaders pay to matters of quality greatly influences how an institution will address matters related to quality. Changes in leadership can impact improvements or declines in quality.

National Association of State Budget Officers. (2013). Improving postsecondary education

through the budget process: Challenges & opportunities. Retrieved from http://www.nasbo.org/sites/default/files/pdf/Improving%20Postsecondary%20Education%20Through%20the%20Budget%20Process-Challenges%20and%20Opportunities.pdf

The present financial models used within American higher education are in need of reform. Enrollments are predicted to continue to grow, while the support received from the state level is shrinking and being allocated with more requirements related to quality control than ever before. Institutional administrators will need to work with state legislators even more closely to address with the financial challenges facing higher education. Opportunities for change could involve designating funding that is tied to performance, ascertaining the appropriate role of tuition in the process, or implementing cost reduction policies at the state and institutional level. To get the process started, states should align their public goals with institutional missions, consider developing separate funding strategies based on the type of institution, rework funding formulas to account for current needs of institutions, and develop ways to control growth of spending on items related to employee benefits.

Pecht, J. (2008). Quality endeavors. *Planning and Institutional Assessment, 107.* Retrieved from http://www.opia.psu.edu/print/78

The management of resources on campus is of importance to institutional administrators across the country. Resources are limited and it is often hard to say no to some well-meaning constituency on campus demanding more resources. However, given the universal nature of this challenge, the success or failure of any institution could lie solely in the hands of those administrators making decisions about resource management. Successful resource management results directly from open lines of communication between all levels, a shared sense of mission

and purpose, and the ability of administrators to incorporate resource management into the cultural norms of the institution.

Smith, M. F. (2004). Growing expenses, shrinking resources: The states and higher education. *Academe*, *90*(4), 32-35.

Higher education institutions face a crisis of financial resources. States are changing the way post-secondary institutions are funded, causing many institutions to consider going private rather than rely on state legislators' benevolence. One cause for this problem is obsolete tax systems found in many states. According to the authors, some states have overcome political pressures and addressed outdated taxation systems, such as Virginia, while other states, such as Colorado, have failed to make any meaningful changes in their taxation or higher education funding system. As a result, more and more institutions across the nation are relying on student tuition to fill the gaps.

Sensitizing Concepts Related to Space

Foucault, M., & Miskowiec, J. (1986). Of other spaces. *Diacritics, 16*(1), 22-27.

Foucault (1986) discusses the concept of a heterotopia, a different kind of space that is a real place, but creates some contrast or suspension of how it would normally be conceived. A zoo is an example, where animals of all types that would never live in close proximity in the wild are living side by side. Heterotopias have six main characteristics. First they appear in every culture. Second, their function can change over time or depending on the context. Third, they can oppose different places in the same place. Fourth, heterotopias separate us from our normal time. Fifth, each heterotopia maintains a boundary that both isolates and connects it from other spaces. Finally, these spaces create an imaginary order, which stresses the fact that this place could not exist elsewhere.

Thrift, N. (2006). Space. *Theory, Culture & Society, 23*(2-3), 139-146.

Thrift (2006) proposes that whenever discussing space one must root one's approach in four concepts: everything is spatially distributed; there is no such thing as a boundary; every space is in constant motion; and there is no one kind of space. From there one can begin to imagine different ways of conceptualizing space and its effects on the inhabitants of that space. Thrift then discusses three different conceptualizations of space: whale singing and the space used in conjunction with that purpose, the British Empire in India and how it was able to simultaneously dominate and segregate the spaces under its control, and the necessities of performance the systems and the spaces they occupy. His intent is to expose readers to different conceptions of space that may not have been thought of in the past. When one thinks of spaces in new and different ways, one is able to better understand how more common spaces impact their inhabitants.

Sensitizing Concepts Related to the Planning of Physical Environments in Higher Education Institutions

Bady, S. (2013, January 2). Trends Report: New facilities enhance the quality of campus life. *Building Design + Construction.* Retrieved from http://www.bdcnetwork.com/issue/2013/01/january-2013

Bady (2013) discusses the increasing proliferation of high quality nonacademic facilities at colleges and universities across the United States. In an effort to more holistically approach educating students, many of these facilities are designed to incorporate academic life with social life. Administrators are specifically planning and designing facilities that meet multiple sets of needs for students. This has an impact on the quality of the programs and services offered by the institution as well as the learning experienced by the students at the institution.

Blanchette, S. (2012). Space & power in the Ivory Tower: Effective space management and decision making – what's the problem and what's the process? *Planning for Higher Education, 41*(1), 64-74.

Blanchette (2012) examined decision-making processes for space management in higher education institutions. Findings indicate that having a well-defined decision-making process used by knowledgeable decision makers is critical to the successful management of space at higher education institutions. Decision makers must have access to accurate data, both qualitative and quantitative, to aid in the decision making process.

Block, P. (2008). *Community: The structure of belonging*. San Francisco: Berrett-Koehler Publishers.

Block (2008) contends that the physical environment has a profound impact on the activities that take place within a particular space and the sense of community developed by the users of that space. Physical space serves as a metaphor for the larger intended community; what is included and excluded speak to who is and who is not part of the community. How a room is set up and how individuals interact with that set up have a profound impact on what can come from those interactions.

Cyros, K. L., & Korb, R. (2006). *Postsecondary education facilities inventory and classification manual (FICM): 2006 Edition*.

This manual classifies different spaces and facilities found at higher education institutions in the United States. This document provides a standard definition for general classroom facilities that is recognized across institutions.

Fink, I. (2004). Research space: Who needs it, who gets it, who pays for it? *Planning for Higher Education*, *33*(1), 5–17.

Fink (2004) examines multiple space management approaches to university research space. Findings suggest that institutions vary in their approaches to handling decisions related to research space allocation and funding based on the mission, institutional priorities, and operational culture. Regardless of approach, institutional administrators report their decisions having a profound impact on students and employees, the end users of the space.

Hanafin, J., Shevlin, M., Kenny, M., & Neela, E. (2007). Including young people with disabilities: Assessment challenges in higher education. *Higher Education*, *54*(3), 435-448. doi: 10.1007/s10734-006-9005-9

Researchers examined the assessment challenges faced by students with disabilities in higher education. The findings suggest the physical environment of a higher education institution has a profound impact on the students during tests and exams. Rationed installation of key features such as ramps and toilets created obstacles for students with disabilities not experienced by students without disabilities. The researchers conclude that the physical spaces used for assessment must be carefully planned so as to ensure equity for all students who use those spaces.

Harris, M. S., & Holley, K. (2008). Constructing the interdisciplinary ivory tower: The planning of interdisciplinary spaces on university campuses. *Planning For Higher Education*, *36*(3), 34-43.

Harris and Holley (2008) examined how colleges and universities administrators plan and cultivate interdisciplinary spaces on campus. Findings suggest that organizational culture and a well-defined institutional strategy, lead to more successful creations interdisciplinary spaces. The authors conclude that interdisciplinary space is necessary for true interdisciplinary

engagement to take place. The actual physical spaces designated as interdisciplinary have a profound impact on students and faculty engagement in interdisciplinary work.

Kennedy, M. (2001). The top 10 facility design and planning solutions. *American School & University, 73*(5), 30-37.

Kennedy (2001) discusses trends in facility design for educational institutions. How a space is designed will dictate what activates can take place in that space. Therefore, spaces must be designed in such a way as to meet the current needs of students while also be flexible enough to adapt to unforeseen changes. Kennedy (2001) suggests dual purposing spaces to provide both operational and educational functionality. In addition, the author suggests that institutional administrators should also consider outdoor spaces more carefully as they also provide locations for learning to take place.

New England Association of Schools and Colleges. (2014). Standard 8: Physical resources. Retrieved from https://ctci.neasc.org/standards-policies/non-degree-postsecondary-standards/standard-8-physical-resources

This policy document discusses physical resources for Career and Technical Education centers accredited by the New England Association of Schools and Colleges [NEASC]. The standards in this document explicitly make a connection between physical spaces and the effectiveness of the learning environment created in those spaces. These standards require facility managers to review facilities proactively to ensure they are contributing to, and not detracting from, the designated purpose of each specific space (learning, recreational, etc.).

O'Connor, U., & Robinson, A. (1999). Accession or exclusion? University and the disabled student: A case study of policy and practice. *Higher Education Quarterly*, *53*(1), 88-103

Researchers examined the experiences of 21 students with disabilities in higher education. Findings suggest that the physical environment in which students attend class has a significant impact on their success within their academic program and their sense of belonging at the institution. Access varies across institutions and may even vary within the buildings and spaces of one institution. Having access to the appropriate facilities and knowledgeable administrators who understood physical access issues were important to a student's sense of inclusion and belonging at the institution.

Sapp, D. (2014). Facilities operations and maintenance. *Whole Building Design Group.* Retrieved from http://www.wbdg.org/om/om.php

During the life of any space or building, facilities of any type will require continuous maintenance. Facilities managers must ensure the proper people and resources are in place to care for facilities on a daily basis and over the long-term life of the space. This introductory manual for the operation and maintenance (O&M) of general facilities provides a general overview for facilities mangers of creating and structuring O&M plans. The manual provides guidance on real property inventory, computerized maintenance management systems, computer aided facilities management, creating O&M manuals, and historic building O&M.

Strange, C. C., & Banning, J. H. (2001). *Educating by design: Creating campus learning environments that work*. San Francisco, CA: Jossey-Bass.

This book explores campus environments and their impact on learning in higher education. Strange and Banning (2001) present a hierarchy of learning environment purposes and designs that describes three characteristics of educationally purposeful environments: safety and inclusion, involvement, and community. Physical environments that are educationally purposeful will be able to meet the needs of students on each of these three levels.

Administrators who design physical environments with this hierarchy in mind will greatly influence the learning and work that takes place at the institution.

Sensitizing Concepts Related to Methodology

Abma, T. A., & Stake, R. E. (2014). Science of the particular: An advocacy of naturalistic case study in health research. *Qualitative Health Research*, *24*(8), 1150-1161.

Abma and Stake (2014) use naturalistic case studies to report on a 92-year old resident who moves to a care center. Naturalistic case studies allow researchers to study a particular issue from multiple perspectives with minimal intervention. Naturalistic case studies are flexible in design, allowing researchers to follow and investigate unexpected issues that emerge. They also allow researchers to arrive at holistic and nuanced understandings of the phenomenon under study.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, *13*(4), 544-559.

Baxter and Jack (2008) discuss the use of qualitative case study methodology in educational research. The authors provide examples of different types of case studies and discuss the general process for performing each. Special attention is paid to how to determine what the case is, and the boundaries of that case.

Charmaz, K. (2014). *Constructing grounded theory*. Thousand Oaks, CA: Sage.

Charmaz's (2014) work explains in depth the process for conducting grounded theory research. Charmaz (2014) explains terminology and concepts using straightforward examples from her own research. This work is cited as one of the seminal works on grounded theory research. This work influenced the development of the grounded theory methods used within this study.

Creswell, J. (2012). *Qualitative inquiry and research design* (3nd ed.). Thousand Oaks, CA:

Sage.

Creswell's (2012) book guides researchers through various forms of qualitative research methods including phenomenology, narrative research, grounded theory, ethnography, and case study methodology. Creswell (2012) links research designs with each of the traditions by providing examples that illustrate the key aspects of each methodology. Of interest for this study was the authors' discussion of strategies on collecting and analyzing data, writing narratives from the data collected, and verifying results.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: opportunities and challenges. *Academy of Management Journal*, *50*(1), 25-32.

Eisenhardt and Graebner (2007) explain how researchers can use multiple case studies to develop theory. First, researchers must explain why their research topic is best examined using a methodology that develops theory, as opposed to testing pre-existing theory. Second, cases should be chosen theoretically, based on what they can contribute to the development of a particular theory, and not randomly chosen as if theory were being tested. Third, researcher should clarify the research strategy being used, and collect data using methods that limit bias. Researchers should then develop their theory in sections, which are supported by the empirical evidence found in each case.

Hassan, E. (2006). Recall bias can be a threat to retrospective and prospective research designs. *The Internet Journal of Epidemiology*, *3*(2), 339-412.

Recall bias is the intentional or unintentional differences that occur when recalling events from the past and can be a threat to the internal validity of a study. The authors claim that this problem can occur any time you rely on the memory of participants as a source of data. The researchers suggest selecting cases that occurred more recently than in the past, using

standardized interview protocols, giving the participants enough time before answering, and keeping participants blind to the research hypotheses or questions.

Katalin, E. (2000), "Please, keep talking": The `thinkaloud' method in second language reading research, *Novelty, 7*(3). Retrieved from http://deal.elte.hu/pages/novelty/htm2/vol73/elekes.htm

Katalin (2000) discussed the think-aloud research method though the context of reading in a foreign language. Think-aloud is a process by which a participant reports their thoughts while engaging in a particular activity. In this case, students reported on what they were thinking while reading something in a foreign language. This method has two main advantages. It can uncover data related to unseen thought processes such as how prior knowledge was used in a particular situation. Think-aloud methods also help when studying individual difference between participants.

Kingsley, J. (2009). Visual methodology in classroom inquiry: Enhancing complementary qualitative research designs. *Alberta Journal of Educational Research*, *55*(4), 534-548.

Kingsley (2009) discusses the use of visual methods in her dissertation study on classroom teaching at the elementary level. Visual methods incorporate the use of images as sources of data for a study. Kingsley (2009) used photographs taken of the children as part of her data analysis. She incorporated image based data into her qualitative grounded theory study with success and provided a potential model for how I could incorporate visual data into my study.

Konecki, K. T. (2011). Visual grounded theory: A methodological outline and examples from empirical work. *Revija za sociologiju*, *41*(2), 131-160.

Konecki (2011) discusses the use of visual data in grounded theory studies. This work presents a basic introduction to visual methods concepts and how image based data can be incorporated

effectively and meaningfully into grounded theory research projects. Of particular relevance to this study was the discussion of images as sources of data. This helped to inform diagrams as one of the main pieces of data collected for this study.

Liebenberg, L., Didkowsky, N, and Ungar, M. (2012). Analysing image-based data using grounded theory: the Negotiating Resilience Project. *Visual Studies, 27*(1), 59-74.

Liebenberg, Didkowsky, and Unger (2012) discuss the use of image-based data in their grounded theory study on the Negotiating Resilience Project. This project incorporated video and photographic data as part of the research model.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Newbury Park, CA: Sage.

Lincoln and Guba's (1985) seminal work on qualitative research provides researchers with a complete overview of qualitative research and data analysis. Of particular interest to this study was the discussion of trustworthiness in qualitative research. Lincoln and Guba (1985) describe trustworthiness as how credible the findings of a study are to the end reader. Trustworthy findings are credible to potential users when they are applicable, consistent, neutral in terms of the researchers own interests and motives, and demonstrate a nuanced representation of the multiple realities described by each participant.

Margolis, E. & Pauwels, L. (2011). *The SAGE handbook of visual research methods.* London, England: SAGE Publications Ltd doi: 10.4135/9781446268278

Margolis and Pauwels (2011) provide an overview of visual methods and their incorporation into educational research. Of particular interest to this study was the idea that visual methods complement other research methods. Margolis and Pauwels (2011) discuss the versatility of visual methods and how they can be adapted to integrate with many other qualitative research

methods. They find that visual methods can complement and enhance most other qualitative research methods.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded source book* (2nd ed.). Thousand Oaks, CA: Sage.

Miles and Huberman (1994) discuss several methodological techniques and the applications to research. Of particular interest to this study was the authors' discussion case study research. Miles and Huberman (1994) define a case as the unit of analysis of a study and note that all cases must have boundaries. Case boundaries are the parameters of what will be studied. Case boundaries define what is included within the study and what is not.

Nielsen, J., Clemmensen, T., & Yssing, C. (2002, October). Getting access to what goes on in people's heads?: Reflections on the think-aloud technique. In *Proceedings of the Second Nordic Conference on Human-computer Interaction* (pp. 101-110). ACM.

Nielsen, Clemmensen, and Yssing (2002) discuss the benefits of think-aloud methodology. Nielsen et al., (2002) claim that introspection is a key element of a think-aloud protocol. Because humans are psychological beings and not information processing units, they process think about much more then what they actually verbalize in an interview. Having a subject provide introspective responses allows the researcher to see into the higher order cognitive processes of that subject. Therefore, researchers must expand their data collection efforts and interview protocols to include information about a subjects' cultural background.

Nielsen, J. (2012). Thinking aloud: The #1 usability tool. Retrieved from http://www.nngroup.com/articles/thinking-aloud-the-1- usability-tool/

Think-aloud tests ask a participant to engage with a system while continuously thinking out loud about that engagement. The goal is to have a participant verbalize their thoughts while they

move through the particular system. This type of protocol allows the researcher to look inside a respondent to see how they truly feel about a system or activity. Nielsen (2012) states the benefits of think-aloud are low cost, robust results, flexibility in design, the data retrieved is usually convincing in some way, and the procedure itself is easy for the researcher to learn and master.

Rossman, G. B., & Rallis, S. F. (2011). Learning in the field: An introduction to qualitative research (3nd ed.). Thousand Oaks, CA: Sage.

Rossman and Rallis's (2011) book provides a guide for researchers pursuing qualitative research methods. Rossman and Rallis (2011) use the story of three researchers planning their own studies to demonstrate the key constructs of qualitative methodology. Of interest for this study was the authors' discussion of the positionality of the researcher. A researcher's positionality is how the researcher relates to the subject of a study and the participants within the study. Positionality is what the researcher carries into the project when designing and conducting a research study.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks, CA: Sage.

Teddlie and Tashakkori's (2009) work focuses on the use of mixed methodology in social science research. The authors review the origins of this type of research and provide detailed information on conducting mixed methods research. Of particular interest to this study was the authors' discussion of negative cases. Negative cases are cases that do not fit in with the overall pattern observed in other cases. These cases help to refine and rework existing ideas and theory to make them better.

Turner, D. W. (2010). Qualitative interview design: A practical guide for novice investigators. *The Qualitative Report*, *15*(3), 754-760.

Piloting is an important part of the process when designing an interview protocol. Piloting the interview protocol allows the researcher to deterring if flaws or weaknesses exist within the protocol, giving the research time to make correction before the study begins. It can also help to refine a study's research questions. Pilots use participants who are similar in characteristic to the participants you hope to interview and part of your study.

Watt, S. K. (2015). Authentic, action-oriented, framing for environmental shifts (AAFES) method. In Watt, S. K. (Ed), *Designing transformative multicultural initiatives: Theoretical foundations,* (24-40). Sterling, VA: Stylus Publishing.

Watt (2015) details the Authentic, action-oriented, framing for environmental shifts method (AAFES). Part of this methodology informed this study. Under the third quality of the framework, framing for environmental shifts, Watt (2015) discusses the idea of resituating process-oriented concepts as "third things," (p. 34). A third thing takes the form of text or other items that is used by the researcher to open up dialogue around the particular process under study (Watt, 2015). The third thing holds participants accountable to more than their own positionality in relation to the process under study (Watt, 2015). The diagrams I asked participants to create were third things as defined by Watt (2015).

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

Yin (2003) explains in depth the use of case study methodology in research. The process laid out by Yin (2003) is iterative in nature, using multiple examples from real studies to illustrate the

different steps and procedures associated with the method. This methodology is cited as one of the critical works in case study methodology.

Chapter Three

Methodology

This grounded theory study explored the design process of general classroom facilities at four-year public higher education institutions. Specifically, the purpose of this study was to develop a theoretical model to explore what factors are most influential to the design of general classroom facilities, who has a role in the process, how that process plays out in real time, and what explains differences in how the process is implemented in different settings. I used grounded theory, case study, visual methods, and authentic, action-oriented, framing for environment shifts (AAFES) methods together to address my research questions.

Grounded theory methods allow a researcher to construct theories based on qualitative data collected within a study (Charmaz, 2014). The constructed theories are "'grounded' in the data themselves" (Charmaz, 2014, p. 2). The collected data acts as the foundational basis for any construct or theory the researcher generates (Charmaz, 2014). Grounded theory gives researchers strategies for developing theories about the worlds they study (Charmaz, 2014).

Grounded theory has traditionally emphasized the study of processes (Charmaz, 2014). A process is a series of events connected in time that have clear starting and ending points and that lead to some form of change (Charmaz, 2014). My study focuses on the process of design/construction for general classroom facilities in American four-year, public higher education institutions. This is a time-based process that is influenced by the context in which it operates. This is another reason grounded theory fits this research study.

Case studies allow the researcher to analyze how and why questions and develop a wider theoretical model (Abma & Stake, 2014; Baxter & Jack, 2008; Yin, 2003). By using multiple cases, I was able to draw comparisons across cases (Eisenhardt & Graebner, 2007; Yin, 2003).

This yielded more robust findings, a key feature of multiple case study designs (Eisenhardt & Graebner, 2007).

Visual methodologies are steadily becoming more prevalent in sociological and educational research (Caulfield, 1996; Harper, 1994; Kingsley, 2009; Konecki, 2011; Liebenberg, Didkowsky, & Ungar, 2012; Margolis & Pauwels, 2011). Visual methods focus on images as a source of data and can be combined with other methodologies to produce a fuller picture of the phenomena or process under study (Caulfield, 1996; Harper, 1994; Kingsley, 2009; Konecki, 2011; Liebenberg, Didkowsky, & Ungar, 2012; Margolis & Pauwels, 2011). Images become a vehicle for accessing ideas and experiences not expressed by participants through other methods (Liebenberg, Didkowsky, & Ungar, 2012).

The AAFES method, as described by Watt (2015), offered an interesting tenant applicable this study. The AAFES method assumes "communities need to be continually in a process of dialogue that deconstructs and reconstructs environments for inclusion," and that "change in the environment needs to occur rather than retrofitting individuals" to fit the environment (Watt, 2015, p. 34). From the framing for environmental shifts leg of this framework comes the idea of resituating process-oriented concepts as "third things," (Watt, 2015, p. 34). A third thing takes the form of text or other items that is used by the researcher to open up dialogue around the particular process under study (Watt, 2015). The third thing holds the participants accountable to more than their own positionality in relation to the process under study (Watt, 2015)

I conducted interviews with people responsible for the design of general classroom facilities at different public higher education institutions that had recently constructed general classroom facilities using a talk out loud protocol. As part of this process, participants co-

created with me a diagram of that process as they experienced and perceived it. By situating the process as a third thing in the form of a process diagram co-created by the researcher and participant, I was better able to understand what considerations influence the process of design/construction of general classroom facilities at higher education institutions in the United States. Four research questions guided this research.

Research Questions

1. How do those most responsible for facilities describe the steps or phases of design for general classroom facilities at public higher education institutions?
2. How do those most responsible for facilities describe the conditions specific to the institution and the wider context that contribute to the design process of general classroom facilities at public higher education institutions?
3. How are financial and human resources used/leveraged to influence the design of general classroom facilities?
4. How do those most responsible for facilities explain how the process is implemented at different institutions?

Chapter Three focuses on the design of the study. I begin with an explanation of my own biases and positionality in relation to the topic under examination. I then discuss the sample selection process and the instrumentation used in the study. I follow this with an explanation of the data collection and analysis procedures. I conclude Chapter Three with the steps taken to enhance the authenticity and trustworthiness of the study.

Positionality

Positionality or reflexivity is the researchers' reflections on the relationship between themselves and those who participate in the study (Rossman & Rallis, 2011). Researchers bring

ideas and understandings to a study based on their past experiences and influences (Charmaz, 2014; Rossman & Rallis, 2011). This is considered a strength rather than a weakness in qualitative research (Charmaz, 2014). Prior knowledge influences how the study is designed and how that researcher may interact with study participants (Charmaz, 2014; Rossman & Rallis, 2011). Therefore, it is important to identify the predispositions I brought to this study in relation to the topic and my participants.

At my home institution, I work as the campus' Americans with Disabilities Act (ADA) Specialist. I am tasked with monitoring compliance on campus with Title II of the ADA (1990, 2008). Title II of the ADA (1990, 2008) concerns physical and programmatic access at all state institutions and facilities. As a public institution, my home institution must comply with these regulations. My job entails regularly examining campus facilities for compliance with federal, state, and local access regulations. I work with departments across campus to make both facilities and the programs and services offered within those facilities accessible to students, faculty, and staff, and visitors.

As part of this work, I regularly participate in a portion of design process for new facilities at my home institution. My involvement consists of reviewing building plans at various phases of completion (i.e. 30%, 60%, and 90%) to offer comments and concerns related to the ADA (1990, 2008) and accessibility. I provide feedback directly to university architects and members of consulting design firms employed by the institution. I have also participated in strategic planning meetings concerning campus facilities and the University's five-year strategic plan for space and facilities.

Another part of my job involves training and consultation. My office provides training and consultation services to faculty, staff, students, administrators, business owners, managers,

and human resource specialists across the campus and the greater community on a wide variety of topics related to the ADA (1990, 2008). I have developed and facilitated multiple training sessions and presentations related to physical and programmatic access.

Students, faculty, and staff members with disabilities as a population within higher education are my main areas of interest. I study this population and routinely work with individuals who identify as having a disability. As a result, of these experiences, I am sensitive to design elements that create barriers to learning within our campus facilities and community. These factors may have influenced the way in which I approached the design of this study, interactions with my participants, and the way the data were analyzed.

Sample Selection

In all case study research, the case is "your unit of analysis" (Miles & Huberman, 1994, p. 25). In this study, the unit of analysis for each case was a single design/construction project of a general classroom facility at an American, four-year, public higher education institution. Since the goal of this study was to create a process model for the design of general classroom facilities, I chose to collect data from multiple cases. Multiple-case studies allow a researcher to study a phenomenon under different contexts (Baxter & Jack, 2008). Studying multiple cases allows the researcher to understand similarities and differences across cases (Baxter & Jack, 2008). The researcher can "analyze within each setting and across settings" (Baxter & Jack, 2008, p. 550).

To select specific cases for this study I used a combination of purposeful sampling techniques that include typical case sampling and snowball sampling (Rossman & Rallis, 2011). Qualitative researchers use purposeful sampling to select specific participants for a study who can provide data to answer the research questions posed in the study (Creswell, 2012; Rossman

& Rallis, 2011). Sample selection for this study was first informed by the designated case boundaries.

Case Boundaries

As the unit of analysis, a case must have defined parameters or boundaries (Abma & Stake, 2014; Baxter & Jack, 2008; Miles & Huberman, 1994; Yin, 2003). Boundaries delineate what is and what is not part of the case and help set the scope of the investigation (Abma & Stake, 2014; Baxter & Jack, 2008; Miles & Huberman, 1994; Yin, 2003). In this study, the case boundaries related to place, activity, and time.

The first boundary related to place and consisted of limiting cases to public, four-year institutions physically located within the same state. States have a unique subset of laws, policies, procedures, and economic conditions within the United States. State legislatures and agencies are responsible for all individual higher education institutions located within their borders but are more directly connected with the public institutions as compared to private institutions. While two-year institutions are public institutions, they often are treated as whole systems rather than individual units within their states. Therefore, a place related boundary ensured that all cases would operate under the same regulatory and economic conditions.

The second boundary related to activity. Because this study examined the design of general classroom facilities, it was critical that this activity actually took place recently onsite for each case. Therefore, the institutions selected must have designed and constructed new general classroom facilities on their respective campuses.

A third boundary also related to activity, centering on project cost. In the Commonwealth of Virginia, building projects with a projected cost of more than two million dollars are considered capital building projects. Cases in this study centered on projects costing

more than two million dollars, ensuring that all building projects in the study fell under the same categories of regulation from the Commonwealth. This boundary also ensured that each project had the same level of complexity. Design and construction projects at this level can occur as either new construction or as renovations to existing facilities. By using this dollar amount, I was able to include facilities that experienced extensive renovations while still ensuring the projects were of sufficient scale and complexity to warrant inclusion.

The fourth boundary related to time. Design and construction of the new general classroom facilities must have occurred between January 1, 2012 and January 1, 2016. This ensured that similar regulatory and economic conditions existed during the time of the design/construction phase of the project.

The Sample

The sampling for this study was purposeful (Charmaz, 2014). It included people at four-year American public higher education institutions connected with the design of general classroom facilities at those institutions. Participants had titles such as director of university design and construction, project manager, and dean and represented a variety of institutional offices such as facilities, facilities services administration, university design and construction, individual colleges and schools within the institution, and university planning.

I followed the case boundaries to identify individual participants and first selected a state that would be representative of all other states within the nation. I chose the Commonwealth of Virginia. Virginia has multiple public four-year institutions representing a wide variety of Carnegie classifications. Virginia has one coordinating body for higher education, the State Council for Higher Education in Virginia (SCHEV), which oversees all public higher education institutions (SCHEV, 2014a).

Once Virginia was selected as the sample state, I identified the public institutions located within that state. According to the SCHEV, the Commonwealth has 15 public four-year higher education institutions located within its borders (SCHEV, 2014b). All public four-year institutions in the Commonwealth of Virginia were included within this sample.

Once the specific institutions eligible for inclusion in this study were identified, I conducted a web search for the name and contact information of the chief administrator responsible for design and planning at each institution. I used the search features located on the institution's webpage to find the appropriate administrator. If the institution's webpage did not have a search feature, or I could not determine who the appropriate administrator was by using the search feature on the institution's webpage, I used Google to search for the administrator's information. I conducted a web search for the name and contact information of individual administrator responsible for design and planning of general classroom facilities at each institution. Those administrators' titles identified in the search process included director of university planning, director of planning and construction, and director of facilities management.

I contacted the directors of university planning (DUPs) by phone to introduce myself, ask for 10 minutes of that person's time to discuss the study, and ask five questions. For any respondents who did not agree, I thanked them for their time and moved to the next potential candidate. For all respondents that agreed, I introduced myself and the study and asked the following questions: (a) whether or not one or more capital improvement projects (defined as new construction or renovations to existing structures, classified as a capital improvement project) specifically related to general classroom facilities (defined as "a room or space used primarily for instruction classes and that is not tied to a specific subject or discipline by equipment in the room or the configuration of the space" (Cyros & Korb, 2006, p. 49)) had

occurred on their campus between January 1, 2012 and January 1, 2015; and (b) If yes, which space specifically?. Next I asked, (c) were the respondents' individual campuses willing to participate in my study? If yes, (d) would individual institutions require additional IRB approvals? No institutions included in this study required further approvals. Finally I asked respondents (e) to supply names, contact information (title, phone number, and email), and a brief description of the individual's role in the design process for anyone involved in the design of the specific general classroom facilities who might be willing to participant in an interview related to their role in the design process.

I explained that I was seeking individuals who either worked for the institution or for the design/construction firm hired by the institution to work on the specific project identified in the first two questions. Potential participants had to have been employed by the institution or design/construction firm for at least three months prior to the time of participating in the design of the specific general classroom facility. This ensured that participants would be familiar with the state regulatory and financial conditions that outlined the project. All DUPs meeting the eligibility criteria were allowed to participate in the study (see Appendix A for a complete listing of eligibility questions for institutional participation). If the DUPs contacted did not wish to participate in the study or their campuses did not meet the required qualifications, I moved to the next eligible institution in the pool.

Next, I contacted individuals that might participate in the study. Using the contact information provided by each DUP, I contacted potential participants by email (see Appendix B for a complete copy of the introduction email to potential participants). I introduced my study and requested potential participants to reply by email with a time and contact number to follow up by phone. The purpose of the follow up phone call was to provide further details of the study

and to gauge their interest in participating. Each individual I contacted via email agreed to participate in the study.

When potential participants agreed to speak by phone, I called at the agreed upon time. I introduced the specifics of my study and explained how it focused on the design of a specific general classroom facility at that person's institution. I then confirmed the individual's involvement with the specific design/construction project. If they were not involved in the specific project, participants were informed that they would not be eligible to participate and I thanked them for their time. If they were involved, I then asked potential participants how long they had been employed by their respective institution/design firm at the time of their participation in the design/construction project. If they had worked for less than three months at their respective institution/design firm when participating in the design process, participants were informed that they would not be eligible to participate and I thanked them for their time.

If potential participants met each of the previous conditions, I asked them if they were willing to participate in a 60-90 minute recorded, in-person interview related to the design of general classroom facilities at that specific institution. If potential participants were not willing to participate, I thanked them for their time. If potential participants agreed to take part in the study, I thanked them and arranged a date and time to conduct the interview (see Appendix C for a complete listing of eligibility questions for potential participants).

Protocols

I used a talk-out-loud interview protocol to collect data for this study. Interview data were collected through individual in-person interviews. Talk out loud, or think out loud protocols, ask participants to use a system while continuously thinking out loud (Katalin, 2000; Nielsen, Clemmensen, & Yssing, 2002; Nielsen, 2012). The goal is to have participants

verbalize their thoughts as they move through the process (Katalin, 2000; Nielsen, Clemmensen, & Yssing, 2002; Nielsen, 2012). This allows the researcher to gain insight into how the person approaches a problem and may lead to key details that other methods may have missed (Nielsen, Clemmensen, & Yssing, 2002; Nielsen, 2012).

The interview protocol consisted of four sections and was used for all interviews (see Appendix D for the complete interview protocol). The protocol was semi-structured and included 10 questions. The questions used in the interview protocol were open-ended allowing participants to respond freely while still standardizing questions across participants (Rossman & Rallis, 2011). This type of interview was most likely to provide data on how people approach the design of general classroom facilities.

An expert review panel of faculty members familiar with the study reviewed the interview protocol. The protocol was piloted at my home institution using participants who actively participated in the design of general classroom facilities for the institution. These individuals offered feedback on the interview protocol and I revised the document to reflect their suggestions. Questions were reworded and in some cases deleted or combined based on the feedback received from pilot participants.

Section one included two questions designed to put respondents at ease and get to know them. For example, I asked respondents to tell me about themselves and how they began their career in higher education. The goal was to collect some background information about the participant while getting them engaged with the interview process.

The next section of the interview focused on the design of a specific general classroom facility at the participants' home institution. Participants were asked to walk through the process of design and talk about it out loud, step by step. During this part of the interview, I asked

participants to construct with me a diagram that showed the steps of the process. I began by drawing the first step in the process based on what the participant stated, and invited the participant to help me complete diagram as we went.

As participants identified new steps in the design process, I used the third section of the protocol and followed up with additional questions about specific steps. These questions were open-ended and designed to gather more details related to each specific step. For example, I asked participants to indicate whom were the most influential people involved with a specific step of the process and if it was important enough to add it to the diagram as a separate step or additional detail.

The final section of the interview protocol concluded the interview with closing questions. Here I asked participants about other considerations that might have influenced the design of general classroom facilities that we had not already discussed and if the particular project we are talking about differed in any important way from other, similar projects executed about the same time. I also asked the participants if I could follow up with them in the future, should additional questions arise.

Data Collection

The first step in the data collection process involved obtaining approval from the Institutional Review Board (IRB) at my home institution. I did not need to secure additional IRB approvals from participating institutions included in this study. Once the study was approved (see Appendix E for IRB approvals), I began to solicit participants and collect data.

Data were collected primarily through interviews. Data collection took place during the fall of 2016. Each interview was recorded using a digital video recorder and interviews took place at campus locations agreed to by the researcher and the participant. The locations at each

institution were selected for convenience, neutrality, and comfort level. Interviews took place in conference rooms or in private offices with limited distractions.

I sent a confirmation email to each participant, 24 hours prior to the interview confirming the date, time, location, and duration of the interview. In the email I included a copy of the informed consent form and the IRB approval for the study. The email instructed the participant to read through the IRB and informed consent materials and explained that participants would be asked to sign a hard copy of the informed consent document prior to the start of the interview.

I started each interview by greeting and thanking the person for participating. After reviewing the informed consent documents, I had the participant sign one copy of the form. Next, I turned on the recording device and confirmed with participants their willingness to be recorded. I then began the interview. When the interview was completed I thanked the participant and turned off the recording devices.

As part of each interview, a diagram was co-created by the participant and interviewer. I kept all diagrams created during the interview sessions as this was the primary source of data for this study. The diagrams provided data on the sequence of steps in the process, as experienced by each participant. These helped to develop an overall process model for the design/construction of general classroom facilities within each institution and overall.

Data collection took place on a case-by-case basis. I began with my first case, collected data, and then moved to the second case. I repeated this selection and data collection process until I reached saturation.

Data Analysis

This study used an inductive process for data analysis. Inductive data analysis is "a process for 'making sense' of field data" (Lincoln & Guba, 1985, p. 202). This is a grounded

theory study in which I did not use a preexisting theory to guide my research. Data from this study could not be analyzed deductively as I was not testing an existing theory or hypothesis. Inductive analysis involves the study of multiple different individual cases for patterns that form conceptual categories (Charmaz, 2014). It involves generating theories or constructs from the data itself (Charmaz, 2014).

Data for this study were analyzed using a constant comparative approach (Charmaz, 2014). The constant comparative method is a major feature of grounded theory and involves the researcher constantly comparing data sources to previous sources of data in the study (Charmaz, 2014). This process is repetitive and involves using procedures to generate codes and categories that reflect multiple layers of meaning (Charmaz, 2014). These codes and categories are then repeatedly compared to one another throughout out data analysis in an attempt to cover every possible combination. This allows the researcher to form a more nuanced picture of phenomenon under consideration (Charmaz, 2014).

Individual Cases

Data analysis began first with the individual cases (i.e. the individual design/construction project of a general classroom facility) of the study. I started by examining the final diagrams created during each interview of the particular case. I transferred the steps found in each participant's final diagram to an Excel workbook. Because coding individual words or lines can be difficult in a visual image, Liebenberg, Didkowsky, and Ungar (2012) advocate for coding "relevant segments or 'chunks' of visual data," (p. 68). I, therefore, grouped related steps into columns and coded those groups accordingly. After recording and sorting each participant's response, I compared steps across participants from the same case to generate labels for each grouping of steps. For example, if one person said "budgeting meetings, took place while we

met to discuss our needs for the space," while a second participant said "we met to discuss the financing of the proposed project. Then we relayed our understandings to the individual department heads connected to this project", I considered these to be similar steps and combined them under the heading of making the case for a new facility. I then created a new diagram to represent the combined design/construction process for the particular case. I repeated this process for each case in the study, crafting a narrative of each project from the views of participants.

I then analyzed the recordings of each individual interview by memoing extensively while watching the videos. Memos allow the researcher to record observations from an interview session that might not be apparent in the transcript of the interview (Rossman & Rallis, 2011). In my memos on individual interviews, I recorded not only my general thoughts of the content, but also specific words and phrases used by participants that captured key details related to the process of design for the specific facility identified in the case. I used open coding to examine those memos and the details contained within individual participant diagrams.

Open coding is an initial type of sorting that involves taking pieces of data and categorizing them under broad topics (Charmaz, 2014). Guided by my research questions, I designated four categories that thoughts and comments could fall under and created Excel spreadsheet with separate tabs for each: Items related to steps in the process, Items related to conditions specific to the institution and the wider context of the design process of general classroom facilities, Items related to how financial and human resources are used/leveraged to influence the design of general classroom facilities, and Items related to differences in the process relative other institutions. As each piece of data was coded, I transferred it into one of the three tabs.

Next, I analyzed each of the tabs of my Excel workbook for emerging themes using axial coding. Axial coding allowed the researcher to look for emerging themes within categories created during open coding (Charmaz, 2014). Axial coding requires the researcher to reassemble the data that were broken down during open coding into new meaningful themes (Charmaz, 2014). I compared comments within each of the documents and found commonalities among those comments. When a common topic appeared in multiple interviews, I counted it as a theme. For example, if one participant said "I sought input from the faculty members of the department as they would be the end users of the space," a second said "the department chair met what seemed like a hundred times with us to talk about the space" and a third said "we couldn't have done this project without the input of the department's faculty and staff," I would group these comments together in the tab on Items related to how financial and human resources are used/leveraged to influence the design of general classroom facilities. I would further group them together under the theme of "faculty input matters" because all three comments related to how the faculty and staff of the department ultimately using the space were important resources for the project. I repeated this process for each case in the study.

As I completed the analysis of additional interviews, I open coded comments by adding them to the appropriate Excel tab. I then coded the comments with axial codes, and analyzed each for additional new themes and ideas. I compared data from one interview to data from previous interviews continuously to see if new codes or themes emerged. When new codes and themes arose, I went back through the data to confirm and refine those codes. I also compared codes derived from data between

Throughout the coding process, I also wrote memos to capture my thoughts and impressions as they unfolded. Memo writing is the "intermediate step between data collection

and writing drafts of papers" (Charmaz, 2014, p. 72). Memo writing allows the researcher to analyze his data and codes early in the research process (Charmaz, 2014). Memos are where the researcher captures his thoughts about the data, makes important connections, and solidifies for the researcher in what direction to continue.

Memos aid in documenting the connections and comparisons made among different pieces of data (Charmaz, 2014). Continued use of memoing allows the research to reach higher levels of abstraction during analysis (Charmaz, 2014). I used my memos to help revise and refine my codes and themes produced at all levels of coding. I made important connections between participants' individual narratives in my memos and fleshed out the details of each case's process model within my memos.

The relationship between data sources was also examined. Images are products of social construction and need to be considered in relation to other forms of data (Kingsley, 2009). Pink (2001) noted that relationships between images "and other research materials and experiences (including memories, diaries, photographs, notes and artifacts) provide important insights as each medium may represent interrelated but different types of knowledge about the same theme" (p. 110). I applied the constant comparative method as described above in an attempt to tease out that interrelated knowledge.

Cross Case Analysis

After analyzing each case individually, I began to analyze data across cases. I started with the process models created for the design process in each specific case. By examining and comparing the steps within each case, I was able to develop an overarching process model of the process of design/construction of general classroom facilities.

I then moved to the individual case narratives. Codes and categories developed from one case were compared to and applied to subsequent cases. As new codes and categories emerged, I went back through the data to confirm and verify those new items. I created coding maps to assist with this process (see Appendix F for a complete coding maps). By comparing items across cases, I was able to enrich the process diagram already created and develop an overall theory of design/construction of general classroom facilities.

After completing this process, I was able to answer the research questions posed in my study (see Appendix G for a summary diagram depicting the analysis process). I developed the findings produced from my data analysis process into a theory of design that provided a description of the elements influential to the design of general classroom facilities. I also created model to depict the process.

Trustworthiness of the Data

Trustworthiness refers to how credible the data is to potential users (Lincoln & Guba, 1985; Rossman & Rallis, 2011). Trustworthy findings are credible to potential users when they are applicable, consistent, neutral in terms of the researchers own interests and motives, and demonstrate a nuanced representation of the multiple realities described by each participant (Lincoln & Guba, 1985). Trustworthy findings reflect the thoughts and feeling of multiple participants accurately (Lincoln & Guba, 1985). They "are sufficiently believable that others will use those findings to take action to improve social circumstances," (Rossman & Rallis, 2011, p. 59).

I enhanced the trustworthiness of the data in several ways. First, I used reflexivity throughout the project. Reflexivity is the process by which the researcher reflects on the respondent's position and biases in the world and how those influence the study design and

interaction with participants (Charmaz, 2014; Rossman & Rallis, 2011). I memoed, took field notes, and reflected on my biases throughout the study.

Second, an audit trail was kept of my decision making process throughout the study. An audit trail is a detailed list of all decisions made by the researcher regarding the design of a study, its implementation, and the analysis of data (Rossman & Rallis, 2011). Audit trails help a reader know why the researcher made certain decisions related to design and analysis (Rossman & Rallis, 2011).

Third, the interview protocol was piloted on a representative group of individuals. I piloted my interview protocol on two individuals at my home institution who regularly participate in the design of general classroom facilities. Piloting helps refine the instruments used within a study prior to collecting actual data (Turner, 2010).

Finally, I used a panel of experts to review my interview protocol and coding schemes. Third parties help alleviate some of the researcher's biases while providing a fresh perspective that may not yet have been considered by the researchers (Creswell, 2012). By having expert faculty members review each of these pieces of the study, I was able to enhance the trustworthiness of the findings.

In summary, this study was designed to gain an understanding of the elements influential to people who design general classroom facilities at public higher education institutions. The grounded theory methodology used in this study provided data relevant the research questions of the study. The findings and resultant diagrams from the data analysis portion of this study appear in Chapter Four. An in depth discussion of this study's methodology and its impact on the findings appears in Chapter Five. As a result of choosing the alternative dissertation model

offered by my home institution, Chapter Four and Chapter Five will take the form of two articles of sufficient quality to be submitted for review by a refereed publication.

Chapter Four

Abstract

This study combined multiple methods to produce the "Train Model of Design for General Classroom Facilities." Projects experience two stages, four overall phases, and are initially influenced by institutionally specific factors (college strategic goals and location of the project). Resources (budget and time) fuel their progress and are applied by a triumvirate of important players. Projects move along the rails of planning for the future and incorporating pedagogy into the designs, supported by collaborations with stakeholders. Variations in implementation are explained by the available state procedures, the type of project (new construction vs. renovation), and the procurement method used to select a construction management firm.

The Process of Design for General Classroom Facilities in Higher Education

In higher education, quality has many connotations, most importantly in relation to learning (Armstrong, 2005; Hazelkorn, 2013). Administrators at the institutional level have financial, human, and physical resources at their disposal to address quality of learning (Bady, 2013; Bidwell, 2014; CHEA, 2014; Dew, 2009; NASBO, 2013; NEASC, 2014; Sapp, 2014; Strange & Banning, 2001; Tracey, 2003). Financial resources are the money available to institutional administrators (Bidwell, 2014; NASBO, 2013). Human resources consist of the people at the institution (Tracey, 2003). Physical resources consist of the equipment and the spaces and facilities found at an institution (Bady, 2013; NEASC, 2014; Sapp, 2014). General classroom facilities are one type of physical resource that has a large impact on learning quality (Block, 2008; Hanafin, et al., 2007; Harris & Holley, 2008; O'Connor & Robinson, 1999; Strange & Banning, 2001). I was particularly drawn to this topic as I routinely review campus facilities for accessibility concerns. I see daily how different structures improve or reduce the quality of learning experiences for students.

Some research exists on the design of learning environments within a higher education context. Researchers have explored whether to build new or to renovate existing structures on college campuses (Blanchette, 2010; Harris & Holley, 2008; Kennedy, 2001). They have studied the design of higher education learning environments in digital spaces, including online classrooms (Strange & Banning, 2001). However, little research exists on the process for design of general classroom facilities at public higher education institutions. With such a direct connection to learning, the design of general classroom facilities is an important consideration in higher education. This topic is understudied, leaving a need to understand this process in greater

detail. This study attempted to fill that gap by generating a theoretical model for the design of general classroom facilities at public higher education institutions.

Research Questions

The following research questions guided this study:

1. What are the steps or phases of design for general classroom facilities at public higher education institutions?
2. What are the conditions specific to the institution and the wider context that contribute to the design process of general classroom facilities at public higher education institutions?
3. How are financial and human resources used/leveraged to influence the design of general classroom facilities?
4. How do those most responsible for facilities explain how the process is implemented at different institutions?

Literature Review

The types of spaces and equipment found at a particular institution will directly contribute to the quality of learning that takes place at that institution (Fink, 2004; Harris & Holley, 2008; NEASC, 2014; Sapp, 2014; Strange & Banning, 2001). Physical space has particular significance for learning quality. Physical space, or the physical environment, has a profound effect on what actions take place at a given location and how those actions are perceived, understood, interpreted, and relayed by the participants and observers of those actions (Block, 2008; Foucault & Miskowiec, 1986; Strange & Banning, 2001; Thrift, 2006).

Higher education institutions contain a wide variety of physical spaces. However, it is the spaces specifically designated for academics that most directly impact the quality of learning

taking place at an institution (Bady, 2013; Fink, 2004; Harris & Holley, 2008; NEASC, 2014; Strange & Banning, 2001). Academic spaces consist of any physical space found at a higher education institution specifically intended for learning (e.g. classrooms, laboratories, study rooms, etc.). The most basic unit of academic space is the general classroom. General classroom facilities are defined by the Postsecondary Education Facilities Inventory and Classification Manual as "a room or space used primarily for instruction classes and that is not tied to a specific subject or discipline by equipment in the room or the configuration of the space" (Cyros & Korb, 2006, p. 49). General classrooms facilities used for educational activities have a direct impact on the learning that takes place within those spaces.

The design of the physical environment is of critical concern to institutional administrators interested in maximizing quality of learning experiences (Strange & Banning, 2001). The physical environment influences access to learning opportunities, participation in learning experiences, the types of learning opportunities offered and the overall quality of those learning experiences (Block, 2008; Hanafin, Shevlin, Kenny, & Neela, 2007; Harris & Holley, 2008; O'Connor & Robinson, 1999; Strange & Banning, 2001). By directly influencing the design of the environments and spaces in which learning take place, college and university administrators can harness available resources in one physical location to influence the quality of learning at an institution (Harris & Holley, 2008; Strange & Banning, 2001).

Methodology

This grounded theory multiple case study explored the design process for general classroom facilities at four-year public higher education institutions. Specifically, the purpose of this study was to develop a theoretical model to explore what factors are most influential to the design of general classroom facilities, who has a role in the process, how that process plays out

in real time, and what explains differences in how the process is implemented in different settings. Using a pragmatic approach, I combined grounded theory with case study methods, visual methods, and portions of the Authentic, Action-Oriented, Framing for Environmental Shifts (AAFES) method discussed by Watt (2015) to address my research questions.

Combining these methods, I conducted interviews with people responsible for the design of general classroom facilities at different public higher education institutions using a "talk out loud" protocol (Katalin, 2000; Newell & Simon, 1972; Nielsen, Clemmensen, & Yssing, 2002; Nielsen, 2012). As part of this process, participants co-created with me a diagram of the process as they experienced and perceived it. By situating the process as a "third thing" in the form of a co-created process diagram (Watt, 2015), I was better able to understand what considerations influence the process of design/construction of general classroom facilities at higher education institutions in the United States.

Case Boundaries

As the unit of analysis, a case must have defined parameters or boundaries (Abma & Stake, 2014; Baxter & Jack, 2008; Miles & Huberman, 1994; Yin, 2003). Boundaries delineate what is and what is not part of the case, setting the scope of the investigation (Abma & Stake, 2014; Baxter & Jack, 2008; Miles & Huberman, 1994; Yin, 2003). In this study, the case boundaries related to place, activity, and time.

Cases were bound to four-year institutions, located in the Commonwealth of Virginia, whose administrators had designed or constructed new or renovated general classroom facilities, with a minimum budget of two million dollars, between January 1, 2012 and January 1, 2016. These boundaries ensured that all cases operated under the same regulatory and economic conditions and that the design/construction projects were of sufficient scale for comparison.

Using specific building projects as the focal point of participant interviews, I examined three cases that fit the described boundaries.

Participants

I sampled participants purposefully (Charmaz, 2014), including people connected with the design of general classroom facilities at each institution. Participants' titles included director of university design and construction, project manager, and dean, representing a variety of institutional offices such as facilities management, university planning, and individual college departments or schools. These individuals all participated in some phase of the design/construction of the specified facility and worked for the respective institution for a minimum of three months at their time of participation. I interviewed three individuals for each of my three cases, conducting a total of nine interviews.

Procedures and Data Collection

I conducted face-to-face interviews with participants from each case using a semi-structured, talk out loud protocol. Talk out loud asks participants to use a system while continuously verbalizing their thoughts as they move through the process (Katalin, 2000; Nielsen, Clemmensen, & Yssing, 2002; Nielsen, 2012). This allows researchers to gain insight into how the person approaches a problem and may lead to key details that other methods may have missed (Nielsen, Clemmensen, & Yssing, 2002; Nielsen, 2012).

I asked participants to co-construct with me a diagram of the steps of the process, as they understood it. The diagrams act as third things as described in Watt's (2015) AAFES method. A third thing takes the form of text or other items (i.e. drawings, music, poetry, etc.) that are used by the researcher to open up dialogue around the particular process under study (Watt, 2015). The third thing holds participants accountable to more than their own positionality in relation to the process under study (Watt, 2015). This was an ideal task given that participants were

familiar with using diagrams as part of their work. I began by drawing the first step articulated by the participants and invited them to help me complete the diagram as we went. Participants drew and wrote out steps using colored markers, while I wrote in a black pen. The diagram was placed between participants, and myself so I also wrote upside down. My contributions to the diagrams constituted on average five to 10% of the total diagram. In this way, we co-created a process diagram representing that person's understanding of the process of design used to construct the specific facility discussed.

Interview Protocol

I used one interview protocol consisting of three sections (see Appendix D for the complete interview protocol). The semi-structured protocol included 11 open-ended questions, allowing participants to respond freely while still standardizing questions across participants (Rossman & Rallis, 2011). This type of interview was most likely to provide data on how people approach the design of general classroom facilities.

An expert review panel of faculty members familiar with the study reviewed the interview protocol. I piloted the protocol at my home institution using individuals who actively participated in the design of general classroom facilities. These individuals offered feedback on the interview protocol and I revised the document to reflect their suggestions. For example, pilot participants advised that I change multiple questions in section three of the protocol. The questions originally asked participants to give specific numbers of examples of resources and personnel influential to the individual steps of the process. Pilot participants suggested revising those questions to be more open ended. They also suggested focusing follow up questions on the larger phases of the process rather than the individual steps associated with each phase.

Data Analysis

This study used an inductive data analysis process. Inductive data analysis is "a process for 'making sense' of field data" (Lincoln & Guba, 1985, p. 202). Inductive analysis involves the study of multiple different individual cases for patterns that form conceptual categories (Charmaz, 2014). It involves generating theories or constructs from the data itself (Charmaz, 2014). Since this was a grounded theory study, deductive analysis could not happen, as I was not testing an existing theory or hypothesis.

Using a constant comparative method, I analyzed the data via open and axial coding (Charmaz, 2014). The constant comparative method is a major feature of grounded theory and involves the researcher constantly comparing data sources to previous sources of data in the study (Charmaz, 2014). This process is repetitive and involves using procedures to generate codes and categories that reflect multiple layers of meaning (Charmaz, 2014). These codes and categories are then repeatedly compared to one another throughout data analysis in an attempt to cover every possible combination. This allows the researcher to form a more nuanced picture of phenomenon under consideration (Charmaz, 2014).

Visual data were coded in "chunks" (Liebenberg, Didkowsky, & Ungar, 2012, p. 68) and placed in categories. I then wrote extensive memos while reviewing the recorded interviews. In my memos, I wrote my general thoughts of the content and specific words and phrases used by participants that captured key details related to the process. I memoed extensively throughout the analysis. After open coding, I engaged in axial coding of the data to further enrich the findings. This allowed me to develop key constructs related to the process of design for general classroom facilities. To assist with the process, I created coding maps demonstrating how open codes connected to axial codes and to the larger theory of design (see Appendix H for an example).

Cross Case Analysis

After analyzing each case individually, I began to analyze data across cases. I started with the process models created for the design process in each specific case. By examining and comparing the steps within each case, I was able to develop an overarching process model of the process of design/construction of general classroom facilities.

I then moved to the individual case narratives. Codes and categories developed from one case were compared to and applied to subsequent cases. As new codes and categories emerged, I reexamined data to confirm and verify those new items. By comparing items across cases, I developed an overall theory of design/construction of general classroom facilities. After completing this process, I was able to answer the research questions posed in my study.

Cases

This study consisted of three cases, described here in brief. Administrators at the first institution included in this study constructed a new building with more than 100,000 square feet, costing more than $45 million dollars. This five-story facility included general classroom facilities intended for use by a specific college at the institution. This building was intended to accommodate *30% growth in that college's enrollment*.

Administrators at the second institution included in this study also constructed a new building with more than 100,000 square feet, costing more than $40 million dollars. This facility included general classroom facilities intended for use by a specific college at the institution. This building became *the gateway to the institution*.

Administrators at the third institution included in this study renovated an existing building used by the largest college at the institution. The renovation cost more than $4 million dollars and covered more than 25,000 square feet. Renovations took place to general classroom facilities on the first and second floors, as well as pathways and entrances to the facility on three

floors of the existing facility. This renovation was intended to update a facility originally constructed in the 1960's, to address accessibility concerns with the existing layout, and *to make it a better teaching facility*.

The Process of Design for General Classroom Facilities

The three cases used in this study exemplified a different approach to design and construction projects for general classroom facilities higher education. By analyzing data across cases I was able to answer the study's research questions. My first research question asked what are the steps or phases of design for general classroom facilities at public higher education institutions. When compared across cases, a general pattern of stages and phases emerged.

Each case experienced two stages with four phases. While each case exhibited the same number of phases, differences appeared in the number and sequence of steps taken during each phase. The two stages of the process had clearly distinct functions. Stage 1 focused on Making the Case and includes the planning and design phases. Participants described activities such as *making the case*, determining institutional needs, determining the scope, developing a design, creating a design, and reimagining a space. One participant called it determining "the official what" of the project. This is the stage where the *budget and scope* of the project are set. Administrators in this stage make decisions about what will and will not go into the new space.

Stage 2 focused on Making the Space and includes the construction phase and occupation and warranty phase. Participants described phases such as pre-demolition, construction, reoccupation, final take over, occupation, and warranty as part of this stage. The line separating the two stages is fluid but still important. While some elements of design and construction bleed together, facility administrators are generally committed to the overall idea and plan of action once this line is crossed. Minor changes can be made in Stage 2, but "major changes should be

addressed during the design" phase according to one participant. In this stage, administrators implement the budget and schedule determined in Stage 1.

Conditions Specific to the Institution and the Wider Context

Research question two examined the conditions specific to the institution and the wider context that contributed to the process of design. Several conditions emerged from the data. These conditions influenced how participants approached the process and reflected commonalities across cases.

Conditions specific to the institution.

Two conditions specific to the institution emerged from the data as influential to the design process. First, institutional and college level priorities inform the possibilities of design and construction. Participants described different initial motivators for each of the cases, (i.e. creating community for the discipline, growing the discipline, elevating the position of the college, making accessible, and updating the college's facilities) stemming from the overarching institutional or college level planning. For example, one interviewee explained that their building project was intended to address accessibility concerns on campus, in addition to creating "a better teaching facility" for the department. Another participant described several concepts stemming from the college level strategic plan that set the parameters for the new space: "[discipline] on display," "student engagement with faculty research," and "[discipline] education and outreach."

Second, the physical location of the project matters. It sets some basic parameters for the design process of general classroom facilities. Participants discussed the location influencing phases of the design, demolishing existing materials, addressing accessibility, and incorporating special materials all stemming from the selected location for each project. These concepts were exemplified by one participants account, noting "the way the university has developed to the

south" heightened the focus on accessibility as this facility "served as a circulation" pathway from one portion of campus to another. Another participant recounted how designers incorporated special materials into the design of a facility to accommodate noise from a major city intersection. "The fact that this building was on [a major city street], and we have the 18 wheelers, noise was an issue." The design team addressed this concern during the design phase of the process to ensure the building's functionality once completed.

These two concepts act as a launch point for general classroom facilities design and construction projects. Priorities established at the institutional and college level and the location of the facility on campus provide a foundation for administrators to anchor the planning and design phases of the process. They set the initial direction of a project and function as the initial constraints of the project. Without this basic foundation, administrators could not successfully begin the process of design.

Conditions specific to the wider context.

The second part of research question two concerned conditions specific to the wider context of the process. The first condition to emerge from the data was pedagogy embodied through design and construction. Participants discussed engaging in behaviors such as embodying pedagogy, translating pedagogy into the physical world, and converting needs to designs. In each case, administrators sought detailed feedback from faculty members who would ultimately inhabit each new space regarding how they teach and make us of different spaces. Each discussed pedagogy and its importance to the design process. One project sought to redefine the general classroom: "Traditional classrooms are designed with traditions of teacher authority and student independence and competition. We have an opportunity to modify this pedagogical design." A participant from another case noted "we're wanting to create places for

active learning, places for students and faculty to interact" in the facility. Changing the way students and faculty interacted in the classroom was a big priority for the project.

Planning the future through facilities design emerged as another influential condition related to the wider context. Participants talked about incorporating flexibility and predicting the future when designing their respective general classroom facility. According to one participant, "you're not going to get another new building from the Commonwealth for that purpose for another 30-40 years, so let's do it right the first time." Another participant discussed "seeking not to specify" so as to be flexible for future needs. In each of the cases examined in this study, participants actively acknowledged that they were planning for the future needs of different colleges or schools on campus.

Another condition specific to the wider context of the process of design was that of building consensus through collaboration. In each of the cases studied, collaboration occurred on many levels throughout the design process (i.e. including campus stakeholders in the process, the handling of change orders, and project leaders collaborating together). This collaboration was necessary to help move the project through the various phases of design. One participant discussed "user meetings" during the design phase that incorporated the different disciplines set to inhabit the facility. In addition, input was sought from "IT, mechanical, mediation, [the registrar], housekeeping, structural, landscaping and grounds, and parking and traffic" on campus. Another participant describe multiple meetings with campus constituents,

> What we did is, we actually set up within the university, we have a meeting every two weeks with the design team, then after that we meet with the owner, which would be [two depart members] as being the owner's representative for the school.

In all cases, collaboration was necessary to deal with change orders to the project. One participant talked about meeting with stakeholders to decide "do we want to change it, do we want to keep moving forward, would there be a cost savings, [and] would there be an increase to the project?"

The conditions specific to the wider context acted as boundaries for the process. General classroom facilities projects navigate within the boundaries of embodying pedagogy through design and construction and planning the future though facilities design as they move through the phases of the process. Administrators are continuously using those boundaries as guides to ensure the project maximizes the benefits of the final product in relation to its initial specific conditions. Building consensus through collaboration acts as connection points between the two boundaries. Through collaboration, everyone gains a better "understanding of how to translate needs into physical space." The collaboration displayed by project administrators and stakeholders makes sure that decisions made on the project connect both current pedagogy and future needs of the tenant disciplines together.

Leveraging Resources

Research question three examined how resources were leveraged throughout the process of design. The three most important resources discussed by participants were the project's budget, time, and a triumvirate consisting of three distinct participant roles: the project manager (PM), the construction manager (CM), and the academic department's representative. Financial resources were leveraged most effectively by using value management or value engineering processes. Each of the projects incorporated some form of value engineering as part of the process. Participants discussed different value management actions and behaviors such as value engineering through process decisions, negotiating to save money, matching the budget with design, and managing costs which all contributed to this theme. One participant talked of

negotiating "items one at a time" to ensure that you are spending your budget as wisely as possible. If "that's going to cost us a dollar, where can we go take a dollar out of the job? So you're doing that kind of negotiation stuff." Another participant noted how the team decided to "cut the scope of work down," to lower costs. This decision led to financial savings that could be put back into the parts of the project that remained within the scope.

Time was leveraged most effectively through prior planning. In each case, planning ahead saved valuable time. Participants described making schedules, investing other resources into planning, and sticking to schedules as ways in which planning ahead saved time. One participant noted that planning ahead allowed for "key decisions [to be] made in a timely manner." Another participant noted, "the more investment you make in [planning and design] the better the process goes and the better the end result is." Another participant discussed "saving several months" of time on one project by carefully planning how construction would unfold while still finishing the final details of the design. These types of planning activities ensured time was leveraged as efficiently and effectively as possible.

Human resources were leveraged most effectively by building trust through communication. In each case, the functioning relationships between the members of the triumvirate were critical to the flow of the project. Trust was a key factor in building positive working relationships among the triumvirate. Participants described actions such as the triumvirate members acting as communicators, triumvirate members acting as leaders, and meeting to discuss progress all contributing to the buildup of trust among the triumvirate members. One participant noted, "it's about getting the right people to the table at the right time." Keeping each member of the group up to date on changes to the project helped building a positive working relationship with all parties. Another participant talked about how the team

"went around [the site], and talked about what the vision was, and how much it would cost, how quickly we could get it done" ensuring everyone was on the same page in regards to the how to proceed. This positive working relationship or trust that was built up over time helped keep each of the projects on course.

Leveraging resources in these ways ensured the process of design continue to move forward and that projects worked toward completion. These resources drove the progress of the project. Making the most of your budget, time, and the working relationship among the triumvirate emerged as critical component to the smooth progression of a general classroom facilities project. Failing to engage in value engineering, failing to plan ahead and invest forethought into decisions, and failing to build trust among the triumvirate leads to a breakdown in the process, a loss of momentum, and a halt to the progress of the project.

Explanations for How the Process is Implemented Differently by Institutions

Research question four examined explanations for how the process was implemented at different institutions. While all cases followed the same stages and phases, the steps taken within each phase varied in number and sequence. Explanations for these difference emerged from the data. First administrators made use of available state level procedures to transition phases in the overarching process. Participants described using Bureau of Capital Outlay Management (BCOM) procedures, using a University Building Official (UBO), and following state requirements to make use of the available state level procedures. As one participant described it, "BCOM reviews throughout the process." In each of the three cases, institutional administrators used either the services of the BCOM or an internal UBO to obtain key document approvals during all phases, conduct critical inspections of work throughout progress, and grant certificates of final occupancy. The transition from one phase to another was marked by some use of a state level procedure by administrators (i.e. "the UBO issued the certificate of

occupancy," signaling the transition between the construction and occupation and warranty phases).

Another explanation that emerged from the data was that renovations require additional considerations not found in new construction. Administrators discussed relocation of existing people and programs, enabling projects, and working around the existing usage of the facility as critical activities related to the successful completion of a renovation. During planning, institutional administrators "had to determine swing space," or where existing faculty and programming would move to while renovations took place. Additional steps take place in the construction phase of the new space to ensure critical systems in the building continue to function. "We found somethings that [weren't] according to the original documents that was issued on the building when originally built." This resulted in more steps occurring during the construction phase of the process.

The final explanation to emerge from the data related to procurement methods used by institutional administrators when acquiring construction management firms. When and how you procure your construction management firm greatly impacts the design process. Participants discussed acquiring construction management firms during design, acquiring construction management firms during construction, and determining construction management style as influential to the process. Participants described several methods of procurement for construction management firms such as "design-build, design-bid-build, and CM at Risk." The CM at Risk method involves bringing the CM onto the project during design. In one case, participants described an internal process using no external procurement procedure, mirroring a CM at Risk process. What became clear from the project narratives was the impact this choice makes on the implementation of the process. According to multiple participants, the sequence of

steps in the process changes depending on when the CM was brought into the process. According to one participant, "in the best of all worlds, you would bring the CM at risk on during [the design phase]." Bringing the CM onto the project during the design phase allowed collaboration and trust to begin to build earlier in the process and allowed the CM to comment on designs before they were finalized. This allows the CM to "give us constructability and cost estimates," and provide feedback during all value engineering processes. This reduced the overall time needed to produce a design and the number of change orders enacted during construction.

These factors all contribute to the process playing out with more or less steps on any one given project. The available state procedures, the type of project (new construction vs. renovation), and the procurement methods implemented to secure a construction management firm all influence how institutional administrators implement the process. They afford the triumvirate different options and contribute to the differences in implementation of the design process seen between general classroom facilities projects.

The Train Model of Design for General Classroom Facilities

These findings coalesced into the "Train Model of Design for General Classroom Facilities" (see Figure 1). This model depicts the process by which participants designed and constructed general classroom facilities at public, four-year institutions.

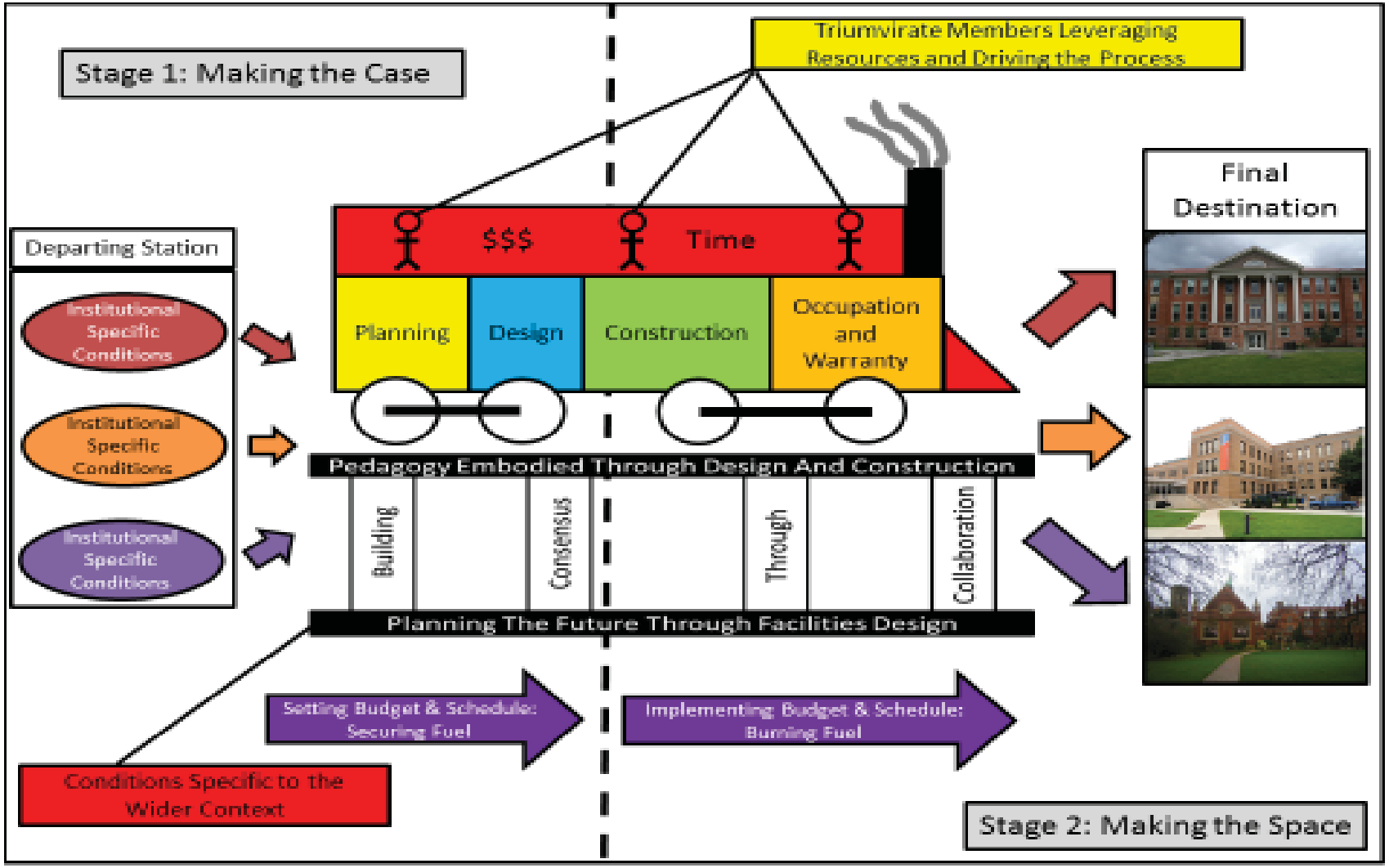

Figure 1. The train model of design for general classroom facilities. See the reference list for photographic citations.

The process begins with the specifics of the institution or college and its chosen direction. The conditions specific to the institution act as a departing station for the process. The conditions specific to the wider context function as the rails on which the train moves. The rails are held together by crossties consisting of the constant collaboration of the triumvirate and stakeholders. The triumvirate (the PM, CM, and academic department representative) functions as the conductor of the train, driving the process while feeding it two distinct types of fuel: budget and time. The triumvirate must continuously monitor the fuel supply to reach the end of the process. In addition, the triumvirate continuously monitors the passengers, to incorporate their feedback into the trip.

The stages of the process function similarly to boarding and disembarking on a train. In Stage 1, Making the Case, you prepare to leave the station. You make a case for what travels on the train with you and what gets left at home. You also determine the fuel needs of the train by setting the project budget and schedule. Stage 2, or Making the Space, consists of the travel to the final destination, carrying along those well laid plans from Stage 1. The triumvirate drives the train while carefully monitoring the fuel levels. You can make a few minor adjustments once you have left the station, based on feedback from the passengers, but drastically altering the plans is not a viable option. The type of train you drive represents the different ways in which the process can play out at specific campuses. A passenger train works differently compared to a freight train. The number and sequence of steps in the process of design will vary depending on the type of project you are undertaking (new construction vs. renovation), the available state procedures, and the timing of your procurement of a construction management firm (i.e. the different types of trains you can take). The final destination of the train is the completed general classroom facility.

Discussion

Without co-creating diagrams with participants, and taking advantage of situating the process as a third thing (Watt, 2015), I would not have developed as rich a model of the process of design for general classroom facilities. Participants described a similar process of design for general classroom facilities at each of the campuses included in this study. Each case experienced two stages with four phases. While each case exhibited the same number of phases, differences appeared in the number and sequence of steps taken during each phase.

Participants all pointed to institutionally specific contexts such as campus strategic plans, campus master plans, and project locations as starting points for the process. This reflects Hendrickson and Au's (2008) notion that "the programming of capital projects is shaped by the strategic plan of an organization," (Hendrickson & Au, 2008, Ch 2, para. 15). Dooris, Kelley, and Trainer (2004) and Hinton (2012) contend strategic plans are the institution or a college's lifeblood and compass, setting the course for many years to come (Dooris, Kelley, & Trainer, 2004; Hendrickson & Au, 2008; Hinton, 2012). The purpose of strategic planning in the context of higher education is to improve the institutions condition in relation to faculty and student recruitment, facilities, academic programs, student services, and or resource acquisition (Dooris et al., 2004; Hinton, 2012). "A campus master plan is a physical manifestation of a university's strategic plan," (Lehigh University, 2016, para 1). This plan maps out how facilities will aid in the execution of the strategic plan (Lehigh University, 2016). At the heart of these plans "is this human capacity for intentionality – this ability to formulate goals and proceed toward them with direct intent," (Dooris et al., 2004, p. 5). [1] The general classroom facilities built in each of the

[1] In the Commonwealth of Virginia, the mechanics of informing the possibilities of design and construction include a 6-year Capital Outlay Plan required of each institution by the Commonwealth. This plan identifies the capital building projects institutional administrators would like to undertake over the next six years and includes

cases were manifestations of this intentionality. “An essential part of strategic planning involves shaping the institution in ways that ensure mission attainment,” (Dooris et al., 2004, p. 6). Facilities construction on campus does this quite literally.

Participants also noted the importance of the location of the construction project. The physical environment is a critical contributing factor to learning quality (Block, 2008; Strange & Banning, 2001). Where you locate certain structures dictates where certain activities are supposed to take place on campus and says a lot about how an institution’s administration prioritize those activities (Block, 2008; Strange & Banning, 2001). Location also influences the design and construction of any facility on campus (Hendrickson & Au, 2008). Locations dictate what types of work can be done and in some cases what building methods to utilize (Hendrickson & Au, 2008). As a result, location is a critical factor for any construction on campus (Block, 2008; Hendrickson & Au, 2008; Strange & Banning, 2001).

Conditions specific to the wider context functioned as guiderails for the projects. The first guiderail consisted of pedagogy embodied through design and construction. Jamison, Dane, and Lippman (2005) discussed the importance of collaboration between teaching faculty and designers, noting “architects and designers need to be informed of new pedagogical developments” (p. 21). This creates “opportunities for the architects and designers to understand the teaching strategies and approaches presently employed at the university as well as likely future practices” (Jamison, Dane, & Lippman, 2005, p. 21). By incorporating this collaboration, designers gain an understanding of “the diverse learning environments required for the range of teaching and learning activities scheduled on a daily, weekly, monthly or yearly cycle” (Jamison, Dane, & Lippman, 2005, p. 21).

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justifications for each. For capital level facilities projects to receive Commonwealth approval, they must appear on the institution’s plan and move up the priority list over time.

The second guiderail consisted of planning the future through facilities design. Facilities are expected to last a long time making the task of planning for the future critical to the exercise (Hendrickson & Au, 2008). Planners need to address this concept head on when designing a new facility (Hendrickson & Au, 2008). As indicated by participants, institutional administrators did just that as they worked through the process.

Tying these two rails together was the collaboration displayed by the triumvirate and stakeholders. Modern facilities construction requires PMs and CMs to work with a wide variety of stakeholders in addition to the principle occupants (Hendrickson & Au, 2008). They must incorporate a wide variety of needs into the building while keeping its original intent in mind (Hendrickson & Au, 2008). Effective collaboration makes this a possibility (Hendrickson & Au, 2008).

Time and budget resources function as the fuel of progress for each project. Large-scale facilities construction projects require large budgets (Hendrickson & Au, 2008). Careful management of the projects budget is the key to successfully completion (Hendrickson & Au, 2008). One way to accomplish this is through value engineering. Value engineering is defined as any systematic attempt made by an organization to identify and reduce unnecessary costs in the proposed designs or construction methods of the project (Hendrickson & Au, 2008). This process can occur during the planning, design, or construction phase of any new construction or renovation project (Hendrickson & Au, 2008). It is a highly recommended method for matching design specifications with actual budgeted dollars (Hendrickson & Au, 2008).

Good scheduling is also a necessity for any large facilities project (Hendrickson & Au, 2008). Project scheduling ensures the necessary materials and workers are on the project at the

appropriate times (Hendrickson & Au, 2008). Poor scheduling of a large scale facilities project usually results in delays to completion (Hendrickson & Au, 2008).

The triumvirate drives the process forward while monitoring resource usage. The trust built among the triumvirate helps to facilitate the progress of each project. In large-scale facilities projects, leadership is critical to project completion (Hendrickson & Au, 2008). Without strong leadership and communication between the owner of the facility, the PM, and the construction team, a project will not be successful (Hendrickson & Au, 2008). A close working relationship is necessary between the PM, CM and owner of the facility throughout the project's lifecycle (Hendrickson & Au, 2008). Communication between all parties is critical to this concept (Hendrickson & Au, 2008). The triumvirate members in each case examined in this study were able to build trust through communication.

The design process is implemented differently at institutions based on the available state procedures, the type of project (new construction vs. renovation), and the procurement method used to select a construction management firm. In 2005 the Commonwealth of Virginia passed the Restructured Higher Education Financial and Administrative Operations Act of 2005 (Restructuring Act). The Restructuring Act created "a three-tiered system that ties each institution's level of autonomy to its administrative and financial capacity and ability to meet the state's policy goals," (Office of Legislative Research, 2005, para. 1). Regarding building projects, the three-tiered system gives certain institutions autonomy to approve and conduct capital level projects without going through the central BCOM office in Richmond (Restructuring Act, 2005). Instead, those institutions make use of an onsite UBO.

Government regulation of facilities design and construction happens throughout the United States (Hendrickson & Au, 2008). At the local, state, and federal level, there are

regulations related to the planning, design, construction, and occupation of any large-scale building project (Hendrickson & Au, 2008). While the cases in this study followed the procedures set forth by the Commonwealth of Virginia, all higher education institutions around the country would follow their state's procedures for facilities design and construction at public institutions. Administrators should make themselves aware of what those procedures are for their individual state.

The differences in number and sequence of steps between new construction and renovation projects seen in the data reflect Douglas's (2005) thoughts on renovations. Renovations require "a carefully staged process that minimizes downtime" (Douglas, 2005, para. 1). Administrators must take this into account when planning renovations. These types of projects deal with a preexisting space utilized by people and programs at the institution (Douglas, 2005). "The variety and complexity of unknowns in an existing building makes planning" difficult (Douglas, 2005, para. 2). Swing space availability is critical for this stage (Douglas, 2005). During the design phase, it is important to determine how you will keep key systems online during the renovation (Douglas, 2005). Participants set the construction schedule around class times. This allowed greater control over when and for how long certain nosy activities took place (Douglas, 2005).

Experts also agree with the finding that procurement methods for construction management firms impact how a project is implemented. Under CM at Risk, the CM is brought into the process during the design phase (3D/International, 2015). CM at Risk "is gaining popularity in the public sector," (3D/International, 2015, p. 1). The CM at Risk procurement method brings the CM onto the project with enough time to provide input on the designs (3D/International, 2015). Institutional administrators "recognize that contractors have

experience, wisdom, and creativity too. They want this talent on their side of the table during the design phase, not just during construction," (3D/International, 2015, p. 2). CMs can also get started on actual construction work prior to completing the details of the design (3D/International, 2015).

Conclusion

College administrators influence the quality of learning taking place at their institution by carefully designing and constructing general classroom facilities on campus. By understanding the process of design used for general classroom facilities, institutional administrators can understand what their role is in the process and how that role influences project completion. The Train Model of Design for General Classroom Facilities gives administrators a "rail map" for successfully engaging in the process of design for general classroom facilities. It depicts the stages, and phases taken when designing and constructing general classroom facilities at public higher education institutions. It offers insight into how resources are managed and how different projects can playout given their purpose. Most importantly, it demonstrates how pedagogy manifests in the designs of the space itself. The linkage of pedagogy with design is a critical component to successful general classroom facilities projects at any public campus.

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Chapter Five

Abstract

This article examines the use of visual methods in educational research and specifically the inclusion of participant co-created diagrams as sources of imagery data. While visual methods typically focus on the incorporation of photographs or videos as sources of data, participant co-created diagrams can also be considered as legitimate sources of visual data. Using my study on the process of design for general classroom facilities in higher education, I demonstrate how diagrams can be used as a data source. Diagrams are a great way to capture details on a process and are very compatible with grounded theory.

Diagrams are Worth a Thousand Words: Using Visual Methods to Examine the Design Process for General Classroom Facilities in Higher Education

Visual methodologies are steadily becoming more prevalent in sociological and educational research (Caulfield, 1996; Harper, 1988; Harper, 1994; Kingsley, 2009; Konecki, 2011; Liebenberg, Didkowsky, & Ungar, 2012; Margolis & Pauwels, 2011; Pink, 2001). Visual methods focus on images as a source of data and can be combined with other methodologies to produce a fuller picture of the phenomena or process under study (Caulfield, 1996; Harper, 1988; Harper, 1994; Kingsley, 2009; Konecki, 2011; Liebenberg et al., 2012; Margolis & Pauwels, 2011, Pink, 2001). Images become a vehicle for accessing ideas and experiences not expressed by participants through other methods (Liebenberg et al., 2012).

Visual methods give researchers the ability to reach another undiscovered layer of data, strengthening results and conclusions that emerge from the data (Caulfield, 1996; Harper, 1994; Kingsley, 2009; Liebenberg et al., 2012; Pink, 2001). Traditional visual methods involve the use of photographs, artwork, and video recordings created by participants and or the culture in which those participants operate as sources of data (Caulfield, 1996; Harper, 1988; Harper, 1994; Kingsley, 2009; Liebenberg et al., 2012; Margolis & Pauwels, 2011; Pink, 2001). One type of imagery lacking from the literature on visual methods are participant produced diagrams. I propose that diagrams created by participants are another valid form of imagery data suitable for use with visual methods.

Using my dissertation research as an example, I demonstrate how the use of participant created diagrams enhanced the inherent strength of the resultant model. The diagrams created were visual maps of the steps of the process of design for general classroom facilities. I examined the process of design for general classroom facilities at American public institutions of

higher education. Incorporating visual methods into my research allowed me to uncover elements of the process of design that would have remained hidden had I only conducted interviews. By asking participants to draw diagrams as part of the interview process, I produced a fuller picture of the process of design for general classroom facilities at American public higher education institutions.

Literature Review

"Images are everywhere" (Pink, 2001, p.21). They are found in all facets of our life from our work, to our homes, to even our dreams (Pink, 2001). As Liebenberg et al. (2012) note, imagery allows individuals "to construct visual representations of how they personally experience and understand their lives," (p.60). Images produced by research participants provide a unique window into how that person experiences a particular phenomenon or process (Caulfield, 1996; Harper, 1994; Kingsley, 2009; Konecki, 2011; Liebenberg et al., 2012; Margolis & Pauwels, 2011; Pink, 2001). With such a pervasive nature, qualitative researchers can gain a wealth of information by incorporating visual data into their studies (Caulfield, 1996; Harper, 1988; Pink, 2001).

Caulfield (1996) explains that images are of interest to researchers for three reasons. Images "reflect the lifeworlds and social relations of their makers and users" (Caulfield, 1996, p. 57). Participant created images provide a view of how the individual sees, feels, or experiences a particular phenomenon. Images "are often formative elements of social life" (Caulfield, 1996, p. 57). Images play an important role in society and influence how we conduct our lives. They may be central to the particular phenomenon under study. Finally, images "may hold documentary information about their subjects" (Caulfield, 1996, p. 57). Imagery can provide details and other means of description not available in other types of data.

Images are products of social construction and need to be considered in relation to other forms of data (Kingsley, 2009). Pink (2001) noted that relationships between images "and other research materials and experiences (including memories, diaries, photographs, notes and artifacts) provide important insights as each medium may represent interrelated but different types of knowledge about the same theme" (p. 110). As Liebenberg et al. (2012) describe, use of imagery causes participants to engage in a reflective process and enhances the narratives they provide. Visual methods tend to produce data not found with the use of more traditional qualitative research techniques (Caulfield, 1996; Harper, 1994; Kingsley, 2009; Liebenberg et al., 2012). In essence, visual methods give you another layer to the story that may not have emerged just by talking to a participant (Kingsley, 2009; Liebenberg et al., 2012; Pink, 2001).

Visual methods are very compatible with grounded theory. Grounded theory has traditionally emphasized the study of temporal processes (Charmaz, 2014). A process is a series of events connected in time that have clear starting and ending points and that lead to some form of change (Charmaz, 2014). Visual methods can provide another source of data relative to a persons' experience with a system or process, complementing grounded theory based studies. The sample study provided below examined the process of design for general classroom facilitates. This is a time-based process which begins with institutional administrators taking actions to define the scope of the project and ends with a change to the campus in the form of a new general classroom facility. As such, it was an excellent topic for both grounded theory and visual methods.

When considering the use of visual methods, Pink (2001) contends that researchers must consider "how visual methods, images and technologies will be interpreted by individuals in the cultures where research will be done, in addition to assessing how well visual methods suit the

aims of specific projects" (p. 42). Questions such as "is this something that your participants will understand", "will they be interested in doing this", or "will they be hesitant to engage in this activity" are important to consider for a researcher before beginning your study. In addition, the researcher must decide if visual methods are even appropriate for the topic (Banks, 1995; Pink, 2001). It is important to make sure that imagery is an appropriate data source given the subject under study (Banks, 1995; Pink, 2001). In some cases, imagery may not be an appropriate data source. For example, in some cultures it is forbidden to produce imagery related to certain entities or topic. If a researcher was studying one of those topics in such a culture, it would not be appropriate to asks participants to create imagery related to the phenomenon under study.

Researchers have studied the incorporation of photographs, videos, and drawings as data in qualitative research (Caulfield, 1996; Harper, 1994; Kingsley, 2009; Konecki, 2011; Liebenberg et al., 2012; Margolis & Pauwels, 2011; Pink, 2001). What is lacking from the literature is a discussion of participant created diagrams that represent a process as data worthy imagery. This article attempts to fill that gap by providing an example of visual methods research that incorporates participant co-created diagrams as a source of data. Next, I discuss how visual methods were incorporated into my study and what benefits the resulting model exhibited from their inclusion. I offer insight for researchers on how best practices for using co-created diagrams as data.

Diagrams as Visual Data: A Case Study

This study explored the design process for general classroom facilities at four-year public higher education institutions. I conducted interviews with people responsible for the design of general classroom facilities at different public higher education institutions using a talk out loud

protocol. As part of this process, participants co-created with me a diagram of the process of design as they experienced and perceived it. By including visual methods, I was better able to understand what considerations influence the process of design/construction of general classroom facilities at higher education institutions in the United States.

Why Visual Methods were Appropriate

Visual methods were appropriate for this topic in several ways. My study focused on a process. Images give researchers a unique window into how participants experience a specific process (Caulfield, 1996; Harper 1988; Kingsley, 2009; Konecki, 2011; Liebenberg et al., 2012; Pink, 2001). In this study, the participant co-created diagrams provided additional data on how participants experienced the process of design. The diagrams served as a form of picture making by participants and researchers as first articulated by Harper (1994). According to Harper (1994), the images produced by a participant are worthy sources of rich descriptive data. While Harper (1994) focused on image production in the vein of photography within his definition of picture making, any type of image created by participants or the researcher would fit his description, including participant co-created diagrams. This made their inclusion as part of the research design a natural fit.

The participant co-created diagrams spoke to two of Caulfield's (1996) three reasons for researcher interest. The diagrams reflected how participants experienced designing a specific general classroom facility (e.g. reflected their lifeworlds and social relations in regards to the process). They also provided data that directly spoke to the steps taken in the creation of that specific facility (e.g. holding documentary information about the process) (Caulfield, 1996).

Diagrams were also a type of image participants all already associated with the process under study. Diagrams and flow charts were regular occurrences in their world and something they readily associated with the design process. By incorporating visual methods in the form of co-created diagrams into my study, I asked the participants to do something they were very familiar with and connected to the process already.

Finally, visual methods fit the pragmatic approach I took to this study and its research questions. I combined the use of visual methods with grounded theory to explore the process of design for general classroom facilities because those methods were most likely to provide data to address my research questions. Pragmatic approaches recognize that the world is multifaceted and can be approached from multiple different directions (Johnson & Onwuegbuzie, 2004; Saunders, 2011). As a result, pragmatists combine approaches to that are most likely to address specific research questions (Johnson & Onwuegbuzie, 2004; Saunders, 2011). In this case, the combination of visual methods and grounded theory was most likely to address my research questions.

Research Questions

Four research questions guided this study:

1. What are the steps or phases of design for general classroom facilities at public higher education institutions?
2. What are the conditions specific to the institution and the wider context that contribute to the design process of general classroom facilities at public higher education institutions?
3. How are financial and human resources used/leveraged to influence the design of general classroom facilities?

4. How do those most responsible for facilities explain how the process is implemented at different institutions?

Study Participants

I sought study participants with direct knowledge of the process of design for general classroom facilities in higher education. Participants' titles included project manager, construction manager, and dean. These individuals represented a variety of institutional offices such as facilities management, university planning, and individual college departments or schools. These individuals all participated in some phase of the design/construction of a specific general classroom facility on their respective campus used as the focal point of interviews.

I sampled participants purposefully (Charmaz, 2014; Creswell, 2012; Rossman & Rallis, 2011). Qualitative researchers use purposeful sampling to select specific participants who can provide data to answer the studies research questions (Creswell, 2012; Rossman & Rallis, 2011). Participants at first were selected based on initial requirements or boundaries I established. Boundaries determine your scope of what is or is not considered for inclusion in the study (Abma & Stake, 2014; Baxter & Jack, 2008; Miles & Huberman, 1994; Yin, 2003). These included participants from four-year public institutions in the Commonwealth of Virginia, whose administrators had designed or constructed new or renovated general classroom facilities, with a minimum budget of two million dollars, between January 1, 2012 and January 1, 2016. I chose those boundaries to ensure that all participants engaged in the process of design under the same regulatory and economic conditions. In addition, I wanted to ensure that the specific design/construction projects I would reference during the interview were of sufficient scale for comparison.

In total, I interviewed nine individuals about the process of design for general classroom facilities in higher education. Participants included five men, four women and came from three

different public institutions in the Commonwealth of Virginia. Their experiences working in a higher education setting ranged from three years at the least to more than 15 years at most. All indicated in their interviews that they had participated in multiple general classroom facilities projects, including the specific project selected for discussion in each interview.

As I began to interview and analyze data, I developed first codes, then categories from my data. Though I had already interviewed five participants, I needed more data to flesh out fully those emergent categories and sought additional participants to do so. This was a form of theoretical sampling (Charmaz, 2014; Patton, 2001). Theoretical sampling is an important element of the grounded theory methodology. It is a type of sampling focused on collecting data pertinent to your emerging categories (Charmaz, 2014). According to Patton (2001), theoretical sampling is the process of selecting "incidents, slices of life, time periods, or people on the basis of their potential manifestation or representation of important theoretical constructs" (Patton, 2001, p. 238).

This, for example, is how I began to target directors of capital projects construction or their campus equivalents to locate additional participants. I saw several categories develop from the data that really held promise, but I needed more data to fully flesh them out. One participant had mentioned how they reported to the director of capital projects, a role on the campus involved with all capital projects. I made note of this in my field notes and came back to it while analyzing my data. These individuals were directly connected with scheduling and budgetary concerns for all construction projects on campus based on their position within the organizational structure of the institution. They were also in charge of large teams of people and could speak about institutional mechanics from a higher vantage point. I felt those individuals would be able to add valuable details to my categories. By engaging in theoretical sampling in this way, I was

able to target additional participants that helped me further develop and refine my emerging categories.

Data Collection

Data collection occurred during the fall semester of 2016. I collected data through face-to-face interviews conducted with participants. A talk out loud protocol was used for each interview.

Interview protocol

The interview protocol for this study was a semi-structured talk out loud protocol consisting of 10 questions, focusing on a specific building project on the participants' campus (see Appendix D for the complete interview protocol). Talk out loud, or think out loud protocols, ask participants to use a system while continuously thinking out loud (Katalin, 2000; Newell & Simon, 1972; Nielsen, Clemmensen, & Yssing, 2002; Nielsen, 2012). The goal is to have participants verbalize their thoughts as they move through the process (Katalin, 2000; Newell & Simon, 1972; Nielsen et al., 2002; Nielsen, 2012). This allows the researcher to gain insight into how the person approaches a problem and may lead to key details, which other methods may have missed (Nielsen et al., 2002; Nielsen, 2012).

During each interview, I asked participants to co-construct with me a diagram of the steps of the process as they understood it. Interviews focused on a specific building project at the campus. This gave participants a concrete example to reference throughout the interview. I began by asking participants to draw the first step and indicated I would also add to the diagram as we moved through the interview. Participants drew and wrote out steps using colored markers, while I wrote in a black pen. The drawing pad was placed between the two of us in such a way that I wrote upside down on each of the diagrams. My contributions to the diagrams constituted on average five to 10% of the total diagram. In this way, we co-created a process

diagram representing that person's understanding of the process of design used to construct the specific facility discussed. As we progressed, I asked follow up questions to add more clarity and details to the diagrams. I also took field notes after each interview to collect initial thoughts and reflections on each interview.

Newell and Simon (1972) originally developed think aloud protocols to study problem-solving strategies. Designing general classroom facilities is a type of problem solving activity that involves considerable efforts from administrators to make sense of institutional and organizational needs and translate them into functional physical spaces on campus. Administrators engaging in the process of design for general classroom facilities are determining and developing the best type of space to meet the needs of the department, college, or institution as appropriate.

The talk out loud protocol also facilitated the use of visual methods by creating a natural vehicle for me to incorporate the creation of imagery into the interview process. Talk out loud protocols ask participants to speak their thoughts as they do a task (Katalin, 2000; Newell & Simon, 1972; Nielsen et al., 2002; Nielsen, 2012). I asked participants to draw diagrams with me as I asked them questions about the process of design for a specific facility at their campus. I wanted them to draw out the process as they experienced it while verbalizing their thoughts and insights on the process. Participants used charts and diagrams routinely as part of the design process. They also had firsthand knowledge of the steps of the design process as they experienced it. The talk out loud protocol created a structure where I could invite participants into a conversation about what they experienced as part of the process of design for a specific space while simultaneously affording participants the opportunity to express their insights

through imagery and verbalization. Using the talk out loud protocol, I obtained two types of data: the participant co-created diagrams and their words expressed during the interview.

Data Analysis

Data were analyzed inductively in this study (see Appendix G for a diagram of the analysis process). Inductive data analysis is "a process for 'making sense' of field data" (Lincoln & Guba, 1985, p. 202). Inductive analysis involves generating theories or constructs from the data itself (Charmaz, 2014).

Using a constant comparative method, I analyzed the data and my field notes via open and axial coding (Charmaz, 2014). The constant comparative method involves the researcher constantly comparing data sources to previous sources of data in the study (Charmaz, 2014). This process is repetitive and involves using procedures to generate codes and categories that reflect multiple layers of meaning (Charmaz, 2014). These codes and categories are then repeatedly compared to one another throughout data analysis in an attempt to cover every possible combination. This allows the researcher to form a more nuanced picture of phenomenon under consideration (Charmaz, 2014).

Analysis of the participant co-created diagrams was a unique process. Visual data is unlike traditional interview data and may or may not contain words (Liebenberg et al., 2012). As a result, visual data requires an alternative approach to line-by-line, or word-by-word coding traditionally associated with qualitative interview research (Liebenberg et al., 2012). Researchers need to approach the images in a way that clusters relevant segments of data together (Liebenberg et al., 2012).

I applied this approach in two ways. First, to address research question one, I grouped different steps found in a participant's diagram into common categories or phases of the process. As I analyzed additional participant diagrams I compared groupings and categories across

participants to refine my phases. This process helped me to identify the stages and phases of the process of design. For example, see the sample participant co-created diagram in Figure 2.

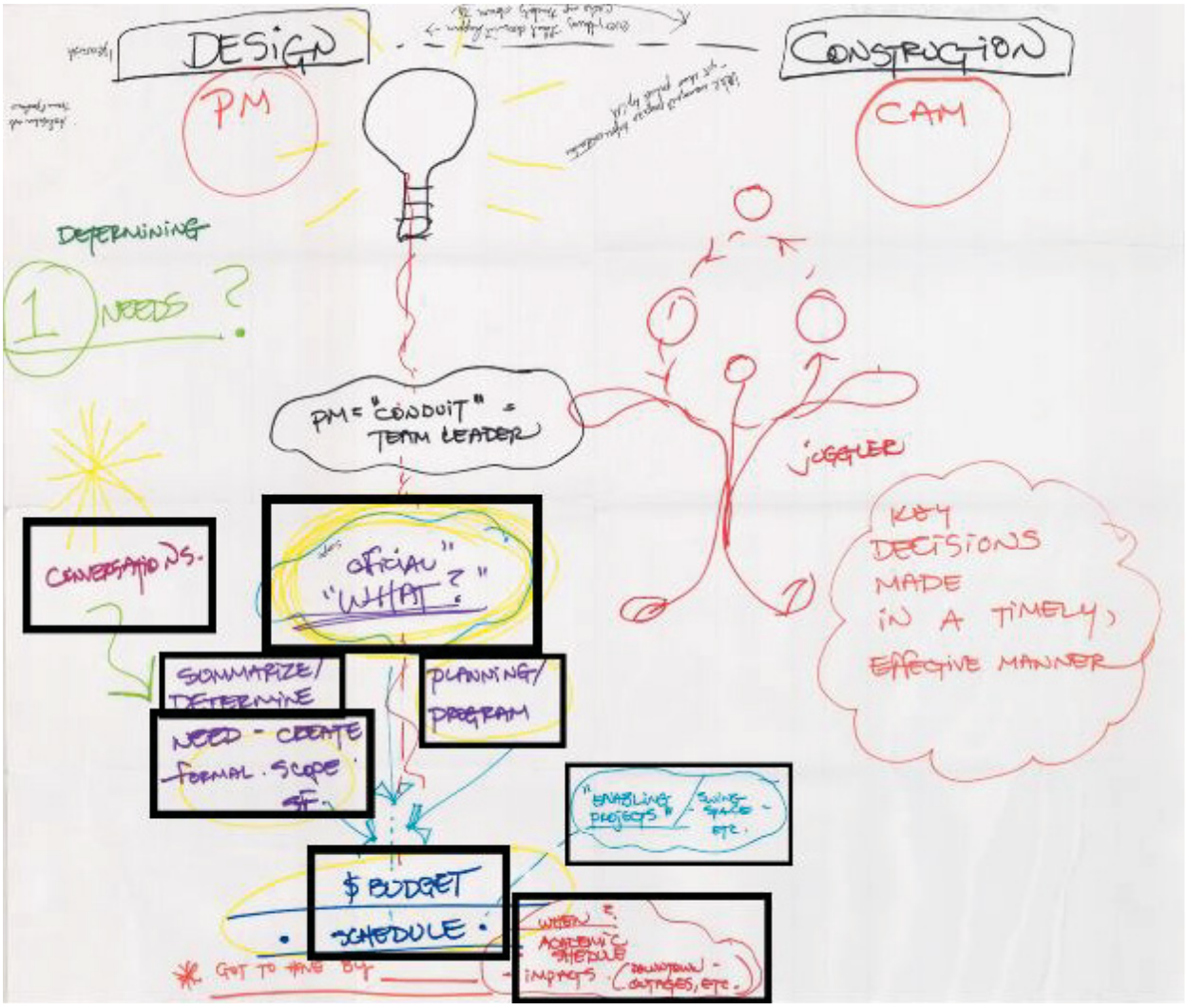

Figure 2. A sample participant diagram showing examples of coding relevant segments related to the steps of the process of design.

In this diagram, I drew a box around segments I grouped together under the focused code of "Making the case." The steps diagramed by this participant included under this focused code were "Conversations among university constituents," "Summarize/Determine needs," "Planning/program," the "Official what," "Create formal scope," "Determine budget and

schedule," "Determine any enabling projects," and "Determine impacts on other things." The focused code of "Making the case" combined with others that appeared across participants' diagrams, ("Determining scope," "Determining needs," "Conception," and "making a plan") to form the first phase of the process of design, the "Planning Phase."

Once this was process was complete, I turned my focus toward the remaining research questions. To answer these, I open coded the diagrams using what Liebenberg et al., (2012) described as "relevant segments or chunks" (p. 68) as the unit of analysis. I grouped relevant portions of the diagram together and applied open codes to those segments. Chunks could contain a mixture of words, symbols, and pictures that conveyed related information. Chunks were not necessarily confined to a single step of the process. For example, see Figure 3. Figure 3 shows sample chunks coded on the same diagram as seen in the previous figure, this time with a focus on the remaining research questions.

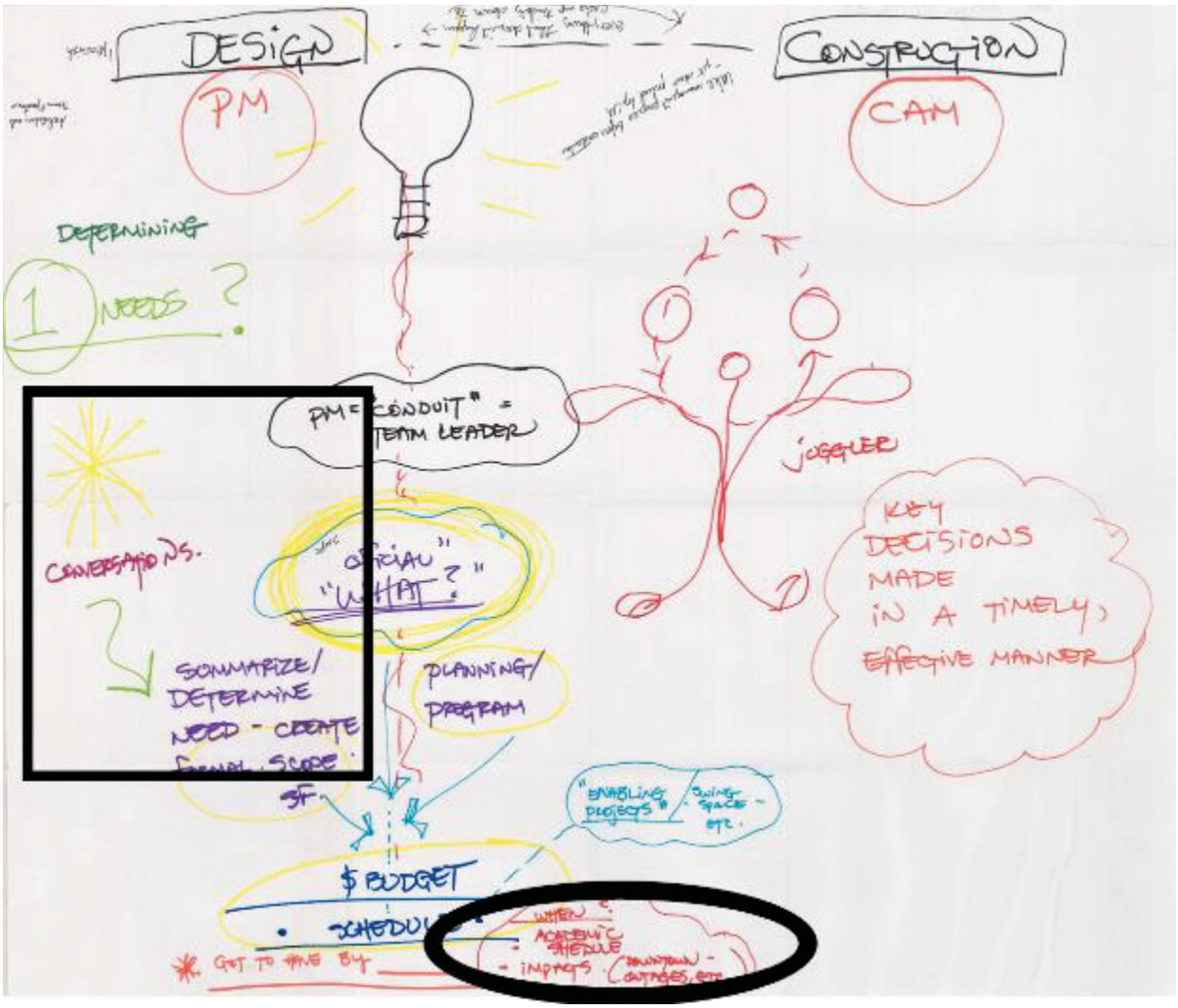

Figure 3. A sample participant diagram showing examples of open coding of chunks of data for the second research question.

In Figure 3, the chunk of data contained I enclosed within the oval received the open code of finding making compromises while the chunk of data in enclosed within the square was given the open code of including campus stakeholders in the planning phase. As I collected more diagrams, I compared new codes with codes from previous participants' diagrams. This allowed me to refine my codes and categories. In this way, I systematically coded each of the participant diagrams I obtained in my interviews.

Memos

Throughout my analysis, I wrote memos concerning the codes and categories to help me refine my thoughts on each. Memo writing is the "intermediate step between data collection and writing drafts of papers" (Charmaz, 2014, p. 72). Memos aid in documenting the connections and comparisons made among different pieces of data (Charmaz, 2014). They allow researchers to articulate "emergent insights, potential themes, methodological questions, and links between themes and theoretical notions," (Rossman & Rallis, 2011, p. 287). Continued use of memoing allows the research to reach higher levels of abstraction during analysis (Charmaz, 2014).

I also wrote extensive memos while reviewing the recorded interviews to capture my insights into the verbal data. In my memos, I wrote my general thoughts of the content, connections I was making between different pieces of data, codes and categories, and specific words and phrases used by participants that captured key details related to the process. I then open coded my memos related to the verbal data.

Below is an excerpt from a memo titled "Why We Built the [Building]." I wrote this memo while reviewing one participants recorded interview:

> There were multiple themes the committee was implementing. First, they wanted to create a community. Another theme, [discipline] on Display – which is why there is a whole lot of glass. Many of the rooms you can look into and see what's going on. They wanted students to see things going on and get interested in how they too could do that. Another theme was student engagement in faculty research. Another theme was [discipline] education outreach (a strength of the college). [The institution] previously had a homemade [discipline specific amenities in their classrooms]. These were greatly

enhanced in the new facility and will be able to serve more community members through the institution's [outreach] program for K-12 schools in the area (November 23rd, 2016).

Table 1 shows how I coded this section of the memo. Using the constant comparative method, I coded this memo with open codes and then focused codes.

Table 1

An Example of Memo Coding Using the Memo Titled "Why We Built the [Building]"

Example of Memo Coding		
Portion of Memo	Open Code	Focused code
There were multiple themes the committee was implementing.	Planning future space	Predicting the future
First, they wanted to create a community.	Create community in the space	Creating community for discipline
Another theme, [discipline] on Display – which is why there is a whole lot of glass. Many of the rooms you can look into and see what's going on.	Pedagogy turned into the physical	Translating pedagogy into the physical world
They wanted students to see things going on and get interested in how they too could do that. Another theme was student engagement in faculty research.	Getting more students	Growing discipline
Another theme was student engagement in faculty research.	Student faculty interaction	Creating community for discipline
These were greatly enhanced in the new facility and will be able to serve more community members through the institution's [outreach] program for K-12 schools in the area.	Create Community in the space	Creating community for discipline

Memoing also assisted with the coding process. Using memos, I worked through each of my codes to systematically to refine them into categories and themes. Codes that did not appear with enough frequency or that did not contribute significantly to the understanding of the process were abandoned. For example the open code of "asking for more money" appeared in early participant interviews. As more participants were added to the study, this code was later dropped as it was not consistently found across participants' interviews or diagrams and did not contribute significantly to my understanding of the process.

Axial Coding

After open coding my data, I engaged in axial coding of the data to further enrich the findings. I moved from open codes, to focused codes, to themes by continuously comparing codes across participants and memoing about the connections I saw in the data. This allowed me to develop key constructs related to the process of design for general classroom facilities. For example, the following open codes appeared repeatedly in my data: "keeping schedule critical," "staying on schedule," "scheduling driving process," "using time wisely," and "monitoring progress." I noticed a relationship between these codes all related to the importance of time. I grouped these codes together under the focused code of "sticking to schedules."

This focused code was then grouped with two other focused codes emergent from the data ("making schedules," and "investing other resources into planning") under the theme of "prior planning saves time." This theme appeared to be important in relation to research question number three. I first articulated this connection in one of my memos titled Making a Plan Beforehand. A portion of the memo stated:

> Planning ahead really is important to the process. Participants talked about making schedules, investing other resources into planning, and sticking to schedules in

> order to maximize their usage of time. Time it turns out is a critical resource in general classroom facilities design. When a project is conceived, it gets assigned an occupation date or time by which the building needs to be finished. When contracts are signed with construction management firms, they agree to get the job done by a certain date. Therefore, time becomes a huge resource for the triumvirate to manage.
>
> By planning ahead, the triumvirate was able to save valuable time in the process. Investing in the planning process brought greater clarity of design and less change orders. Making schedules helped to keep everyone on track as to what would be completed when, setting real expectations for progress. Sticking to schedules ensured time was used wisely and that the projects moved forward (December 20, 2016).

By memoing about "sticking to schedules," "making schedules," and "investing other resources into planning" and their interactions, I was able to connect those concepts and develop the theme of "prior planning saves time." Through memos on each of my emergent codes and categories, I was able to develop themes connected to the process of design for general classroom facilities.

To assist with the coding process, I created coding maps demonstrating how open codes connected to axial codes and to the larger theory of design (see Appendix H for an example of one research question's coding map). The coding maps charted the evolution of my coding system. They showed how open codes eventually resulted in themes connected to the theory of design.

Study Findings

Using the participant co-created diagrams in conjunction with traditional interview data, I was able to answer the research questions posed in my study. I developed the findings produced

from my data analysis process into the “Train Model of Design for General Classroom Facilities.” Figure 4 depicts this model.

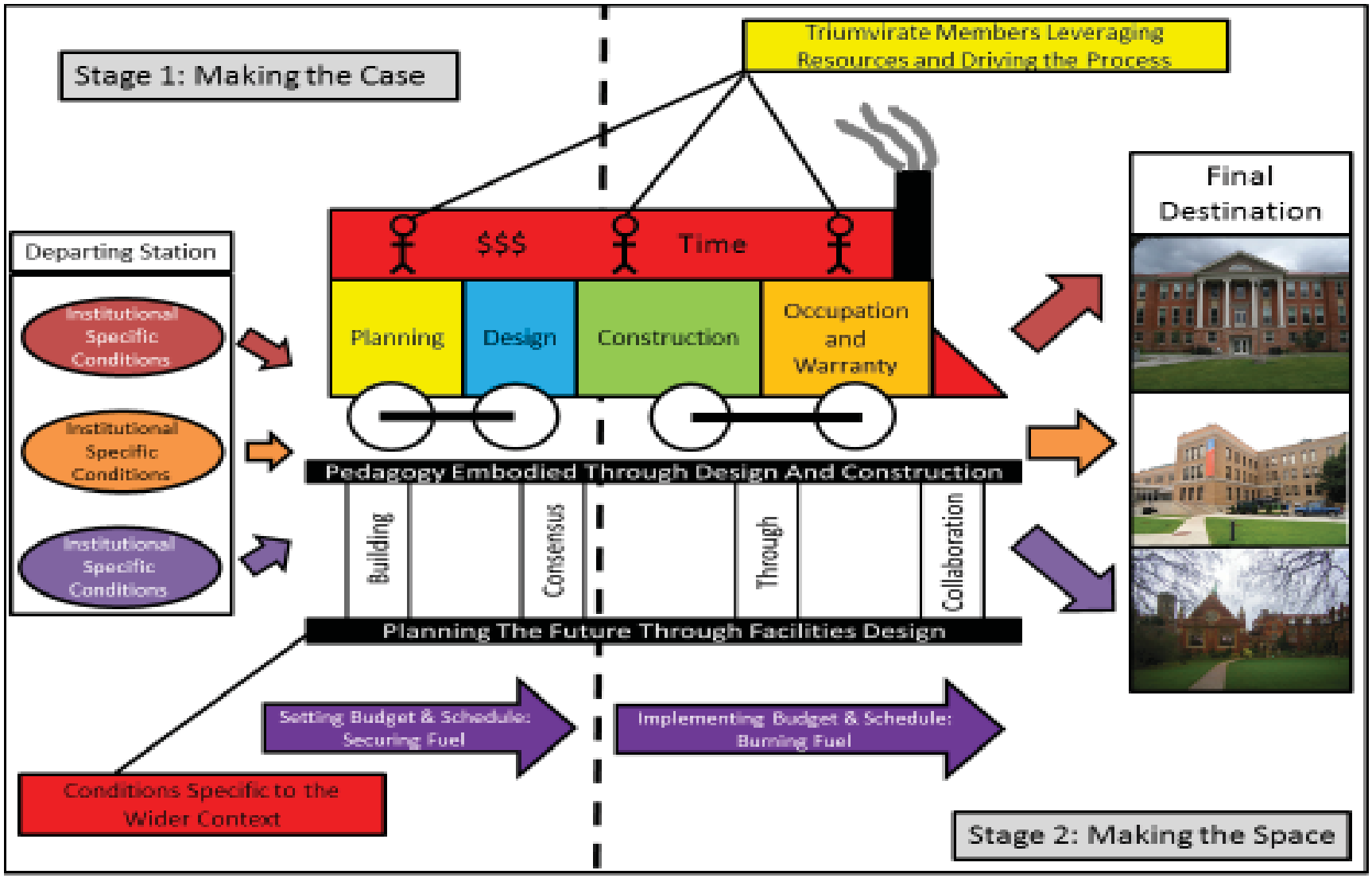

Figure 4. The train model of design for general classroom facilities. See the reference list for photographic citations.

Through my analysis of the data, I found that the process has two stages: making the case and making the space. These stages consist of four phases: planning, design, construction, and occupation and warranty, each with varying numbers of steps.

The process begins with the specifics of the institution or college and its chosen direction. Regarding research questions two, the themes of "Institutional and college level priorities inform the possibilities of design and construction" and "Physical location of the project matters" emerged from the data as important to the process. These themes were institutional specific contexts that acted as a departing station for the process. The conditions specific to the wider context, represented by the themes of "Pedagogy embodied through design and construction" and "Planning the future through facilities design," function as the rails on which the train moves. The rails are held together by the theme of "Building consensus through collaboration," acting as crossties and stemming from collaboration of the triumvirate (e.g. the academic department's representative, the project manager, and the construction manager) and stakeholders.

The themes of "Using value management or value engineering processes," "Prior planning saves time,' and "Building trust through communication" all coalesced to answer research question three. Resources function as the fuel for the train and are leveraged most effectively through value management and prior planning. The triumvirate acts as the conductor of the train, feeding fuel into the train as needed. Building trust ensures they work together to apply resources most effectively and get the train to its final destination.

Regarding research question four, three main themes emerged: "Making use of available state level procedures to transition phases," "Renovations require additional considerations, and "Timing of CM procurement methods impact the process." These themes represent different

types of trains one can use and are explanations for the different ways in which the process can play out at a specific campus. Just as a passenger train operates differently compared to a freight train, the number and sequence of steps in the process of design will vary depending on the type of project you are undertaking (new construction vs. renovation), the available state procedures, and the timing of your procurement of a construction management firm.

Benefits of Using Diagrams as Visual Data

Without the incorporation of participant co-created diagrams in this study, I would not have produced as full a model or description of the process of design for general classroom facilities as described above. Using visual methods, I collected and analyzed data in ways that interviewing alone could not have accomplished. The incorporation of visual methods allowed me to obtain not just interview data, but also data in the form of participant co-created diagrams. According to Charmaz (2014), "the depth and scope of the data make a difference" (p, 18). Multiple data sources meant more evidence to consider. By comparing these two forms of data I was able to develop a fuller description of the process and better answer my research questions.

The use of the diagrams as a focal point of the talk out loud interview protocol put participants at ease and made them more aware of the process under discussion. This helped to keep the participants on track and focused on the topic throughout the interview. As Watt (2015) notes, taking a complex process and situating it as a "third thing" allows participants to approach it from different viewpoints, providing new data (p. 34). The use of diagrams as the "third thing" for participants to focus on in the talk out loud protocol allowed them to create a visual of the process and fill in details about different steps as they discussed what they did.

Just as cameras used by participants for taking pictures serve as "a means through which an informed vision can be made concrete" (Harper, 1988, p. 60), the markers and paper used to

draw the participants' diagrams perform a similar function. My participants had intimate knowledge of the process of design for general classroom facilities and by asking them to create diagrams during the interview process I provided another means of expression for that knowledge. From the data in the diagrams emerged a much more detailed picture of the process of design. From those details I was able to compare experiences across participants and fill in the gaps of the larger model of the process of design. This enabled me to understand how the process worked and how projects progressed through each stage and phase of the process.

The use of diagrams worked well with this group of participants because they were accustomed to working with visuals regularly, especially diagrams. By incorporating the creation of diagrams into the interview process, I was able to present myself as a researcher who understood how they thought and what working contexts' they best understood. Participants, according to Pink (2001), like "to show as well as to tell" (pp. 41-42). Students and researchers had not typically asked to talk with my participants about facilities design and construction, so many were unsure of what to expect from an interview. Knowing ahead of time that they were going to be asked to make a diagram alleviated many of those fears.

I asked the participants to do something they did every day; what emerged from the data was just how excited they were that I had asked them to do it. Most of the participants indicated how much fun they had during the interview making the diagrams and talking about what they did for their day jobs. This showed in the creativity exhibited by some and the attention to detail exhibited by others in their diagrams. All of this unique data would not have emerged if I had approached these participants with a request for a traditional interview. This speaks to an important point made by Pink (2001); it is important to understand how your chosen visual medium will be received by the culture where your research takes place. I chose diagrams

because they were a type of image used by my participants daily and one with which they would have feel familiar creating and discussing.

Another benefit to incorporating diagrams related to the analysis of interview data. Because I had participants create diagrams as they talked about the process of design, much of their verbiage was already written down in the form of text, symbols, or pictures on their diagrams. This meant transcribing and coding participants' transcripts word by word or line-by-line was unnecessary. Instead, I was able to review the recordings of interviews while memoing. Memos aid in documenting the connections a researcher makes while analyzing data (Charmaz, 2014). By memoing, I captured key words and phrases that may not have appeared directly on participant diagrams without having to transcribe each interview word for word. The use of diagrams as data sources made the job of data analysis much easier. This saved valuable time and resources during the data analysis phase of the study.

Recommendations

Visual methods provide unique and interesting ways for researchers to approach a topic. Diagrams are one source of visual data researchers should use for future studies. Based on my experience, I have several recommendations for fellow researchers who want to incorporate visual methods, and specifically diagrams as data sources, into their research studies.

Recommendations Related to the use of Diagrams as Visual Data

First, diagrams are legitimate sources of imagery data, so use them. If appropriate for the study's research questions, diagrams can provide a wealth of data. Any educational research focused on the steps of a process would benefit from the incorporation of user created diagrams. The beauty of diagrams is that people of all ability levels are capable of making a diagram, given the proper instructions. Future research can adapt the concept of creating a diagram to fit the

needs of a particular research question or particular research population. It could be used in a wide variety of fields beyond facilities design and construction.

Second, use diagrams as data sources when examining the steps of a process. Instead of just asking what the steps are of the process as you experienced them, ask participants to draw out step by step what happened. By asking my participants to draw diagrams of how they experienced the process of design, I was able to focus my interviews on the important details of the process. I collected much richer data by incorporating diagrams as part of the interview process. Future research might use visual methods, and participant created diagrams specifically, to explore the process of design of other campus facilities, such as residence halls or laboratories. This would expand the information available on designing physical environments within a higher education context beyond general classroom facilities.

Third, use a data collection method that complements the incorporation of diagrams as a data source. The talk out loud protocol I used was a natural vehicle for the incorporation of participant co-created diagrams as that type of interview protocol was designed to get people working with objects and ideas (Katalin, 2000; Nielsen et al., 2002; Nielsen, 2012). Other methods of data collection may work better depending on your topic. What is important is to pick a data collection method that complements the use of diagrams as a data sources. There should be a natural fit between the two.

Recommendations Related to the use of Visual Methods in Qualitative Research

Images can take on many forms, so be creative! I could have asked participants to photograph buildings or send me copies of blueprints but those images really did not speak to my research questions. By incorporating diagrams into the process, I was able to target a type of imagery that did match my research questions. Diagrams complemented the discussion of a

process and were a natural fit when thinking of images as data sources. Using diagrams in this way allowed me to collect meaningful data that I would not have accessed through traditional interview methods. Based on the study's research questions, choose the type of imagery that best helps to answer those questions. Do not confine data to just photograms or movies. Other images exist and can provide meaningful data; do not be afraid to use them!

Make sure that participants are familiar with the type of imagery you ask them to create. Ensuring participants are comfortable with the type of image used is a critical component of any successful visual methods study (Harper, 1988; Pink, 2001). In this case, participants' were familiar with diagrams and worked with them regularly. By asking participants to create a diagram, I was tapping into a skill set and knowledge base participants already associated with the process I wanted to study. I was not asking for something way out of their comfort zone or something they had zero experience with. Researcher must remember to use visual methods that make sense to their participants and are within the experiences and capabilities of those participants. I would not have collected as much meaningful data had I asked my participants to produce another type of image they were unfamiliar with or did not as closely associate with the process.

Finally, for visual methods to work the researcher must have some credibility in the eyes of your stakeholders. In my study, I was able to establish credibility in two ways. First, by indicating to participants that I too participated in the process of design at my home institution, I was able to convey that I had a basic knowledge of what I was studying and asking them about. I am the campus ADA and Accessibility Specialist at my home institution, so I regularly participate in the review of designs for new and renovated facilities. I indicated this to participants early on to begin to establish my creditability. I also demonstrated an understanding

of the common terminology associated with building and construction. I was able to understand participants' use of acronyms and other common terms, without additional explanation. Once it was clear that I spoke the participants' language, it became a much more natural process of creation for the diagrams. Participants felt comfortable writing and drawing in the terms they understood best. By demonstrating I was also familiar with those terms, I was better able to establish credibility. This created better buy in when asking participants to construct their diagrams. It also contributed to the overall quality of the data I collected. By establishing that professional relationship up front with participants and speaking in their language, participants did not have to take time in the interview to explain basic concepts or terms. This allowed them to give more in depth insight into the nuances of each step of the process. What became clear from this experience was that if a researcher wants to incorporate visual methods into their research studies, it is critical to establish credibility in the eyes of participants before asking them to engage in image production.

Conclusion

In this article I presented an approach to studying the process of design for general classroom facilities in American public four-year institutions of higher education that incorporated visual methods. Using visual methods, I asked participants to co-create a diagram of the process of design for general classroom facilities as they experienced it. By doing so, I was able to generate data that significantly enhanced my ability to address the study's research questions.

Diagrams were worth a thousand words in my study. The diagrams co-created by participants and myself enhanced my understanding of the process of design as experienced by the participants. By incorporating both visual data and narrative data into my study, I was able

to develop a deeper understanding of the nuanced process of design for general classroom facilities. It lead to more robust findings on how this process played out and what factors influenced its progression. The use of diagrams as data sources strengthened the findings of this qualitative study. Diagrams are legitimate forms of visual data and should be considered for use in future qualitative research studies.

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Appendix A

Questions Used to Determine Eligibility for Each Institution and DUP

1. Has one or more capital improvement projects (defined as new construction or renovations to existing structures, classified as a capital improvement project) specifically related to general classroom facilities (defined as "a room or space used primarily for instruction classes and that is not tied to a specific subject or discipline by equipment in the room or the configuration of the space" (Cyros & Korb, 2006, p. 49)) occurred on your campus between January 1, 2012 and January 1, 2015?

2. If yes: Which space is that specifically on your campus?

3. Would you and your institution be willing to participate in my study? This would require participation in an in person interview lasting approximately 60-90 minutes and would take place at a location at your home campus.

    a. If yes: Do you know if your institutions require additional IRB approvals for you to participate?

4. Would you please supply the names and contact information (title, phone number, and email) for anyone involved in the design of the specific general classroom facilities who might be willing to participant in an interview related to their role in the design process? These individuals must have worked for your institution or the design firm enlisted by your institution for a minimum of three months at the time of their participation in the design process of (insert space name)

    a. Could you provide me with a brief description of the individual's role in the design process?

5. As the DUP, do you meet the criteria for participation listed above?
    a. If you yes: Would you be interested in becoming a participant? To be eligible, you must have participated in one phase of the design process of (insert space's name), have worked for the institution for a minimum of three months at the time of participation, and This would require your participation in a 60-90 minute in person interview to take place at your home campus.

Appendix B

Initial Email to Potential Participants

Greetings (insert name),

My name is Michael J. Kutnak and I am a doctoral candidate in the Higher Education Program at Virginia Tech conducting research for my dissertation. My research focuses on the process of design used by administrators at public higher education institutions for new general classroom facilities on campus. I am using Grounded Theory methods in an attempt to generate a theoretical model of the design process for new general classroom facilities. I am reaching out to you because (insert DUP's name) indicated you participated in the design of (insert name of specific space). I would like to request your participation in my dissertation study: *The Process of Design for Classrooms in Higher Education Institutions*. Participation requires one in person interview lasting 60-90 minutes to be conducted at a location on your campus.

In order to participate in this study, you must meet the following criteria:

1. You must have participated in at least one phase of the design process of (insert space's name).
2. You must have been employed by your respective institution/design firm for a minimum of three (3) months at the time of your participation in the design/construction project.
3. You must be willing to participate in a 60-90 minute in person interview to take place at your home campus.

If you are interested in participating in this study, please reply to this email with a date, time and contact number which I can use to follow up with you. The purpose of the follow up phone call is to provide you with further details of the study and to gauge your eligibility to participate.

Thank you for your time,

Michael J. Kutnak

Appendix C

Questions Used to Determine Eligibility for Participants

1. Did you participate in at least one phase of the design of (insert space's name)?

2. At the time of your participation in the design of (insert space's name), had you been employed by your respective institution/design firm for a minimum of three (3) months?

3. Are you willing to participate in a 60-90 minute in person interview to take place at your home campus?

Appendix D

Interview Protocol

Opening

1. As a (insert person's title) can you describe your role at (insert institution's name)? What types of responsibilities do you have in that role?
2. From our previous conversation, you stated that you were involved with the design of (insert space name). Can you please describe your role in the design process of (insert space name) and the point at which you became involved with the project?

Design Process of the Space

3. I want you to walk me through the process of design used at your institution. I want you to use (insert space name) as a reference point as you guide me through the steps of the process. Talk me through the steps (inset space name) went through to look and feel the way it does. At the same time, I'm going to ask you to help me begin making a diagram of the main steps of this process. Please include any details in the diagram that you feel are necessary. Throughout the remainder of this interview, we will co-create a diagram of the process you experienced while designing (insert space name).

Potential Follow Up Questions for Each Step

4. For (insert step number/name), what were the top things (i.e. resources, decisions, data points utilized) that influenced this step of the process?
5. Who were the most influential people involved with (insert step number/name)?
6. If you were to combine the two lists you just provided and rank order them from most influential to least influential, what would that rank order look like?

Conclusion

7. At what point in the process were design elements which create barriers to learning considered?
8. Are there any other important considerations we have not discussed related to the design of (insert space name)?
9. Do you have anything else you would like to add to our discussion?
10. May I follow up with you if I have any additional questions?

Other possibilities for questions I could ask.

1. If you were given sole authority over the design of (insert spaces name), what are the top five things that would influence the final design of the space?
2. The process used to design (insert spaces name) was like…
3. When you think of your role in the design of (insert spaces name), what is the first thing that comes to mind?
4. How critical was your role in the design process?

Appendix E

IRB Approval

Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website http://www.irb.vt.edu

MEMORANDUM

DATE: July 28, 2016
TO: Steven M Janosik, Michael John Kutnak Jr
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)
PROTOCOL TITLE: The Process of Design for Classrooms in Higher Education Institutions
IRB NUMBER: 16-469

Effective July 27, 2016, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.
This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at: http://www.irb.vt.edu/pages/responsibilities.htm (Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 5,6,7**
Protocol Approval Date: **July 27, 2016**
Protocol Expiration Date: **July 26, 2017**
Continuing Review Due Date*: **July 12, 2017**
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website http://www.irb.vt.edu

MEMORANDUM

DATE: November 4, 2016
TO: Steven M Janosik, Michael John Kutnak Jr
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)
PROTOCOL TITLE: The Process of Design for Classrooms in Higher Education Institutions
IRB NUMBER: 16-469

Effective November 3, 2016, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the Amendment request for the above-mentioned research protocol.
This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at: http://www.irb.vt.edu/pages/responsibilities.htm (Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 5,6,7**
Protocol Approval Date: **July 27, 2016**
Protocol Expiration Date: **July 26, 2017**
Continuing Review Due Date*: **July 12, 2017**
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this

requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Date* OSP Number Sponsor Grant Comparison Conducted?

* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

Appendix F

Coding Maps

RQ2: What are the conditions specific to the institution and the wider context that contribute to the design process of general classroom facilities at public higher education institutions?

Conditions specific to the institution

How themes Fit the Theory:	Institutionally specific conditions act as the launching point for any design/construction project at an individual campus. They function as the departing station.	
Theme:	Institutional and college level priorities inform the possibilities of design and construction	Physical location of the project matters

Theme:	Institutional and college level priorities inform the possibilities of design and construction				
Focused Codes:	creating community for discipline	growing discipline	elevating position of the college	making accessible	updating the college's facilities
Open Codes:	student faculty interaction creating community in the space making welcoming spaces	getting more students grow the [discipline] grow [a second discipline]	providing stature making others jealous highlighting a discipline Putting the discipline on display	getting ADA access creating access making accessible	renewing facilities updating facilities making facilities better

Theme:	Physical location of the project matters			
Focused Codes:	location influencing phases of the process	demolishing existing materials	addressing accessibility	incorporating special materials
Open Codes:	location influencing design steps	pipe removal	making circulation accessible	dealing with noise
	location influencing construction steps	moving utilities	making accessible entrances	dealing with existing facades
	addressing safety concerns	securing neighboring buildings	providing access	matching materials to design

Conditions specific to the wider context

How this Fits the Theory:	Pedagogy and Planning function as the rails on which the train travels for the entire process. Collaboration acts as the crossties holding the two rails together.		
Theme:	Pedagogy embodied through design and construction	Planning the future through facilities design	Building consensus through collaboration

Theme:	Pedagogy embodied through design and construction		
Focused Codes:	embodying pedagogy	translating pedagogy into the physical world	converting needs to designs
Open Codes:	fine tuning the facility	pedagogy turned into the physical	updating space
	putting on finishing touches	environment incorporating pedagogy	modernizing space
			making more spaces

Theme:	Planning the future through facilities design	
Focused Codes:	incorporating flexibility	predicting the future
Open Codes:	making more flexible space making for multiple use opening up space	planning future space making plans for the future accounting for future needs predicting future needs predicting growth making predictions

Theme:	Building consensus through collaboration		
Focused Codes:	including campus stakeholders	handling of change orders	project leaders collaborating together
Open Codes:	including campus stakeholders in the planning phase including campus stakeholders in the design phase including campus stakeholders in the construction phase collecting user input\faculty involvement forming a building committee	changes needing consensus making changes requires approvals making compromises	PM working with CM PM working with department rep CM working with department rep

RQ3: How are financial and human resources used/leveraged to influence the design of general classroom facilities?

How this Fits the Theory:	Resources function as the fuel for the train and are leveraged most effectively through value management and prior planning. The triumvirate acts as the conductor of the train, feeding fuel into the train as needed. They shepherd the process from start to finish like a conductor does with a train.			
Theme:	Using value management or value engineering processes	Prior planning saves time	Building trust through communication	
Theme:	Using value management or value engineering processes			
Focused Codes:	value engineering through process decisions	negotiating to save money	matching the budget with design	managing costs
Open Codes:	value engineering	internal negotiations on budget	matching budget with wants	deciding on budgets
	managing value	getting cost estimates	making the case	sticking to set budgets
	implementing value engineering mindsets	negotiating price	testing design against budget	defining budgets

Theme:	Prior planning saves time		
Focused Codes:	making schedules	investing other resources into planning	sticking to schedules
Open Codes:	scheduling is critical	investing people into design	keeping schedule critical
	creating a schedule	investing budget into design	staying on schedule
	planning out time	planning investment paying off	scheduling driving process
			using time wisely
			monitoring progress

Theme:	Building trust through communication		
Focused Codes:	triumvirate members acting as communicators	triumvirate members acting as leaders	meeting to discuss progress
Open Codes:	PM as communicator	PM as leader	PM consulting on progress
	SM as communicator	SM as leader	CM consulting on progress
	Dean as communicator	Dean as leader	meeting to solve problems
	CM as communicator	CM as leader	

RQ4: How do those most responsible for facilities explain how the process is implemented at different institutions?

How this Fits the Theory:	These themes represent different types of trains that can be used on the tracks. Freight and passenger trains handle differently, just as institutions implement the process in different ways.		
Theme:	Making use of available state level procedures to transition phases	Renovations require additional considerations	Timing of CM procurement methods impact the process

Theme:	Making use of available state level procedures to transition phases		
Focused Codes:	using BCOM procedures	utilizing a UBO	following state requirements
Open Codes:	getting BCOM approvals	using a UBO	following state procurement process
	getting BCOM inspections	consulting a UBO	involving the state
	consulting BCOM	asking UBO to approve	following state approval processes

Theme:	Renovations require additional considerations		
Focused Codes:	relocation of existing people and programs	enabling projects	working around the existing usage of the facility
Open Codes:	flexing programs finding other spaces Informing students of changes	finding flex space demolishing existing materials moving faculty moving programs	dealing with HVAC working around class schedules dealing with power dealing with complications

Theme:	Timing of CM procurement methods impact the process		
Focused Codes:	acquiring construction management firms during design	acquiring construction management firms during construction	determining construction management style
Open Codes:	getting cm in design paying more for inclusion of CM early consulting CM in design	using design bid build loosing CM feedback in design process making straight forward projects easy	using different methods of procurement using CM at risk mirroring CM at risk

Appendix G

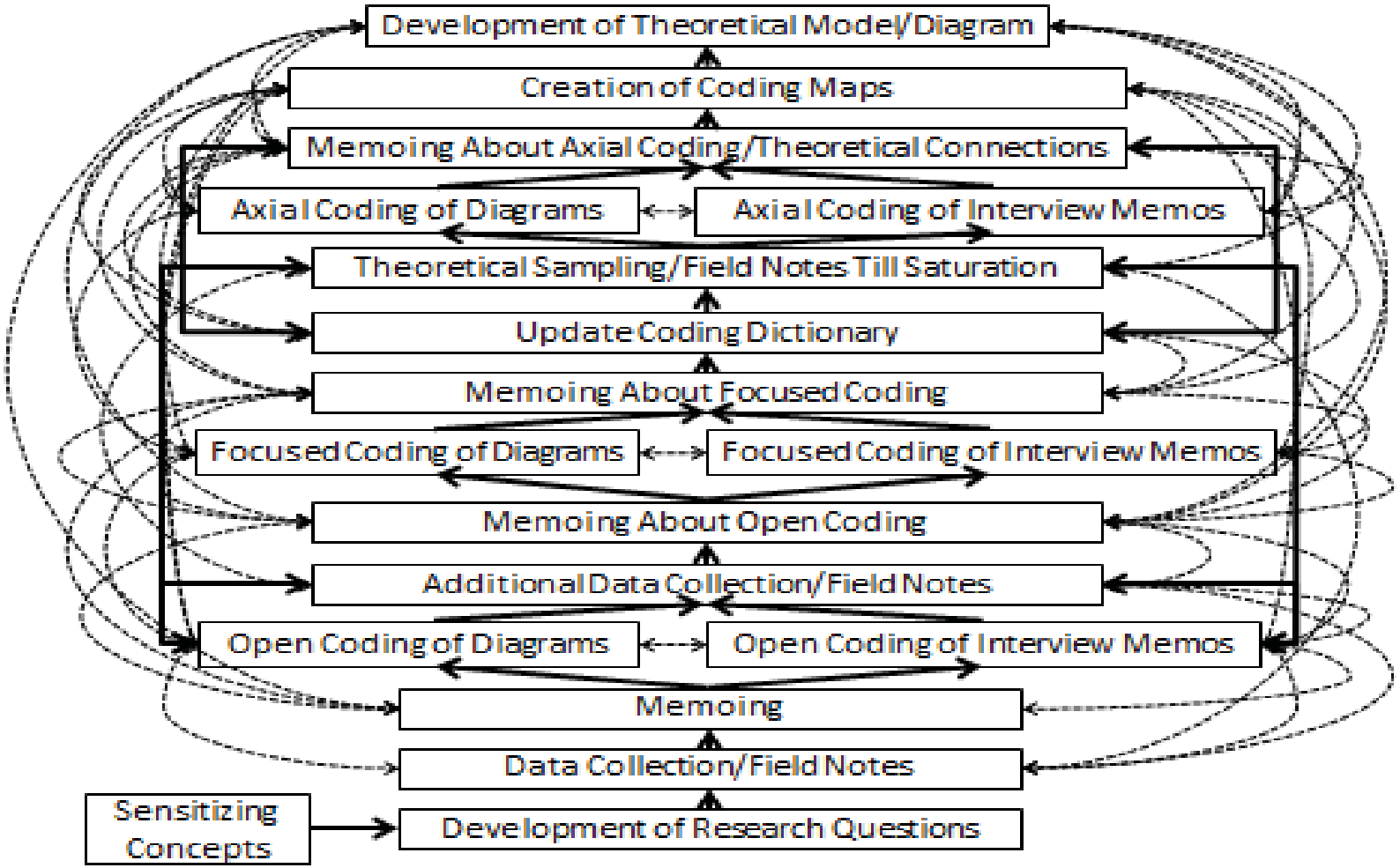

Figure 5. The coding and analysis process used for the sample study. Solid lines represent movement between steps in the analysis process. Dashed lines represent the constant comparison between data sources.

Appendix H

Sample Coding Map

RQ3: How are financial and human resources used/leveraged to influence the design of general classroom facilities?

How this Fits the Theory:	Resources function as the fuel for the train and are leveraged most effectively through value management and prior planning. The triumvirate acts as the conductor of the train, feeding fuel into the train as needed. They shepherd the process from start to finish like a conductor does with a train.		
Theme:	Using value management or value engineering processes	Prior planning saves time	Building trust through communication

Theme:	Using value management or value engineering processes			
Focused Codes:	value engineering through process decisions	negotiating to save money	matching the budget with design	managing costs
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