Examining the Process of School Facilities Planning: A Closer Look at the Educational Predesign and Design

by

Michael H. Hower

B.S., Westminster College, 1996

M.Ed., Slippery Rock University, 1997

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This dissertation was presented

by

Michael H. Hower

It was defended on

February 27, 2019

and approved by

Mary Margaret Kerr, Ed.D., Professor, Administrative and Policy Studies

Diane L. Kirk, Ph.D., Clinical Associate Professor, Administrative and Policy Studies

Robert Isherwood, Ed.D., Associate Professor and Graduate Coordinator, Special Education, Slippery Rock University

Dissertation Advisor: Charlene Trovato, Ph.D., Clinical Associate Professor, Administrative and Policy Studies

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Facility design and the planning steps within this process are part of continued discourse among school design professionals and school officials. Historically, schools often mirrored architectural designs of a time-period or as a response to economic trends. The discourse has evolved over time, and recently, there has been an increasing focus on how facility design impacts teaching and learning. As a result, the actual predesigns and design phases are at the forefront of the debate. Since there are no widely established planning models for educators and architects, it is important to continually explore these phenomena which will ultimately provide clarity within the design process. This investigation sought to determine 1) What are school principals' perceptions about their involvement in the predesign and design phases of school building? 2) What are school principals' perceptions about the involvement of different stakeholder groups in the design of school facilities? 3) What are school building principals' perceptions about the connection between the district vision and planning of the building? This study interviewed 14 administrators that experienced the design process as either current high school principals or former high school principals from school districts in western Pennsylvania. I selected the participants using PlanCon as the guiding criteria. Additionally, I completed the interviews in this investigation via a telephone call with each participant. The findings revealed that principals were not able to establish clear roles on the design team; however, they did indicate communication and safety were the most significant roles throughout the process. The findings also revealed that

principals reported architects, superintendents, and school board members all had the largest extent of influence on the actual design. The data also illuminated a lack of consistency in the design team and levels of influence within each project. These findings provided insight into the level of connectivity between the facility design and the academic vision. The connection of the school design to the academic vision reported to having moderate connections when the design of the school included principal's input. The participants also indicated that academic vision was not part of the actual process after the initial predesign phase. Future research would help shed light on the design process and members of the design team. Potentially, broadening the scope of this study to include more schools or different perspectives (i.e. superintendents, architects, teachers, etc.) would give enough insight into the design process to begin to develop best practices or protocols for predesign and design of schools.

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1.0 Introduction

1.1 Background

Quality educational facilities are essential for our nation's population, and this study originates from this notion. Because of this, we spend a significant amount of money on school facilities to address needs such as student performance or growing student population demands. Early in the 20th century, architectural significance served as an additional crucial focus for communities and school systems as well (Weissner, 2006). However, these factors are not the ones to consider when a school system embarks on building projects, especially when attempting to achieve an effective learning environment. Until recently, critical elements such as student learning and teaching in relation to physical environment have not been part of the discourse related to school design (Withum, 2006).

American school systems face tremendous pressures to meet students' needs of the 21st century. Not only must they provide facilities designed to meet the needs of the learner, but they must also provide adequate solutions to population demographics and ever-changing technological advancements. Therefore, an increased focus has emerged on the predesign and design process. These pressures, recognized by educators and architects alike, have resulted in a surge of ongoing collaboration between them (Kowalski, 2002). And so often, school construction projects that are in line with the district vision and completed on time and budget constitutes successful predesign educational planning as compared to those that area not. Additionally, new school construction

that remains close to principles of predesign educational planning support educational programs and student learning (Castaldi, 1994; Earthman, 2000; Perkins, 2001).

Even though school construction planning teams have thousands of decisions to make regarding the design of the new facility, they do have the ability to complete the project successfully on time and within budget. Using predesign educational planning, supported through research and the experiences of practitioners in the field, ensures the school facility meets expectations of all stakeholders (Tanner & Lackney, 2006). However, predesign educational planning for school facilities can create challenging situations and be overwhelming to stakeholders (Perkins, 2001; Tanner & Lackney, 2006). It is this aspect that is difficult to substantiate and maintain given the different goals set forth by school systems. Effective predesign educational planning requires the input of a large variety of stakeholders to ensure that the facility will not only address the needs of current programs but also be capable of meeting the needs in the future (Tanner & Lackney, 2006). Addressing the needs and goals of stakeholders through recommended predesign planning before the actual design phase and ultimately construction phase begins provides better continuity in the process (Graves, 1993; Perkins, 2001). Predesign educational planning includes the following the following aspects prior to designing the school facility: consulting with multiple stakeholders (Graves, 1993), incorporating the district's vision (Earthman, 2000; Graves, 1993; Perkins, 2001; Tanner & Lackney, 2006), integrating educational specifications (Castaldi, 1994; Graves, 1993; Kowalski, 2002; Perkins, 2001; Tanner & Lackney, 2006), including instructional objectives into potential physical spaces or classrooms (Tanner & Lackney, 2006), implementing long-range academic goals (Castaldi, 1994; Graves, 1993; Perkins, 2001; Tanner & Lackney, 2006), and possibly utilizing an educational planner (Abramson, 2005).

Even though there are many planning models that provide critical steps and strategies, the

problem then becomes the task of educational leaders understanding and choosing the model that best fits their school district and the needs of their school community (Hansman, 2004). Cervero and Wilson (2006) focused on this problem:

> Over the decades, the gamut of rational decision-making models, linear and feedback procedural task systems, and general planning theories have not produced working understandings of the context in which people plan programs. Most planning theory, with its lack of attention to context and its pervasive focus on planning steps, is only partially helpful in focusing attention on what matters in planning programs (p. 5).

Particularly, the planning processes and those participating in the design of school facilities vary from district to district. The stakeholders perceived by district officials can often fluctuate based on their experiences and relationships.

In Pennsylvania, there have been over 520 construction projects since 2006. These projects range from significant renovations to new construction projects. Thirty- one school districts submitted to PlanCon in the past year (PDE PlanCon Report, 2016). The need to plan, renovate, and build educational facilities may sound daunting, but this need lays the foundational for an opportunity for educational leaders to help plan and design schools that meet the educational needs of students in the 21st century. For leaders to address the planning and design of educational facilities, it would be prudent to examine the content in which the planning takes place. Studying the educational facilities planning process may provide insight into the key dimensions of successful planning. Gaining insight into the specific dimensions impacting facility planning may also help leaders successfully guide stakeholders through the overall process. Within these projects all districts follow a linear planning process set forth by the state. This process does not consider

predesign aspects or critical stakeholders which are essential in constructing a learning space that will address current and future needs.

1.2 Significance of Design Planning in School Construction

The significance of predesign or design planning in the construction schools originates from ongoing research connecting student learning and instruction to the physical space in which these elements take place. Many school districts currently find themselves faced with the task of planning new facilities. Studying the planning process and the role principals have may provide valuable insight for school districts facing the planning and ultimately the construction of an educational facility. Researching the planning process through the lens of how educational leaders guide stakeholders and incorporate key personnel into exploring effective educational practices would be beneficial. A more efficient process of planning schools may develop because of the research. In fact, Tanner and Lackney (2006) state that this research could result in planning processes of schools that "are designed and built to enhance teaching and learning and serve as centers of the community" (p. 51).

Various stakeholders could benefit from this research project. Sharing this project with school officials, community members, and facility design teams (i.e., architects, construction managers, engineers) may help them take a proactive position when the need for planning arises. Often school leaders experience school facility design for the first time when they have already delved into construction, and this serves as their only experience. At this point, it is often too late to undo the ineffective planning.

Planning for school facility construction is not just about building a school facility; it is about engaging stakeholders in a social and political process that results in an effective learning environment that will meet the needs of students, teachers, and the entire community (Tanner and Lackney, 2006). Moreover, Tanner and Lackney stated that despite recent findings about school facility planning and the involvement of stakeholders in that process, the incorporation of those findings into planning schools has not been a mainstay in practices by school districts.

1.3 Statement of the Problem

Current research discloses the fact that even though most schools engage in a planning process, the processes used have not resulted in the type of discourse and dialogue that effects educational change (Tanner and Lackney, 2006). Locker (2008) points out that school districts are still consistently creating Victorian style schools because educational leaders do not pose the right questions. Locker stated, "Opportunities to do really good work in exciting best educational practices and facilities planning are missed. In the typical school design process, many people feel good that they got 'the answers' right, but they are the right answers to the wrong questions" (p. 2). Hansman (2004) noted that key stakeholders involved in planning must "listen to and work with each other to negotiate program components in an ethical planning process, while at the same time, not taking actions that are counterproductive for the program" (p. 10). A question that all stakeholders involved in facilities planning must consider is: What planning model will assist school districts in partaking in a collaborative and meaningful planning process that will result in a school that will meet the needs of students now and, in the future, and serve as a resource for the community?

With the significant challenges brought forth by planning educational facilities, there has also been the creation of tremendous opportunity to "design the right solution in the right place at the right time" (Hudson, 2007). When educational leaders implement the appropriate planning processes with pertinent information and resources, the likelihood of resulting in an innovative learning environment for students of various needs while tending to the culture of the community should drastically increase (Tanner and Lackney, 2006).

Unfortunately, the current educational facility planning research mainly presents planning from a very linear, structured approach. The linear processes of facility design inadequately address the complexities of facility planning for school districts since woven within all the information and resources is a social and political process (Tanner & Lackney, 2006). This illuminates the problem associated with the role principals have in the design process. Even though principals do not necessarily set the district vision, they are however, responsible for the articulation of that vision and instructional objectives within the school. This presents the problem of determining the principal's level of influence or role played in the overall design process. Although an understanding of the linear aspect of facility planning is essential to success from the principal's perspective; the principal's ability to guide other educators and community stakeholders into exploring more effective ways of educational delivery and developing an understanding of the factors considered in the planning process provide a significant portion of the framework for understanding the context of this study (Tanner & Lackney, 2006).

The technical considerations as part of designing an educational facility cannot be the only aspect or "how to" addressed in the literature, according to Cervero and Wilson (1994). The planning process needs to address aspects such as the political discourse that inherently accompanies changes within a school system, and the social dimensions. The "what for" and "for

whom" questions are critical when implementing a planning model. Cervero and Wilson stated the political and social elements of facility planning "as noise that gets in the way of good planning; in so doing, these models set up dichotomies between rationality and politics or, more generally, between planners and social structures within which they act" (p. xii). Principals often interact in a setting that must oscillate within this dichotomy.

When all stakeholders become embedded in the exchange of ideas and can view interactions through different lenses, a clarity in the planning process begins to develop. Bolman and Deal (1997) stated that people involved in the design and planning process must view the process through multiple lenses and points of view to understand how to successfully interact with the different stakeholders and influences during the process. A goal of this study was to examine the involvement or principals the design process (i.e. political, social, educational) so that a more appropriate, clearer approach evolves.

Addressing some of the difficulties that the planning process can cause stakeholders, Kowalski (1983) stated, "Since the 1960s, the task of educational facility planning has confronted new, and dramatically different, challenges" (p. 8). These challenges come in many forms. Social, political, technological, economic, and even cultural differences will have varying amounts of influence on the process. These challenges can occur within the actual school system or as outside influences. Principals are members of an educational facility planning team; however, their role is unclear. Developing ways to successfully frame the influences occurring in educational facility design and developing specific roles for educational leaders is complex, however according to Bolman and Deal (1997), facing these challenging environments has become a mainstay in the unbalanced and complicated society in which people live.

1.4 Purpose of the Study

The purpose of this study is to examine the role high school principals have in the design of schools. Principals have a critical role in making sure the learning environment is optimal for teaching and learning and therefore, it makes sense that they would be key stakeholders with high involvement in the school design process. Because of this and the increasing pressures of student performance placed on school administrators, their role becomes increasingly vital in the predesign and planning processes for school facility construction. The design of this study explores principals' perceptions regarding their role in the predesign phase and planning phase of school construction through their experiences. Additionally, this study intends to explore the various factors possibly influencing their involvement and/or decisions made during the process. Even though there is limited literature available regarding the specific stakeholders' roles and decisions in the design and planning processes, this study will attempt to provide insight into the phenomena of school facility design through the lens of the high school principal. This will then be subsequently related to the current research regarding district leaders and key stakeholders in the overall process of school design.

1.5 Research Questions

The research questions for this study grew out of an in-depth investigation of the research focusing on school design. Several aspects became known as this investigation continued. For example, the nature of school planning across this country largely follows very linear planning models. Most of these models are accessible through the Department of Education in each state.

This plan gives a step by step process of districts submitting construction or renovation projects for approval. Additionally, experiencing the process of predesign, design, construction, and occupancy firsthand aided in my development of the research questions.

The existing literature makes it clear that district leaders and major stakeholders should be involved in the design process. However, studies have not identified the critical members of the planning team and the role they should play throughout the process. District leaders are the leaders of the process, but the research does not specify at which level of the organization and what role district leaders have in the process. Whether it is the superintendent, principal, teacher, or community member, the lens in which they view the vital components of school facility planning will be different. So, developing an understanding of the relationship between the way effective leaders of school districts direct stakeholders into investigating effective educational techniques within the context of planning and how those leaders address problems related to meeting current and future facility needs will be of great importance.

To understand the role of principals in the design and planning process for newly constructed or renovated schools, I address the following questions in this study:

1. What are school principals' perceptions about their involvement in the predesign and design phases of school building?

2. What are school principals' perceptions about the involvement of different stakeholder groups in the design of school facilities?

3. What are school building principals' perceptions about the connection between the district vision and planning of the building?

The rationale behind the selection of high school principals in the study is because the high school usually serves the most constituents in each district and has an increased complexity in terms of planning because it is predominantly the most expensive to construct or renovate.

1.6 Assumptions

A major assumption of this study was that principals would be sufficiently motivated to participate in facility planning. Also, principals have a personal stake in engaging in the planning process to make the constructed or renovated school a more effective place for students to learn.

The study assumed that wide participation in educational facility planning results in greater understanding of the educational program, more functional buildings, and a greater interest and pride on the part of school administrators. The study also assumed that the districts included in the study completed the PlanCon process since all have submitted the necessary documents for completion.

1.7 Definition of Terms

Predesign – This is the preplanning process that ideally involves key stakeholders identifying important aspects to include in the construction project (i.e. vision, teaching and learning goals, community input, architectural items).

Design – For the scope of this study, this term is interchanges with predesign because this study does not focus on the architectural and engineering aspects of the school design. The focus is on the school leaders and their involvement in the construction or renovation of a school.

Educational Facility Planning – Educational facility planning is the process of planning the construction of an individual school building.

Educational Program – The educational includes all those activities carried on by a school in implementing the desired educational goals and objectives.

Planning Model – A model that will regulate decisions made, the sharing of information, and who has input into the creation and implementation of the designed school.

1.8 Summary

The ensuing chapters of this dissertation address a review of the literature of school design and construction, as well as the methodology and methods used to perform the study. Additionally, parts of this study include chapters with the findings and a discussion of the implications. The review of the literature (Chapter 2) will encompass the history of school construction, the reciprocal relationship between the design of facilities and teaching and learning, and the factors involved in school design. The review of literature also examines the discourse involved in the design processes of school construction. Chapter three details the research methodology used, the selection of participants, the data collection procedures, and the analysis procedures for the data.

Chapter four reviews the findings of the study and organize the data related to the questions posed in the study. Chapter five concludes the dissertation with a discussion of the implications of the study and includes recommendations for further research.

2.0 Review of Literature

Many school districts in the United States face the critical issue of planning and designing educational facilities (National Center for Educational Statistics, 2000). Since this is familiar to many school districts, the incorporation of advancements in technology, educational theory, and research regarding different ways students learn and teachers teach should present school districts with a great opportunity through the design and planning process (American Architectural Foundation and the Knowledge Works Foundation, 2005). However, the planning processes employed by most school districts does not result in a school with the required design components that will promote a contemporary education and serve as a resource integral to the community (Tanner and Lackney, 2006). Subsequently, facility planning brings about "a lot of new-old buildings designed around some already outdated current practices of the teachers and other adults who define needs in fairly traditional ways" (Locker, 2008).

This chapter provides an analysis of the literature related to school facility planning and construction. Moreover, this chapter provides a foundation for developing a framework for understanding the processes implemented during the design and planning of schools that may result in facilities more conducive for quality educational delivery. This understanding may urge school districts to place as much emphasis on the process as the product. In Chapter 2, the first section provides a historical overview aimed at identifying the different influences in school design (architectural, social, political, and educational). The second section focuses on the reciprocal relationships between teaching and learning, and the environment, which in turn becomes a critical influence in current school facility planning processes. The third section explores the factors and processes impacting the planning and eventual construction of school facilities. It is important to

look at educational facility planning from all these perspectives to develop a strong historical and theoretical understanding of the planning process and the factors influencing school design.

2.1 History of the Design of American School Facilities

School design has been the center of debate and innovation since our country began, and deliberations on design will most likely continue. Logical thought would seemingly point to student learning as the prevailing factor in school design; however, history shows us that other factors greatly influence the design of schools as well. Educational trends, population, politics, and social influences have all permeated the design field, as has current architectural trends, research in pedagogy and student learning, financial constraints, and environmental factors. Current school buildings stand as a testament to those historical influences. Since the significance of these influences is constantly changing in current construction as well, it is important to examine the history of school design to determine the impact of those trends and priorities.

2.1.1 Industrialization and the Common School Movement

Prior to the twentieth century, considerable scholarship, writing, and time devoted to standardizing school buildings occurred. Although the "one room schoolhouse" was adequate in rural areas, it was rapidly becoming obsolete in more heavily populated cities and suburbs. With populations increasing and enrollment in schools on the rise, school construction began to take on a different form; schools became more plentiful as well. Now school systems followed Horace Mann's notions of desks in rows with windows on two sides of the room and assortment of other

educational features to accommodate the rise in population (Baker, 2012). These ideas became known as the Common School movement.

The Common School movement carried with it an expectation that there would be an increase in the number of children attending school, especially in urban areas around the country (Baker, 2012). The new schools built resembled "dark and dank" factories. Tanner and Lackney (2005) noted a similarity between the new school design and the current places of employment: "factories created to produce things led to factories to produce learning" (p.11). The Common School movement focused on compliance and conformity, which were the primary goals of these school programs. This movement resulted in the public education system of today: a formal, hierarchical structure designed to group students by ability and/or age as a guiding criterion for promotion to a higher level within the educational system (Lackney, 1998).

Schools built at the turn of the twentieth century were "largely standardized, utilitarian spaces that were designed to house as many students as possible, maximizing classroom space" (Baker, 2012, p. 2). The outside of the buildings was quite beautiful, reflecting the popular architectural influences of the time including Beaux-Arts form, Colonial Revival, and Gothic (Weissner, 2006). However, the inside of the buildings still possessed a factory-like setting, primarily to manage the influx of students (Baker, 2012). Schools constructed in the state of Pennsylvania followed these same influences. The picture of Johnstown High School in Figure 2.1 illustrates these architectural influences on the surface, however this school housed an exceedingly large number of students in a confined area.

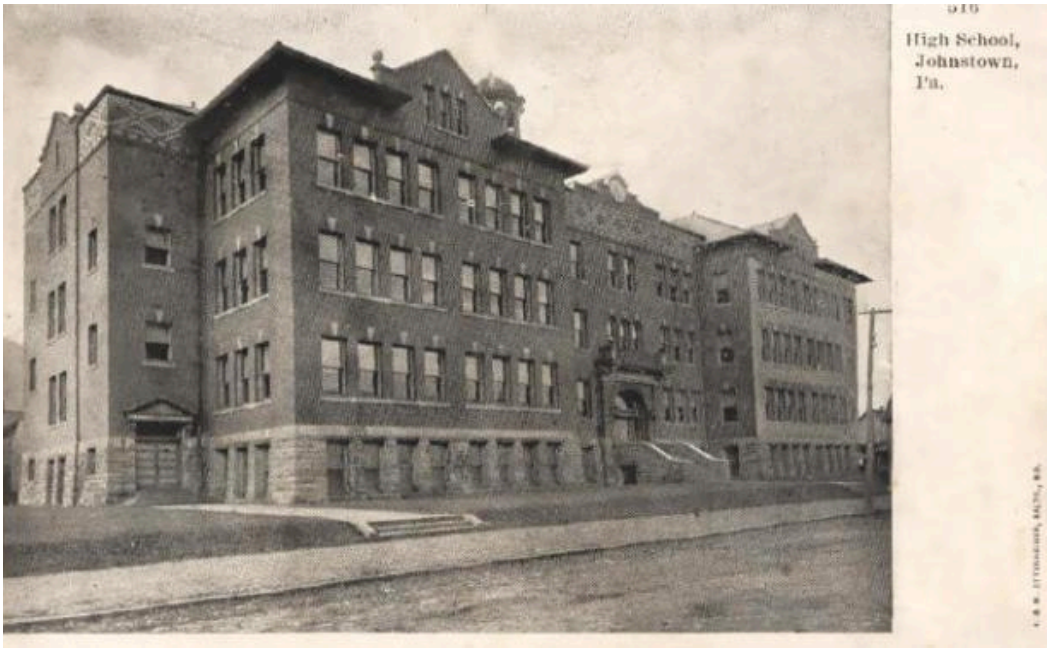

Figure 1. Picture of Johnstown High School in the early 1900s. This school represents the Beaux Art form and neo-classical influences of the time. (Free photograph from http://www3.familyoldphotos.com/photo/pennsylvania/12467/johnstown-pa-high-school-early-1900s

2.1.1.1 Environmental Influences

At the turn of the twentieth century, books addressed the appropriate design and construction of school buildings, highlighting systems such as proper lighting and ventilation (Hamlin, 1910; Mills, 1915). The trending designs and layouts of proposed schools consisted of multiple classrooms in increasing squares that shared common hallways and walls. Tanner and Lackney (2005) reported, "the factory model layout responded directly to the needs of the common school educational system that required repetition and uniformity". In his historical writing, Mills (1915) points to the guiding influences of simplicity, dignity, and use of enduring materials as paramount to school design during this time.

The first public school by grades, Quincy Grammar School in Boston, was one of the first examples of a common school design (Koski, 2013). The school was a four-story building that

housed four equal classrooms on each floor. According to Cutler (1989), "such a layout made possible the closer supervision of students and greater specialization of instruction" (p.5). Each classroom consisted of uniform rows of desks with a teacher desk at the front of the room. Tanner and Lackney (2006) stated, "These general school designs were replicated in dozens of cities across the United States through the early twentieth century" (p.7). Predominantly, this common school design reigned as the popular method of meeting the needs of the communities and largely accommodating the influence of increased enrollment in schools during this time. Even with this common school design, problems emerged with inadequate air quality, poor sanitation, insufficient lighting, and a lack of resources (Bradley, 1996).

2.1.2 Beginning to Connect Educational Facilities and Student Learning

Noticing these issues, some educators realized the need for a different type of school facility. Horace Mann (1891) indicated that the awful school conditions achieved only to "retard the progress of public education." As architects and social reformers reworked school buildings across the early 20th century, other educational theorists such as John Dewey began to rethink the process of education itself. According to Weissner (2006), Dewey protested current architecture due to the stoicism of the standard classroom and cited that the school building design prevented student communication and stifled creativity and curiosity. To promote these ideals, John Dewey opened and directed his laboratory school from 1896 through 1904. Tanner and Lackney (2005) reported the premise of this school was to create a curriculum focused on developmental, intellectual, and social goals for students. John Dewey wrote at length regarding the influences of experience and environment on learning in *Experience and Education* (1938). Dewey's work centered on the theory of experience challenged both traditional and progressive education modes

of education. However, he stipulated experiences did not always have results that were educationally valuable; experiences could be "mis-educative" if not facilitated properly (p. 25). This precept is critical because it helps lay the foundation for future discourse including it as key component in the planning process. Basically, according to Dewey, the teacher has the responsibility to make sure that the environment is conducive to moving the experience (or learning) forward. Figure 2.2 is a picture of a classroom in Dewey's Laboratory School. John Dewey's laboratory school used the physical setting to support the developmental curriculum (Lackney, 1999). Dewey was one of the first educators to begin making connections between the planning of the educational space, student learning and the functionality of the learning space.

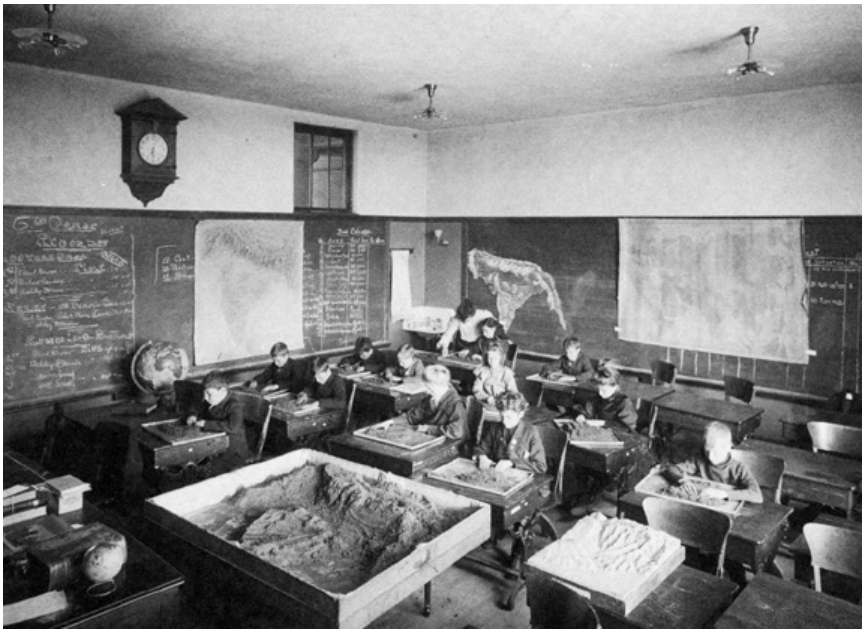

Figure 2. Dewey's Laboratory School (Free photograph retrieved from http://www3.familyoldphotos.com/category/united-states/illinois)

Architects were also working to change the designs of schools as well. Even though collaboration with educational leaders was absent, architects began to examine the physical

environment of the schools. Architect C.B.J. Snyder served as the superintendent of schools for New York City at the turn of the 20th century and campaigned vigorously for upgrading school facilities (Cutler, 1989). Snyder created the "H" shaped building designed to bring natural light and fresh air into every area of the school. He was one of the first school leaders to advocate for architects professionally trained in school design in every school project. The realization of the significance of this influence would not happen for decades to come.

As the investigation of the importance of school design continues, from both an educational and architectural perspective, Dwight Perkins started one of the early architectural firms that focused upon designing schools. Perkins worked collaboratively in designing many schools specifically for the urban school systems. According to Brubaker (1998), Collegiate Gothic manner and the prairie school style dominated designs by Perkins. In fact, he served from 1905 to 1910 as chief architect of Chicago schools. His most notably recognition resulted from the Charles Schulz High School. Brubaker (1998) described this school much like that as a suburban home. The school is set back from the street, with a lawn and trees in the front yard. Perkins used different architectural styles for the facades of the schools, but he also embodied many of the philosophical ideals originally pioneered by Dewey incorporated in internal designs of the schools constructed. Subsequently, Perkins and his team designed and built the Skokie School in 1922. According to Brubaker (1998), "This innovative school has classrooms around two courtyards, and every classroom has an outdoor entrance and a skylight" (p. 10). Now, the designers began to consider other factors besides population while designing. Despite these precursors that suggested the possibilities in combining architectural talent and pedagogical objectives, it was not until the 1940s that a ground-breaking model developed foreshadowing a new type of school architecture (Brubaker, 1998).

2.1.3 The Progressive Era in School Facility Design and Planning

Despite the Depression, school construction continued in the 1930s and early 1940s. The Publics Works Administration provided support for schools, which gave seventy percent of the funding for new construction to local communities (Weissner, 2006). School façades during this time saw little alteration, continuing to make use of a classical style that generally suggested a heritage grounded in other influences such as Greek democracy, the Roman republic, or a link to national history. A secondary influence included designing exterior buildings to connect schools to local community values (Reitzes, 1989). Many architects and school leaders during this time believed that one of the most important aspects of newly designed schools was to sell education by the exterior of the school, which was what the public saw most. A pleasing exterior with intricate details and higher levels of opulence communicates the institution's importance to its viewers (Donovan, 1921). However, most modernization of schools during this time was not visible, as the exterior styles predominantly did not change. Instead, the focus of the reconceptualization of the plans continued to make improvements in interior spaces like auditoriums, gymnasiums, and the distinction between the classrooms and these larger entities (Short & Stanley-Brown, 1939).

During this time, most schools were based on the design principles of earlier times, however there was an increasing interest developing in more progressive school models for education. As attitudes changed, reforming ideals expressed by leaders such as Dewey and Montessori began to take hold. These scholars supported the concept of child-centered learning, and developed educational theories that laid the foundation for much of the current educational practices to this day (Hille, 2011). Along with these educational pioneers, architects began to support these views and incorporate them into their school designs. Architects such as Saarinen,

Aalto, and Neustra completed projects grounded in these theories. According to Baker (2012), schools, such as ones designed by these architects, became known as the "open air school" movement, due to the emphasis they placed on air, light, outdoor learning spaces and ease of movement throughout the schools. Interestingly, Hille (2011) refers to these types of schools as "functionalist," because they emphasized the incorporation of fresh air, outdoor activity, and physical health to address the mental well-being of its occupants.

The open-air school trended in the more mainstream circles of architects through the late 1930s, with scholars noting the importance of re-thinking school building design. In his 1935 article on "Needed Research in the Field of School Buildings and Equipment," Holy notes, "…in the past, and at present, the process of education has been largely a sitting-at-a-desk one with the major emphasis on textbook study…. The broadening curriculum, the more active methods of learning, and emphasis upon doing and working with things rather than merely studying books-all have focused attention upon the importance of the physical environment and the supply of materials necessary for this changed type of work" (p. 406). This statement highlights a shift beginning to take place at multiple levels in school facilities planning and construction.

Standardizing school facility management and the construction process was receiving growing attention during this same time. The creation of the National Council on Schoolhouse Construction, which later became today's Council of Educational Facility Planners International, specifically focuses on the design of schools and the planning processes. Concurrently, there was increased interest in the psychological effects of school buildings, as open plan school designs focused more on the importance designing schools that were student-centered. According to Baker (2012), this movement spurred the need for research in the field of student learning combined with school design. Holy (1935) states, "perhaps most people would agree that there is a relationship

between the quality of the school plant and the character of the educational program, but little evidence of this relationship is currently available" (p. 408).

2.1.4 Post-War Boom and the Impulsive Period

With the onset of World War II, wartime interrupted a lot of school construction. However, this time did introduce new building technologies and materials in the design of schools. Wartime also gave rise to concerns about the costs of labor and material. This in conjunction with nationwide marketing of products for building schools marched in a more efficient way to build schools. Open floor plans and exteriors without historical detail became more popular through the perceived practicality and affordability of the design (Weissner, 2006). However, wartime architect, Lawrence B. Perkins, son of Dwight Perkins, continued to build on the same concepts that his father had established earlier, and designed several schools such as the Crow Island School still functioning today. Perkins worked collaboratively with educational leaders in the design of the school, and according to Brubaker (1998), Perkins spent a lot of time visiting classes and learning all about instructional spaces, the equipment needed, and the kind of activities students would need. The motive behind the design of the school was to create a modern structure that was conducive to learning process intended for the school (Meek, 1995). This represents one of the first collaborative efforts of educators and architects during the planning process.

Figure 3. Picture of Crow Island School Classroom (photograph retrieved from http://peterbrown.typepad.com/.a/6a00e55113a79188330134897cf2b9970c-800wi)

Despite the success of architectural designs such as the Crow Island School, many leaders failed to advance the school design process and construction industry largely because of the impact of the baby boom (Brubaker, 1998). The population boom of the postwar brought about a large need for school buildings. The population of the United States doubled to over 203 million by 1970, with seventy percent of this growth coming quickly after 1940s (U.S. Department of Commerce, 1975). By 1950, there was an academic housing crisis. School officials collaborated with architects to scramble to meet the needs students. As Tanner and Lackney (2005) note, "this period was the beginning of a new age of innovation in educational architecture, although many school boards missed the opportunity to create better school facilities as they struggled to cope with ever-increasing enrollment" (p. 12). Because of rapid population growth, there were time constraints and severe financial restraints placed on school systems. This resulted in design teams focusing on economy and efficiency rather than committing to match pedagogy to the design of the facilities (Graves, 1993). In fact, many schools followed the same precepts used a half a century

earlier (Bradley, 1996). In the 1950s, school design saw an increase of standardized plans, which included a developed consistency in facades that has depicted educational architecture during this time (Tanner and Lackney, 2005).

Consequently, planning teams in the years following WWII failed to acquire and collect the techniques that made schools, such as Crow Island, a success. Modern architects of this time designed schools centered on logic and efficiency. Hille (2011) states, "In practical terms, the modern school as it developed in the United States at this time, was determined to have a number of practical and functional advantages over the traditional two-or three- story brick school house. To begin with, its lightweight construction, which utilized new building technologies, was less expensive and easier to build, and although its life expectancy was shorter, it was argued that schools needed to be rebuilt periodically anyway" (p. 91).

The post-industrial time overlapping the population boom led to a cultural shift in the United States. By 1955, for the first time, white collar and service workers alike began to outnumber blue-collar factory workers (Lackney, 1998). In addition, companies began to use part-time and flextime workers. Team approaches and more fluid corporation models developed in response to more entrepreneurial emphasis. As a result, pivotal reform movements in education followed in the 1960s focusing on instructional design and curriculum (Lackney, 1998). This time or *Impulsive Period* brought about open education, the middle school model, and the design of open classrooms during design processes.

In the late 1970s, researchers were beginning to make connections between student learning and school facilities, and in turn, stressing this connection during the planning stages of school construction. Educators began to suppose that other aspects of the physical environment may have an impact on students' learning and attitudes (Weinstein, 1979). Weinstein reports that

this idea directly reflected in two "controversial educational movements, *open education classrooms* and *open space schools."* Both movements indicate new approaches and outlooks to the use of classroom space. Educators and school facility designers began to create or experiment with areas in the building to develop classrooms without a well-defined space.

Open-plan schools featured walls that were flexible and movable, system components, and the potential for the smaller spaces transforming to large open spaces (Lackney, 1998). Exceptional educational theorists such as Dewey, Montessori, and Froebel provided the theoretical foundation for these designs (Tanner and Lackney, 2005). Also, during this time, there was a social outcry wanting schools to be more in-tune with students' needs, their individuality, need for exploration and expression (Koski, 2011). These school designs had support from architects and facility managers due to the ease of design and maintenance of the structures. According to Tanner and Lackney (2005), open plan schools had adaptable spaces for team teaching, small group, and individual instruction. The flexible spaces gave students the opportunity to work in different settings focusing on their instructional and personal needs. Brubaker (1998) stated, "Regardless of the nature of the curriculum, the open spaces would be adaptable to the changing educational needs" (p. 20). In the history of educational facilities planning and construction, the alignment of the prevailing educational theory and the architects of school facilities has not experienced this type of convergence...

The creation of the Educational Facilities Laboratory supports "helping schools with their physical problems, stimulate research, and disseminate information useful to those who select sites, plan, design, construct, modernize, equip, and finance educational structures and the tools therein" (Marks, 2000, p. 14). Brubaker (1998) stated the EFL "encouraged innovation in school architecture by giving planning grants to schools and consultants and issuing its findings in

attractive publications" (p.16). The open plan was the result of work completed through the EFL, which also trained Harold Gores and Ben Graves, perceived leaders in the field of educational architecture at that time (Koski, 2011).

Despite the convergence of educational theory and building construction, the biggest failure by design teams came about notwithstanding the reciprocal relationship between school design and instruction (Lackney, 1994). The building and occupation of the open-plan schools presented problems. Teachers accustomed to self-contained learning environments reported difficulty in this setting (Lackney, 1998). Unfortunately, the educational theories behind the open education movement did not take hold. This resulted in a disconnect between facilities and educational programs because of the lack of natural fit. Consequently, Tanner and Lackney (2005) report that this failure was a demonstration of the need to include scientific research and practitioners in the planning process.

2.1.5 The Decline in the 1980s

School construction in the 1980s tapered dramatically primarily due to decreased enrollment, and consequently, school districts did not invest large amounts of capital in school facility planning and new construction. Instead, districts largely focused on minor renovations and additions to suit new programs and other basic functional needs (Baker, 2012). During this time politics played an increased role in school design. According to Hille (2011), "in education, the conservative social and political mood of the 1980s resulted in a basic reconsideration of the educational experimentation of the 1960s and 1970s, and a renewed emphasis on basic academic subjects like math, science, and the humanities, preferably taught in more traditional venues" (p. 203).

An emerging awareness of the national crisis hit in the 1980s. Widespread dissatisfaction with the state of American education legitimized scientific inquiry and political weight by a sudden flood of new studies that were highly critical of schools and argued the urgent need for change (Chubb, 1990). These changes transformed schools, not only from a programmatic level, but from a design perspective as well. The outcry for change caused educators and school designers to reexamine the facilities in school systems. During the 1980s, schools began to take on a variety of forms. Without an established architectural influence, schools combined classrooms into small clusters and focused on the aesthetics of the learning environment. Additionally, with increased demographic needs, a growing shortage of affordable land, and limited funds allocated for school construction, conversions of existing buildings not originally intended for educational purposes began to happen.

With decreasing monies available for school construction and renovation, school systems began to use portable classrooms or pods (Baker, 2012). The structures provided an economical way to combat enrollment uncertainties in school systems. However, these portable (or temporary) classrooms rapidly became permanent parts of the schools that used them (Baker, 2012). From a facility planning perspective, instructional practice and/or educational research did not have a roll in the design of these structures for the most part. In fact, most of these structures rivaled the factory-like classrooms of the past (see figure4).

Figure 4. Modular classroom used in a school system with overcrowded schools. (Photo used with permission from Williams Scotsmans Company, http://www.willscot.com/instructional/classrooms/portable-classrooms)

During this time, other major influences seen in school facility design were the incorporation of flexible space in school construction, particularly high school construction. Prior to the economic boom of the 1990s, construction of school facilities was very limited. However, the schools constructed included spaces for other functions besides teaching and learning. According to Lackney (1998), the conceptualization of designing schools as community centers encouraged innovation in school design. Increasingly, schools served students for more than traditional education. Instead, schools were beginning to share space with government organizations, health care providers, and community education programs. Because of this, schools were increasingly becoming centers of their communities, leading to the incorporation of school facility sharing within the design process (Lackney, 1998). This design trend had mixed results, especially with the infusion of community learning centers supported by the federal government in the mid to late 1990s.

2.1.6 New Movements and Changes in the 1990s and 2000s

School planning and design during the 1990s and 2000s began to change because of a variety of factors. Educational leaders and school designers began to translate evolving new technologies, the growing emphasis on the role educational facilities play in a child's education, economic and political forces, and the development of alternative ways to educate children into facility design. In fact, according to Sullivan (2012), "All these trends [emphases] have led to a moment in time when there is a growing awareness that we are at a tipping point in the evolution of the American schoolhouse. The one-size-fits-all approach is giving way to a variety of new designs" (p. 11). In addition, there are several other factors coming together placing school facilities design, particularly high school facilities design, at the center of national attention. These factors comprise of: 1) a surge of high school reform interests from a personalized learning perspective (Littky & Allen, 1999) infrastructure within school systems and communities beginning to fail (Moore & Lackney, 1994); and 3) a recognition that the current designs of high schools do not lend themselves to successful high school reform (Copa, Bodette, & Birkey, 1999).

These foci presented a clear recognition that learning was moving forward and changing rapidly. In addition, there was increased work done both by educators and by members of the design community to develop new principles to guide ongoing reform efforts during this time. In October of 1998, the White House Millennium Council and U.S. Department of Education cosponsored a conference on school design, which highlighted agreed upon design principles for educational facilities:

-Design must enhance teaching and learning for all learners. .

-Have a community centered focus.

-Involve key stakeholders in the design process.

-Have health, safety, and security as critical components of facility design.

-Utilize all resources possible.

-Incorporate flexibility in school design (U.S. Department of Education, 1998, p. 5).

These design principles emphasize the need to plan and design schools that enhance teaching and learning for all students. But research in facility design, the planning process, and their effects on teaching and learning has been incomplete (Lawton, 1999). In fact, at the National Summit for School Design held in October 2005 and hosted by the American Architectural Foundation and Knowledge Works Foundation, school designers and educational specialists agreed that there is very little evidence to uphold that design improves student achievement (Sullivan, 2005). However, according to Lackney & Moore (1994), There is enough research completed that it is reasonable to conclude that environmental conditions are known to have impacts on students learning. Unfortunately, there has been no established standard or way for architects to give form to emerging educational concepts. State-of-the-art pedagogical designs lacked a presence in school buildings (Copa, Bodette, & Birkey, 1999). Nair (2002) points out that since Lackney and Moore's research, not much has changed. The education professionals remain focused on practice and the architects stay concerned with the innovation highlighted in the finished product (Lackney, 1999). Hence, the void in research in educational facility planning research remains evident.

According to Gislason (2009), the limited research on school design and architecture represents a considerable gap in educational scholarship because such research could help make a difference in school design by helping architects and educators make informed decisions. Architect William Day states, "For the most part a new look at school planning and design simply does not have the full attention of either educators or architects. To this end, educators need to become more

designers and reflectors of their environment and architects need to listen better and ask if their school architecture matched the school practices" (retrieved from www.designshare.com). Because of this apparent gap in the reciprocal influences, there is a continuation of the research in educational practice, which did not connect with advancement and changes in school design.

Even though the research connecting the actual design of the facility to student achievement has been inconclusive, there is growing amount of research on environmental conditions and the impact these conditions have on student achievement and teacher performance. Research completed by Cash (1993), Hines (1996), Lair (2003), and O'Sullivan (2006) examined the effect facility conditions have on student achievement. Overwhelmingly, connections developed between the conditions of schools and the effects on student learning. As reported by the U.S. Department of Education (1999), decaying environmental conditions such as peeling paint, inadequate poor ventilation, bad lighting, failing heating and cooling affect student learning and teacher performance. These reports, coupled with the report on the poor state of public high schools, provided increased emphasis on new planning opportunities for educational leaders.

Research in school conditions and school environments has given rise to one of the biggest influences in education architecture: sustainable design or green building. The rise of green buildings, or high-performance schools so to speak, has been a focus in school design recently. This has been in large part by the new green rating system, LEED (Leadership in Energy and Environmental Design) in 1998 (Baker, 2012). This new movement, as well as the Collaborative for High Performing Schools (CHPS) gained momentum in the late 1990s and continues as one of the largest influences in building design during the early part of the 21st century (Taylor, 2009). When designed appropriately and constructed properly, buildings that are LEED certified save energy, minimize negative impacts on the environment, encourage the use of sustainable,

renewable materials, and provide significant financial returns through the management of energy consumption (Crum and Turkes, 2007). According to McDaniel (2010), LEED AP Interior Designer, the interior of schools has transformed from functionality to an integrated design approach. The connection of the psychology of space to the overarching facility design is what is making the built environment the educational place for the "whole" student. In addition, creating schools under these criteria lead to learning in healthier environments. This idea coincides with research that connects the impact of environmental factors such as lighting, acoustics, ventilation, and air quality on student learning.

Concurrently with the "Going Green" initiative, the technology infusion that began in the 1990s continues to influence educational design. Design specialists have since been struggling to incorporate these innovations into the traditional high school setting. Educators and architects alike need to rethink the meaning of "school" based on the increased growth of instructional technologies and the Internet and, for example, forced traditional libraries to become redesigned media centers (Lackney, 1998). Planning for self-contained classrooms continued, but the need for space to house technology equipment remained a focus (Lackney 1998). This trend is already changing due to the rapid implementation of mobile devices. During these initial years of the technology boom, resource centers resembled classrooms rather than in one large main computer room (Lackney, 1998). Now, with the Internet becoming more pervasive and accessible, a strong surge of virtual learning and educational programs has developed. These changes have been pivotal in the argument against the one-size-fits-all educational design and are supporting the shift towards more individualized learning. The demand for smaller schools, charter schools, home schooling, and community schools have grown from this increased accessibility. Schools are now located in storefronts, renovated strip malls, and even shopping malls (Sullivan, 2005).

2.1.7 Future Trends in School Design and Planning

Researchers have postulated what the influences on educational design will be in the future. There are variances, but for the most part there are twelve aspects that will impact educational leaders and building designers in the planning process and on how they shape educational facilities for the future. They are:

1. School choice and equity.
2. Small schools may trump large schools.
3. Class size reductions.
4. Flexibility of space within schools.
5. Technology integration.
6. Classrooms reconfiguring or disappearing.
7. Schools open and used more.
8. Paperless environments.
9. Grade spans changing.
10. Special education.
11. Early childhood programs.
12. Different uses of school facilities (Stevenson, 2007).

In addition to these influences, school designers will begin to develop a design process for translating complex pedagogies into facilities (Washor, 2003). According to Akinsanmi (2008), designers of schools and educational environments will incorporate emerging teaching and learning theories as well as society expectations to determine the possible use of school facilities in the future. This process will be significant because looking at building design through a more holistic lens hopefully will lead to accommodating change more easily. Subsequently, developing

these design models will help prevent school design and construction becoming obsolete before they the processes begin (Akinsanmi, 2008).

2.2 Reciprical Influences Between Teaching and Learning, and School Design

As time progressed, the connection between school design and teaching and learning is becoming a critical aspect investigated. With the passing of the No Child Left Behind Act of 2001 (NCLB), education professionals held the accountability for closing the achievement gap in student academic performance. This legislation, along with the need to renovate, update, or construct new educational facilities, brings school design to the forefront of discourses in the educational and architectural fields again. Kerr (2003) estimated that the national need for new schools or the renovations of existing academic spaces exceeds $127 billion. Blair and Pollard (1998) convey that educators and planners can align academic programs with the actual design of the school building with the proper evaluation tools for facilities and reform movements. This idea aligns with the activities and ideologies of research and political action groups such as the Educational Facilities Laboratory (EFL), American Association of School Architecture (AASA), and the Building Educational Success Together (BEST). In fact, Building Educational Success Together ([BEST], 2005), reports it is the primary responsibility of all educators to guarantee that every child has equal access to a quality education delivered in an educational environment designed for teaching and learning. Subsequently, school systems developing policies that ensure well-designed school facilities have direct and indirect impacts of teaching and learning.

2.2.1 The Relationship Between School Design and Teaching and Pedagogy

School planning and design over the past century has reflected architectural influences, educational research, politics, and financial limitations, and all these aspects impacted school design to varying degrees. Nair (2002), an international planner and architect, stated that little thought as to whether school designs are improving student learning, and this comes at over a $20 billion annually to build or renovate schools. Additionally, there is little research connecting building design to improvements in teaching. Researchers and designers have postulated the reciprocal notion that the building design may influence teacher behavior, however, as Horne-Martin (2002) argues the style of teaching and room design are in fact linked, but it is unclear as to which is the cause and which is the effect.

Owens and Valesky (2007) developed a school environment conceptual model that incorporates the relationships between school design, teaching, and school culture. Owens and Valesky suggested that the school environment possesses four interrelated dimensions (see Figure 5). The dimensions are *Ecology, Organization, Culture, and Milieu.* *Ecology* refers to the environment or school setting. *Organization* refers to the way the teachers are incorporating their practice. *Culture* refers to the assumptions and values of the school, and *milieu* entails students' the way students interact, their motivations, and even learning styles.

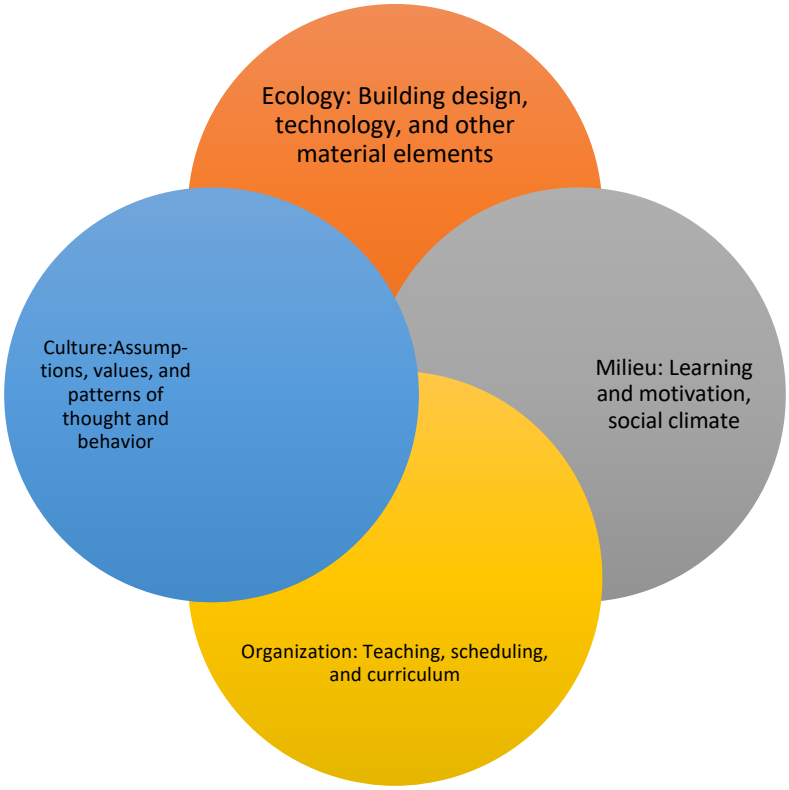

Figure 5. School environment conceptual model (Owens and Valesky, 2007)

According to Owens and Valesky's conceptual model, there is an adequate account that the environment does not have a single cause/effect relationship with any of the other three dimensions, but it instead has a very observable interaction. The model illustrates that educators have direct influences on space organization and time allocation. The major strength of the model according to Gislason (2009) is that it demonstrates a connection between facility design and teaching as complimentary components. This connection gives a theoretical basis for examining how well school facilities support various educational programs and equally, how well-suited those programs are for the designed facility. However, according to Davis (2004), because of the unpredictable nature or teaching; prearranged organization is difficult. Because of this, teaching, "cannot be managed into existence," even when presented as part of a complex framework (Davis,

2004, p. 170). This means the vision of teaching must support an engaged responsiveness to others who are involved in the entire process of learning. It also signifies that teachers "establish a balance between sufficient organization to orient learners' actions and sufficient openness to allow for the varieties of experience, ability, and interest represented in any classroom" (Davis, 2004, p. 182). Regardless of the role environment plays in teacher practice, it is emerging as part of the discourse for facility planning.

From the literature, poorly maintained or designed facilities adversely influence teacher performance, and therefore have a deleterious impact on student learning and achievement (Earthman, 1986). Moreover, Hickman (2002) reported that faculty were more likely to be productive and come to work more often in a new, well-designed facility because "pleasant working conditions tend to positively support the notion of better staff pride and morale and thus better attendance results because the conditions support improved teaching and learning" (p. 121). One of the main cornerstones of the functionality of schools is teacher performance. In turn, Bishop (2009) attests the dissatisfaction of the physical conditions by teachers results in the potential for destructive influences on student behavior and learning as well.

Research indicates proper facilities have continued positive contributions to teachers' level of performance. Siegel (1999) found there was a causal relationship between facility design and the level of collaboration between teachers in high schools. The arrangements of physical spaces in the design have immediate consequences on a teacher's ability to effectively and productively complete daily activities, form positive relationships, and professionally collaborate to share teaching suggestions and content knowledge. The meeting rooms and collaborative areas where teachers engage in collegial discourse are equally important to the design of the classrooms (McGregor, 2004). However, school/classroom design does not only involve architects. It involves

school leaders. One study determined that educators, who are already more apt to chance their classroom and produce what they feel is a better learning environment are also more likely to interact with other professionals in the planning room (Bissell, 2004).

Through a study completed by Agbenyega (2008), it was determined that the classroom affects teachers' behaviors. Their instructional habits and their relationships with students changed This coincides with Schneider (2002), who studied the design of the schools. High school teachers selected from the Chicago Public Schools system participated in an analysis of their teaching environment. This study included aspects such as classroom layout, lighting, school size, and comfort (temperature, air quality, and noise levels). Overall, 75% of the educators indicated several different aspects impacting their overall ability to teach. The respondents indicated that good school facilities and design were as important to classroom success. Additionally, the teachers' lives at work interact continually with the physical environment. This, in turn, helps configure and define how the teacher behaves instructionally. This alignment revealed through the designed environment: the architecture or design of the classroom itself and the materials and technologies incorporated. Therefore, the social relations (curricula and pedagogy) are reflected in the physical environment (Siskin, 1994; Lawn & Grosvenor, 2001).

Conversely, Cooper (1981) states, "Those who offer guidance on the planning of buildings tend to assume that there is some necessary relationship between the design of a building and the behavior of those who occupy it" (p.125). Cooper refutes this notion in detail. Apart from the research on facility design, Brennan et al. (2002) determined that by changing the design to a more open-air design did not necessarily have a direct connection to an increase in socialization. Results like these, as well as those findings by Horne (1999), infer that the design of the teaching space does not truly impact their practice, rather teachers just simply manage the environment they are

in. This possible connection grew from the notion that the teachers did not "own" the space because they did not participate in the design process. Ellis (2005) disputes that there is a direct connection between the way that educators interact with their teaching space and the way they interact with their homes, former schools, playgrounds, etc. This idea is very crucial for the relationships between teachers and students because these relationships dictate the types of teaching strategies used for the students.

There have been different styles of school designs proposed and built with specific teacher behaviors in mind. The factory model implemented a standard classroom with students sitting in rows and a teacher place in the front. The factory style schools exemplified the transmission of knowledge from the teacher to the students as the primary and almost only way to learn (Upitis, 2009). After the transmission of knowledge or information, the assessment of the students' abilities to retain this based on that style of instruction ensues. Regardless of the development of learning theories, including Dewey's progressivist concepts of learning, factory schools and the styles of teaching that are inherent within the design continue. For over a century, public schools have rivaled the same design as factories. Homogeneously grouped students occurred in standardized, box-like rooms for almost a year, and within this setting and timeframe students received a predictable style of teaching (transmission) and curriculum, then they moved to the next box-like room when deemed ready. This continues year after year until students have reached an age where the "factory" or school determines they are complete (Upitis, 2009).

Washor (2003) reports that despite intended educational innovation, if an educator teaches in a traditional rectangular classroom with 30 fixed desks in a row and a chalkboard in the front, the teacher will use antiquated "lecture and listen" teaching styles. In her observational study of teachers over two years, Bissell (2002) supported the assertions made by Washor (2003) that the

room or physical space can influence teacher behavior. Subsequently, Bissell (2002) found that traditional classrooms, while consistently satisfactory for traditional work patterns of teachers, were frustrating to use for teachers with non-traditional teaching styles. Bissell stated, “The standard classroom makes it difficult for them to provide learning and student-centered instruction and to interact with their students in a satisfactory level. These teachers spend large amounts of time and personal resources adjusting their work environments to fit their needs, often with less than ideal results” (p.250).

In addition to the factory model, other designs influenced instructional practices. Open design or open classrooms designed to increase collaboration and student interaction developed. According to Ahrentzen and Evans (1984), there was evidence that more nontraditional open-style classrooms did impact the pedagogy of teachers, however Rivlin and Rothenberg (1976) contested that the impact is not nearly to level anticipated. In fact, despite the development of school policies and the radical change to classroom design to be more flexible, many of the teachers they studied did not change their teaching styles, essentially continually teaching from the “front” and they did not change student seating or any other furniture arrangements at all. Weinstein and David (1987) pointed out, “open-space, in and of itself, does not have a universal effect" (p.12), whereas Canter and Donald (1987) argued when comparing the influences of more traditional classroom designs to open ones, they determined that the critical aspect was the school’s philosophy of education combined with the physical layout, not the layout or design exclusively.

The issue with incorporating advancements in pedagogy directly into facility design is that there are political and economic influences that have been hindering this connection for over one hundred years. Even though certain design attributes have been consistent in most high schools since the inception of public education, there have been instances of school design meeting

pedagogical and learning needs. An example of this is the Horace Mann High School designed by William Wirt. Wirt adhered to the progressive approach towards teaching and learning, which translated into his design of the Horace Mann High School (Washor, 2003). Experiential learning was the backbone of this design. Horace Mann incorporated zoos, parks, and farms where students completed hands-on learning, utilized technology, and worked collaboratively in small and large group project meeting areas (Copa, Bodette, & Birkey, 1999). Recently, innovated approaches to facility design have developed by architects focusing on schools (Copa and Pease, 1992; Fielding, 1999). These approaches highlight the design of high schools focusing on learning-centered environments (Washor, 2003). Copa and Pease (1992) developed a design for new high schools that included these key design elements:

- Student outcomes connected to future career goals
- Rigorous expectations and authentic assessments.
- Multiple pathways for students that incorporate learning styles and interest.
- Integration of high-level academic education and vocational training.
- Partnerships to diversify learning setting.
- Special focus of the school that promotes coherence between teaching and learning.
- Operate as a caring community that often requires subdivisions or areas of large schools.
- Complete integration and alignment of different areas within the school.
- Decision making processes consistent with overall aim of the school.
- Partnerships with the larger community to help make learning meaningful (p. 16).

The intent was to craft new facility designs focused on innovative pedagogies (Washor, 2003). The development of open spaces, places for large group instruction, small collaborative

spaces, and individual workstations resulted from the processes employed. This list is important; however, it does not contain the planning process needed to ensure the incorporation of these elements.

Gislason (2009) completed a case study analysis of the School of Environmental Studies, a public high school, which focused on studying the various aspects of the environment. This school design followed the processes and design components set forth by Copa and Pease (1992). Gislason (2009) argued that the physical design of the school lends itself to more collaboration and multidisciplinary teaching practices specifically designed towards the school's academic focus. He reported that the open concept of the school moved towards collaborative teaching methods rather than traditional. Furthermore, the success of the school was an integration of the facility design in conjunction with the style of instruction, and curriculum. In this instance, the environment influenced both student learning and teacher pedagogy.

2.2.2 The Relationship Between School Design and Student Learning

The literature substantiates a strong link between conditions in schools and student performance. Major studies completed by Earthman and Lemasters (1996), McGuffey (1982), Weinstein (1979), Cash (1993) and Heschong (1999) confirm that there is a powerful connection between substandard conditions (temperature, poor air quality, lighting, acoustics, plumbing, and cleanliness) and student achievement. Furthermore, the replication of these studies focusing on different educational levels over time and in different geographical areas occurred. Consistently, the results in recent studies support the claims of this research, however the conditions of high schools were the focus. Research completed by Smith (2008), Bishop (2009), and O'Sullivan (2006) utilized the Commonwealth Assessment of Physical Environment (CAPE) and determined

there was a relationship between the structural and cosmetic conditions of the high schools and student achievement.

Architecture affecting learning may possibly connect more closely to the curriculum. But researchers determined, most often, that students attending schools which are well-maintained are more likely to have higher levels of academic achievement than students who attend schools that have subversive conditions (Berner, 1995; Peters, 2003). For years facility designers and educators have studied the role lighting and color have in creating environments which increase positive social behaviors and are conducive to learning (Dudek, 2003; Tanner, 2000). Additionally, the use of natural light increased student performance as well as being cost effective for the district. A study completed by Heshong (1999) determined that there were significant connections between the amounts of natural light and student performance. The students learning in classrooms with more natural light progressed more rapidly than those lacking these features. In this study, students achieved a faster rate of acquisition of 15% in math and 23% in reading. Studies, such as the one by Heshong, have included other measurable factors within building design (acoustics, color, air quality), all of which impacted student learning.

These findings coincide with evidence that school design incorporating higher environmental standards will have an increased influence on student learning regardless of pedagogical practices (Washor, 2003). In a *Pattern of Language*, architect Christopher Alexander (1977), discussed how the design of buildings convey specific messages about their functions and how the design influences behaviors of its occupants. Buildings that are windowless, dark, and lacking an aesthetically pleasing environment will most likely negatively affect human performance.

Earthman and Lemasters (1996) state that school design, not only influenced student

learning, but it is measurable. Among the components that have an impact are temperature, lighting, acoustics, and age of building. Chan (1996) supports these claims that a proper learning environment contains key ingredients such as appropriate quantities of natural light, pastel colors on the walls, good ventilation, and acoustics. Furthermore, quality learning environments free students from experiencing stressful situations due to the physical conditions, therefore, making it easier for students to focus on schoolwork. These features relate primarily to comfort and not to the physical space designed for learning or the general design of the school attributing to student interaction. Owens and Valesky (2007) attempted to develop a theoretical model (Figure 2.5) that conceptualizes the possible interactions of the learning environment including the impact of the building design on student learning. Using the conceptual work of Owens and Valesky as a guide, Gislason (2009) concluded student learning [milieu] and school design do interact with each other because milieu forms the basis of how students interact with their environment.

Additionally, crucial design elements in school planning supported quality learning. Districts that implement design features that focus on smaller spaces increased several factors impacting student learning such as (use of manipulatives and better questioning) (Weinstein, 1979; Evans & Lovell, 1979). Smaller spaces, as noted in the research, have positive influences continually, but the well-designed learning spaces no matter what the design can have that same affect. Supporting this, Moore and Lackney (1994) determined that well-designed schools, with the proper focus on student learning versus poorly designed schools, promoted greater levels of engagement, more teacher-student interaction, and higher levels of cooperative behaviors and social interactions.

Conversely, Earthman and Lemasters (1996) postulate that the differences or impact that the learning environment has on learning and student behavior is not significant enough to affect

the outcomes in schools. They further stipulate that even if the design of the learning space can account for a slight increase in student learning, the efforts of teachers overshadows any variances or impact of the environment. McGuffey (1982) has a different approach to these same determinations. Subsequently, he agrees that learning environment only has a small impact on student performance. But in the context of all school related variables having impacts, the actual design of the building affecting student learning could be sizeable considering the connection of variables have to student learning that the district has control.

Bogle (2012), president of the American Architecture Foundation and leader in educational design, refutes these claims on the premise that students learn in many different ways: lecture, small discussions, individual tutoring, hands-on experiences, research, etc. `When educators and facility designers partake in school design, the designers should include a full range of learning styles, and the learning environment should be constructed in a way that supports students, teachers, and the styles of learning. Bogle (2012) further substantiates that innovative designs are not as simple as removing walls and making spaces more flexible; it is about generating spaces that accommodate the specific educations needs and learning styles.

As stated in the Tennessee Advisory Commission on Intergovernmental Relations (2003), "Policymakers should be concerned about the relationship between school facilities and student learning and achievement, not only because of health, security, and psychological issues, but also because the failure to create and maintain optimum learning environments can undermine the efforts to reform education" (p. vii). Meek (1995) continues, "The design of physical structures offers an important means of giving concrete expression to abstract ideas, and new approaches to school design can themselves be an effective tool for communicating the new educational values" (p. 10).

Ongoing research also illuminates the impact of specific facets of school design like the design of the classroom. Talton and Simpson (1987) affirm that classrooms are fundamental units in our schools, and with this being the case the planning process would affect these units. Additionally, Sommer and Olsen (1980) determined that a newly designed classroom, equipped with proper furnishings, and designed to be more inviting, increased student engagement. They reported participation rates in classroom discussions increased by two to three times as high prior to the change in the physical environment.

Other studies completed in other fields may still directly relate to the influences learning styles have in relation to school design. The facility environment for corporate employees was studies at Motorola and Siemens (Stamps, 1998). Their conclusions have implications for school design regarding physical environments and how people learn. The determinations of the study directly connected to educational research that people learned best in small groups or individually; facilities need aligned to those needs. This idea upholds the work completed by (Shank, 2003), which attests that classrooms are the design component of the past. He wants to see schools eliminate the classroom as an integral part of school design. From a learning perspective, students need to be making things, utilizing technology, talking with others, and creating things, classrooms are not a necessity for these things to happen. Shank stresses the best way to learn is by doing, therefore using computers for simulations, and completing hands on experiences virtually eliminates the need for the classroom.

Beyond the research, Crumpacker (1995) theorizes about schools' impact on students' lives long after they leave the system. She states, "The environments…have profound and lasting effects on our lives and learning" (p. 42). Chan (1996) reports that students express both positive and negative attitudes based on the condition of their environments. Within a well-designed

environment, students will learn with higher motivation and demonstrate better performance along with a positive attitude. According to Washor (2003), student interest and motivation must be part of the designed physical space. Unfortunately, schools are not set up this way. Washor (2003) stipulates that a new collection of design and planning principles, which incorporate educational programming and the physical structure of schools, foster student learning and increase student interest.

2.2.3 Environmental Psychology, Learning Theory, and School Design

There is existing literature in the field of environmental behavior that is relevant to the impact school planning and design has on teaching and learning. These theories presented postulate explanations for observed behaviors as people interact with their environment. Additionally, environmental psychology is a growing field among educational designers thinking about the symbolism and psychology of the school building as part of life, learning, and individual student growth (Keller, 2007). With the development of new ideas in design and the incorporation of new technologies, the design of new facilities is different than old ones (Chan, 1996). The new school designs impact teachers and students. Changes in behaviors, thinking, and even daily assignments illuminate this impact. Facility designers and educators alike are now developing an increased interest in the overall facility planning process including the impact the facility has on its users (Chan, 1996).

Environmental determinism theory suggests there is a stimulus-response relationship that exists between physical environment and human behavior (Bissell, 2002). Environmental determinism -- also referred to as *architectural determinism* -- centers on the concept that design does matter, that design does make a real difference to its occupants. In fact, a core tenet of this

theory posits that new environments created will change behaviors and attitudes of the occupants (Hamill & Everington, 2002). The problem with this theory is that responses are not easily predictable and difficult to isolate and measure. An alternative environmental behavior theory, *environmental possibilism-architectural possibilism*, suggests that an environment presents possible choices (behaviors). Actions or activities depend on the choices a person makes while interacting with the designed space (Rullman & Kieboom, 2012).

A third theory in environmental psychology, *architectural probabilism,* supposes that behavior is unpredictable but purposeful design increases the likelihood of behavior responses. For example, physical environments that are inviting, well lit, and easy to find will not necessarily cause use but may increase the likelihood—or probability—of use (Rullman & Kieboom, 2012). Educators and educational designers who suggest that a classroom organization of cells in a row and closed doors predicts isolation, while grouped classrooms around an open floor plan or common space predict collaboration, often note probabilism when observing classroom organization and use (Keller, 2007). There are other theories applied to the physical environment and the way people interact with it such as *affordance theory* and *symbolic interactionism*. Both theories derive from a set of physical and behavioral components that will result in consistent behaviors in the extent they recognize the potential of that environment for that behavior (Keller, 2007).

Educators and educational designers are beginning to reexamine these theories in environmental psychology to build a foundational knowledge in school design. Several educators see the school as having great impact on students psychologically, both because of environmental issues and the interactions happening at a critical time of development (Keller, 2007). Rapaport (1982) considers building/human relationships to be non-verbal, but existent. The building or

school supplies cues that humans react to with emotion, behavior, interpretation, and self-context. He affirms that people believe these non-verbal cues more than verbal. For example, a set of 30 desks in rows with a podium in the front would not invite student participation, collaboration, and active learning (Strange & Banning, 2001).

In school design practice and theory, incorporating new directions and research in learning that address student-centered, constructivist methods will undoubtedly affect the overall design of schools. Students spend several hours of their days in schools, and the learning environment has a pivotal influence in students developing a feeling of belonging. Contemporary theories in learning and more recent developments of cognitive theories have promoted a shift in paradigm in education (DeGregori, 2007). More learner-centered constructivist views replaced past instructional views (Jonassen and Land, 2000). Subsequently, school designers wrestle with the dilemma of incorporating more complex instructional designs (project-based learning) and open environments as the central component of educational facility planning.

Through the synthesis of disciplines as part of facility design (architecture, learning theory, environmental behavior) DeGregori (2007) studied the interconnected factors related to students' ability to learn. This, in turn, may advance the discourse centered around school design. The effectiveness of learning is amount of opportunity the learner has for achieving best experience in a school setting with the best outcomes. DeGregori was able to develop a plausible theoretical framework conceptualizing the complexity of interactions and connectivity between environment, pedagogy, and learning (Figure 6).

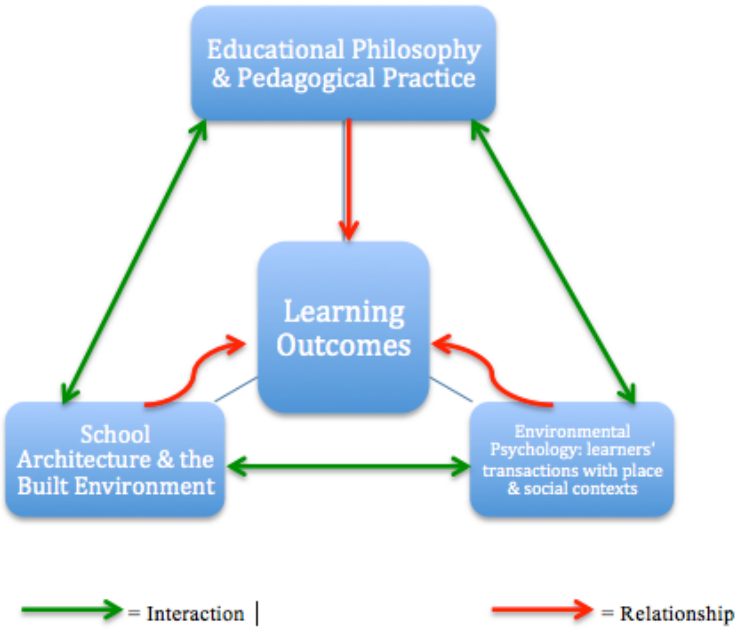

Figure 6. Conceptual framework related to the architecture of schools as learning environments

Because of the complexity and difficulty isolating the design itself as a limiting factor, the discourse in connection with school architecture needs to be redefined based on the advancements in teaching and learning theory. Moreover, Taylor (2009) posits dramatic shift for school design is foreseeable; students will begin to play a critical role in designing the learning workplaces. This shift will inherently change the way school design happens in the future.

Dudek (2000) explains that architects have the difficulty of incorporating aspects in the educational realm that have contradictory views. The task of incorporating social interactions and areas where deep reflection can occur is very daunting. Consequently, schools that have open, collaborative areas yet consist of the compact, flexible spaces that make learning more personalized are the demands of school designers. Dudek merges these competing forces by recommending a "hybrid approach" to design that reflects both student-centered styles coupled with teacher centered pedagogy thereby balancing influences of architects and educators. In

addition to this hybrid approach, Akinsanmi (2008) reports that designers of schools can look to current learning theories and the expectations of the community to help guide designing for years to come. While keeping those merging trends in mind, as well as implementing a hybrid design approach will assist in creating facilities that oscillate or incorporate change more easily. These influences will not only be on programs and classroom configuration, but also the choice of building materials, specific details in the construction or specification of the project, and overall aesthetics.

2.3 Factors and Processes Involved in Designing School Facilities

There are many factors directly impacting school facility construction. Once a school system embarks on the journey of facility design and construction, there are specific elements taken into consideration throughout the duration of the project. Regulations, needs, wants, political trends, and changing priorities affect schools, not unlike other organizations. Ideally, the standardization of these elements gives educational leaders and architects a road map for designing schools that optimally promote student learning and teacher effectiveness. However, there is considerable discourse centered on the level of importance factors have in the design and construction of schools. Moreover, the design processes used in school systems vary based on the philosophical predispositions of the people involved.

The debate continues regarding the recipe for an effective school design process and the factors influencing the decision-making process. Comprehensively reviewing the literature in this domain provides a foundational knowledge for continued investigation in creating a paradigm for building design. This framework forces school designers and school leaders to take a proactive

approach by identifying critical factors that influence building design and working collaboratively to uncover the major conceptual framework needed for future planning.

2.3.1 Factors Influencing School Design

School districts must abide by specific regulations governing school design and construction. These regulations stem predominantly from federal/state laws and local mandates. If districts are seeking reimbursement for the school construction project in either its entirety or partially, outlined steps need following.

In Pennsylvania, school districts undertaking large facility construction or renovation projects and seeking reimbursement from the Commonwealth must implement a process known as PlanCon. According to the Pennsylvania Department of Education, "PlanCon, an acronym for Planning and Construction Workbook, is a set of forms and procedures used to apply for Commonwealth reimbursement. The forms are designed to (1) document a local school district's planning process; (2) provide justification for a project to the public; (3) ascertain compliance with state laws, regulations and standards; and (4) establish the level of state participation in the cost of the project" (Pennsylvania Department of Education, n.d.). The Division of School Facilities in the Department of Education (2018) assesses potential school building projects. According to the Department of Education, this includes the plans and specifications, enrollments, building utilization and building condition. Additionally, the Division calculates state reimbursement for qualified school construction projects, and reviews and approves the financing for reimbursable projects. These procedures are well documented and well known by school planners and vary from state to state. Because these steps are well known by educational facility planners, these factors are not part of this review. Regardless of the state processes implemented, there are other factors,

which are independent of regulations and laws, influencing the planning process of designing schools.

2.3.1.1 Economic Influences

Economic influences and the economy of the school building go together while planning a school facility. Economic influences refer to the monies available to sustain existing facilities through renovations or build new structures within a school system, and the economy of the building refers to the maximum educational and utilitarian value per dollar expended (Castaldi, 1994). The financial resources available to school districts vary across school systems. Because of this inconsistency, continuing pressure exerted on educators and architects to stretch the school building dollar ultimately impacts school construction (Leu, 1965). The financial commitment of school construction lasts for a very long time. McGowen (2007) stated that the single most expense and most enduring transaction made by school leaders are designing and building school facilities. According to the Annual School Construction Reports in the National Clearinghouse for Educational Facilities (NCEF), from 1999 through 2008, approximately $300 billion supported the construction and/or renovation of schools in the United States. Moreover, the number of school projects increased between 1997 and 2007, which increased the amount of monies spent on facility design (U.S. Department of Education, 2009). Despite this construction, more than half of the current schools are more than forty years old (NCEF, 2010). These statistics allude to the overwhelming responsibility of school system leaders to anticipate the district's financial needs, to plan for educational facility construction, and for architects to implement design techniques to achieve good economy of the constructed or renovated building without sacrifices in educational adequacy or maintenance costs.

School leaders and school designers should make every effort to achieve maximum economy in both capital outlay and operation of a proposed school building. Castaldi (1994) refers to school planners needing to differentiate between true and false economies while conceiving a building project. The criteria used to determine a true economy are 1) that the reduced cost in capital outlay does not adversely affect the curriculum or educational efficiency of the school, and 2) that the reduced initial cost does not result in increased maintenance and operational costs. The first criterium refers to aspects of education that may be difficult to evaluate in relation to school design. However, school planners must be sure that an economy does not hurt or hinder a desired educational program. The second aspect refers to the relatively straightforward cost versus maintenance and operation of various components of the built environment.

2.3.1.2 Community, Culture, and Politics

Educational facility planning does not occur in a vacuum. School systems embarking on renovating or building a school, regardless of the design model implemented, will reflect the community, culture, and political struggles within the district. Hoy and Miskel (1996) posit that social, political, and economic trends beyond the scope of the school district in size will impact the way district leaders, community members, and facility designers approach the overall design of schools. Because of this mirroring affect, one could reasonably conclude that what happens at the regional, state, or national level may affect the school district, but it is possible there is a reciprocal effect as well (Hoy and Miskel, 1996). Furthermore, since schools do not operate predominantly as other organizations, there are fundamental characteristics reflected in the design of almost all schools, such as the culture and political beliefs within the community. Scott (1995) describes schools as designed environments that have the specific focus of compliant behavior. This notion applied to school design in general will naturally influence the architectural design of

schools. Consequently, the juxtaposition of these fundamental beliefs with the design principle of designing with the common goal of "form following function" pioneered by Louis Sullivan and continued by Frank Lloyd Wright leads architects and facility planners into a complex dilemma.

In a larger context, the ideas brought forth by architects regarding design must be able to fit within the education vision of the district while taking in to account the culture of the community. Elliot Washor (2003), co-founder and co-director of Big Picture Learning and the MET in Providence R.I., reports that schools are remarkably good considering the amount of "system stuff" architects must include when designing a school. The system stuff he refers to is the political rhetoric behind school design. McDonald, Klein, Riordan (2009) do not view the politics behind school design as a negative aspect. The political noise is the sound of the design ideas emerging, the signs of a real school being born, the signs of people on the ground floor in many different contexts risking their values to try something new.

2.3.1.3 Pedagogy and Student Learning Influencing Planning of School Facilities

Besides the fundamental economic, cultural, and political influences, school districts are studying the connections between school environment, student achievement, and teacher effectiveness in relation to the planning process. Section 2.2 addressed reciprocal relationship between teaching and learning and building design previously. However, this section includes this relationship as well because the relationship also directly impacts the planning process in school facility design. Even though there have been notions of this relationship originating back to Dewey, it is not until the latter half of the 20th century that this interaction infused in school facility planning. Research completed by Hines (1996) and Picus, Marion, Calvo, and Glenn (2005) was instrumental in expanding the awareness of school officials and architectural designers concerning the significance of the connection between student learning and physical environment. This

research provided foundational data linking the built environment to student learning and student achievement. Consequently, design teams led by architects and informed educators are now seeking acceptable, rigorous measures of success for new innovative schools that support educational initiatives, faculty collaborative planning, team teaching, differentiated instruction, and community (Washor, 2003). By better understanding the effectiveness of new school paradigms, superintendents and building level administrators as learning leaders can better serve their populations to break out of the prevailing traditional design of facilities that has been a central part of high schools (Washor, 2003). Moreover, recent literature an analysis of recent literature establishes that educators and architects have agreed that the design of the educational facility must meet the needs of the learner and the community as well as reflect the districts vision for education.

2.3.2 Processes Involved in School Design

The processes used to design educational facilities changes based on the magnitude of the project and factors presented above. Additionally, there are no set protocols set forth or endorsed from a research perspective as considered ideal for developing an effective learning environment for children. In fact, the intricacies involved create a process almost unique to each school design process. However, current research is beginning to develop correlations between student learning and the design of the physical space beyond the scope of walls, ventilation, acoustics, and safety. Consequently, the processes involved in attaining the design of a quality space greatly impact the success of the school design.

2.3.2.1 Planning Models

When a school system embarks in the journey to design and build a school, school officials begin to make decisions regarding a variety of factors including site location, scope of project, purpose, financial allocations, and designer. Whether it is purposeful or accidental, the member(s) responsible for the project inherently establish a planning model that will regulate how decisions develop, the transfer of information, and who impacts the creation and implementation of the designed school. There are many well-documented planning models, but according to Kowalski (2002) all models have specific characteristics that fall across two distinct continua:

No matter what planning model implemented, there are identifiable processes along these continua. The selection of the mode of planning is largely dependent on the several key factors such as efficiency, philosophy, and constraints (economic, political, time).

Nonintegrated planning models may lead to a high level of efficiency in the planning process, but this only happens because of isolated decision making. This model lessens the burden on planners by reducing the incorporation of multiple inputs and the need for compromise when conflicts arise. Often, however, if only one or a few people have input into the design, the needs of the community or of the total school district receive minimal attention (Kowalski, 2002).

Integrated planning models are much more complex. They include the realization that the organization's intricate entities possess numerous elements. Systems analysis is one of the best-known integrated approaches (Kowalski, 2002). This approach gives people the opportunity to study various aspects of a given entity or program. In a highly integrated planning model, this analysis is critical when considering the complexity of facility planning. Incorporating multiple

opinions and key factual elements based on the individual components of a school system, then synthesizing these elements into a comprehensive plan for a school facility, oftentimes leads to a more precise plan and a higher quality of information in the design process (Kowalski, 2002).

The second continuum of planning models describes the way decisions come about in relation to identifying the tasks and the order. Even though there are specific steps outlined in the States' Departments of Education, there are a variety of decisions or tasks that need to happen while planning the construction of a new school. A linear planning model provides a sequential list of steps for the planners lending to the notion that one step occurs prior to the next one. Linear planning may be efficient in some cases, but oftentimes pays little attention to the needs and wants of the people affected by the planning model. Moreover, linear paradigms do not recognize that resources, prevailing conditions, and needs of school districts vary (Kowalski, 2002). For this reason, a successful planning model for one school district may not work for another. Additionally, Eisner (1985) states that the goals and objects of every building project are never precise and that critical alterations occur during the planning deliberations. With these shortcomings outlined, linear planning still prevails as the common mode for facility planning because it serves as a guide through critical steps in the process (Kowalski, 2002).

Nonlinear paradigms do not indicate there is a lack of planning, but instead it is a model that does not rely on the sequencing aspects of linear approaches. Even though regulations, state codes, and laws dictate some elements of a linear process, nonlinear planning provides flexibility as to when certain tasks or elements involved in a school design occur. Additionally, more participants usually partake in the planning process when utilizing this model (Kowalski, 2002). Committees may work concurrently to develop components of the facility plan. This model is a

more complex approach to facility planning and takes a significant amount of planning between the committees and those responsible for the facility plan.

2.3.2.2 Collaboration in Facility Planning

The design and construction of any multimillion-dollar school facility requires organization, specialized knowledge, and skills, as well as participation by professionals and laypersons, often with different agendas, financing, and political acumen (Keller, 2007). In fact, a study completed by Meek (1995) determined that if the common thread of collaborative planning between designers and the school community is weak or absent, weaker design solutions will result. New facilities designed in isolation from the community – teachers and learners, parents, and political forces – and not aligned with the district mission for teaching and learning, perpetuate the nonworking environment of the past and negatively impact behaviors (Washor, 2003).

Specialized educational leadership skills are essential for projects of this level of complexity, but for most educational administrators, specific skills related to facility design and construction are absent in formal training and certification requirements (Kowalski, 2002). Moreover, architects, as leaders of design and construction teams, have no training in educational pedagogy and learning theory. This gap in understanding increases the likelihood of a disconnect in the overall built environment and the educational vision of the school system. Both leaders possess limitations in their ability to perform their functions by the degree of knowledge accumulated from experience in their field or transferred from other situations. Yet these experiences may not align with the needs nor the mission and values that comprise the essence of the current project.

For school districts to stop these trends, school officials need to bring about substantial changes in education through high impact dialogue. Locker (2008) explains the significance of

this discourse:

> A good dialogue with administrators, teacher, staff, students, and the community for designing a building would correlate with changes in educational delivery to align with current best practices and an understanding of how education will be changing in the future (p. 2).

School leaders must understand the roots of the discourse and how it originates. Tanner and Lackney (2006) indicated that design team members and district leaders must develop a solid understanding of the planning process to be successful navigating the political, social, and economic aspects embedded in the design process. Making sense of the dynamics or forces at work and how stakeholders respond to these forces support the idea that planning has less to do with the actual design of the school and more to do with the actual design process. Understanding and valuing the actual design process within the larger school community permits school communities to create a new paradigm for completing construction projects. Bingler (1995) explained:

> The conventional wisdom...is that educational facilities simply provide the containers in which learning occurs, but that the form of the containers, and even the process of making them, has little to contribute to the real purpose of education, which centers around the curriculum and instruction delivered by the educator and received by the student (p. 23).

According to Tanner and Lackney (2006), potentially just providing information about the process will most likely challenge conventional thinking. In fact, they stated that simply providing information would not change anything. They suggest even further that stakeholders receive the chance to apply the information presented in an authentic experience; this, in turn, would

encourage “working with people rather than for them and involving them in critical, relevant aspects of the process” (p. 47).

In the design process of new school facilities, professional collaboration between architects and educators promotes better design (Bradley, 1996). Furthermore, Rogoff, Matusov, and White (1996) have claimed that learning is a “process of transformation of participation in which both adults and children contribute to and direct shared endeavors” (p. 389). Collaboration as part of the whole design process would most likely not happen without group participation.

Many superintendents now realize that the knowledge necessary to uphold the educational side of this equation is elusive; the training in facility planning and working with architects to create the types of learning environments their philosophical theories and curricular plans require are missing (Kowalski, 2002; Keller, 2007). Kowalski (2002) calls for a dialogue between educators and architects providing an opportunity to share ideas and define issues each are facing in the design process. This recommendation moves a step further when Bradley (1996) posits the need for educators and architects to spend time learning about the other’s profession, becoming familiar with the other groups’ language, understanding the issues relevant to the other, and gaining respect for each other’s struggles. Only then might each gain the appreciation for the goals the other is attempting to accomplish.

2.4 Research and Factors Influencing School Design

Table 1. Summary of researchers and the different factors influencing school design

	Factors Influencing School Design	Pre-Design/Design Paradigms	Legislation	Politics	Educational Research	Stakeholders	Architectural Influence	Student Learning	Educational Programming	Environmental Factors (Population, Region, Climate)	School Officials	Teaching Strategies	School Culture	Technology	Financial Factors
Researcher	Year														
Agbenyega	2008				x				x			x	x		
Akinsanmi	2008	x			x	x		x		x			x	x	
Baker	2012		x	x	x		x	x		x	x				x
Brubaker	1998			x	x		x				x	x			
Cash	1993					x	x			x					
Cervero & Wilson	1994			x		x									
Castaldi	1994	x	x						x						x
DeGregori	2007	x			x			x	x		x	x	x		
Earthman	2000	x													
Gislason	2009									x			x		
Graves	1993					x	x								
Hickman	2002								x			x	x		
Hille	2011				x		x	x		x					x
Hines	1996					x	x	x		x					
Hoy & Miskel	1996	x		x							x				
Keller	2007	x				x			x		x		x		
Kowalski	2002	x	x			x	x				x				x
Lackney	1998			x	x	x			x	x				x	
Lackney & Moore	1994			x	x		x		x						
Locker	2008	x				x	x			x					

	Factors Influencing School Design	Pre-Design/Design Paradigms	Legislation	Politics	Educational Research	Stakeholders	Architectural Influence	Student Learning	Educational Programming	Environmental Factors (Population, Region, Climate)	School Officials	Teaching Strategies	School Culture	Technology	Financial Factors
Researcher	Year														
Meek	1995	x				x					x				x
Nair	2002			x	x							x			
O'Sullivan	2006			x		x	x			x				x	x
Owens & Valesky	2007	x			x			x		x		x	x		
Perkins	2001	x				x									
Tanner & Lackney	2005			x	x		x			x		x			
Tanner & Lackney	2006	x		x		x			x	x	x	x			
Upitis	2009	x									x	x			
Washor	2003	x		x	x			x	x			x	x		
Weissner	2006				x										x
Weistein	1979				x			x	x	x		x			

2.5 Need for Continued Research

Historically, researchers have produced various analyses of school design. It has become evident that many of the schools built during different periods of time reflect the politics, economics, demographics, and educational trends of those times. Moreover, growing research describes key elements of the planning process to produce a quality school. However, analyses of the outcomes in student performance in relation to school environment are difficult to isolate and the research lacks clarity. Recently, trends in curriculum, teaching, and learning are reaching

center stage regarding building schools that reflect a sound educational vision. According to research, the involvement of individuals from diverse interest groups (i.e. parents, educators, and community members) in the planning process, as well as design professionals, provides a clearer look into the learners served. The *form* of the building design would then follow the *function* of supporting the students. However, a universally accepted planning framework does not exist to achieve this goal.

3.0 Methods

3.1 Statement of the Problem

This study examined the school construction planning procedures and protocols used by school design teams to construct high school facilities. The study sought to provide further insight into the principal's role during school design processes in relation to the success of the overall construction project. Moreover, this study will further contribute to the research base needed to develop planning models for school systems to use when constructing schools. The complexity of the process wherein school planning occurs accounts for the lack of a universally accepted planning model used by school systems when constructing schools. However, this does not mean that a foundational knowledge base or construct cannot develop to help guide design professionals and educators through this process. There is a strong need to continue to build a research base to help design teams better understand how to organize and analyze the complexities of the different relationships within the facility design process.

3.2 Research Questions

The research questions of this study derived from an extensive review of the literature on the connection between the physical environment and overall success of an educational institution. Specifically, the study sought to answer the following research questions:

1. What are school principals' perceptions about their involvement in the predesign and design phases of school building?

2. What are school principals' perceptions about the involvement of different stakeholder groups in the design of school facilities?

3. What are school building principals' perceptions about the connection between the district vision and planning of the building?

Additionally, these questions supported looking at the planning procedures through the lens of a conceptual framework generated as a synthesis of planning model research relating the design of a school facility and outcomes of the study. The conceptual framework consisted of a causal relationship between the built environment and learning outcomes, therefore, investigating the predesign and design phases of facility planning and roles principals have within these phases will contribute to a larger selection of research in school facility planning and design. Table 2 depicts the research questions and the corresponding research, in conjunction with the interview questions used in the interview protocol.

Table 2. Alignment of research questions, interview questions, and corresponding research

Research Question	Interview Question	Corresponding Research
Research Question #1 - What are school principals' perceptions about their involvement in the predesign and design phases of school building?	(Question #3) Please indicate the most significant factors influencing the design of your school?	Akinsanmi, 2008; Baker, 2012; Tanner & Lackney, 2005; Tanner & Lackney, 2006; Washor, 2003
	(Question #2) As the school administrator, when were you involved in the process?	Brubaker, 1998; Castaldi, 1994; Keller, 2007; Tanner & Lackney, 2005; Tanner & Lackney, 2006; Washor, 2003
	(Question #1) How would you describe your "official role" during the design phase of the school?	Kowalski, 2002; Lackney, 1998; Keller, 2007; Tanner & Lackney, 2005; Tanner & Lackney, 2006; Washor, 2003

	(Question #4) What role do you believe principals should have in the design planning of a school?	Akinsanmi, 2008; Baker, 2012; Hines, 1996; Hoy & Meskel, 1996; Locker, 2008; O'Sullivan, 2006; Weinstein, 1979; Washor, 2003
	(Question #8c) Once informed of the project, to what extent were educational specifications prepared prior to the design?	Akinsanmi, 2008; Kowalski, 2002; Hoy & Meskel, 1996; Locker, 2008; O'Sullivan, 2006; Weinstein, 1979; Washor, 2003
	(Question #7) How did this group exert its influence on the design of the school?	Akinsanmi, 2008; Hoy & Meskel, 1996; Weinstein, 1979; Locker, 2008; Washor, 2003
Research Question #2 - What are school principals' perceptions about the involvement of different stakeholder groups in the design of school facilities?	(Question #5) Please tell me what stakeholder(s) had a role in the design and the extent of their involvement?	Brubaker, 1998; Kowalski, 2002; Keller, 2007; Perkins, 2001; Upitis, 2009;
	(Question #6) What stakeholder group had the most influence on the design of the school?	Keller, 2007; Meek, 1995; Perkins, 2001; Upitis, 2009;
	(Question #7) How did this person/group exert influence on the design of the school?	O'Sullivan, 2006; Meek, 1995; Perkins, 2001; Upitis, 2009;
Research Question #3 - What are school building principals' perceptions about the connection between the district vision and planning of the building?	(Question #8a) To what extent was a defined educational vision of the district considered in the design of your school? (Question #8e) To what extent were educational specifications prepared prior to the design?	Lackney, 1998; Lackney & Moore, 1994; Owens & Valesky, 2007; Washor, 2003
	(Question #8d) How do you view the connection between the design of the school and the district's academic vision?	Kowalski, 2002; Lackney, 1998; Lackney & Moore, 1994; Owens & Valesky, 2007; Washor, 2003
	(Question #8b) How often would you say academic vision discussions occurred during the design phase of the project? (Question #8c) Once informed of the project, to what extent were educational specifications prepared prior to the design?	Agbenyega, 2008; Lackney, 1998; Lackney & Moore, 1994; Owens & Valesky, 2007;

3.3 Conceptual Framework

The conceptual framework gleaned from the review of the literature served as the basis of this research study. Because a more constructivist view of instruction is developing instead of more traditional views, the dilemma of incorporating instructional designs such as project-based learning and creating more open learning spaces as the central component of educational facility planning forces school designers to rethink normal processes. Educators, in turn, need to be engaged in facility design and have significant involvement in the predesign and design phases if the inclusion of these instructional design aspects are to occur. DeGregori (2007) studied the interacting factors related to learning effectiveness and students reaching the level of optimal experience in a school setting through the lenses of education, learning theory, and architecture. DeGregori was able to develop a plausible theoretical framework conceptualizing the complexity of interactions and connectivity between environment, pedagogy, and learning (Figure 7). It is this framework that served as a basis for this study. The framework included several aspects impacting learning outcomes, but as depicted in the figure 7, learning outcomes remains the focus regardless of the influencing factors. Subsequently, school architecture and the built environment not only interacts with educational philosophy, practice, and social contexts, it has a direct relationship to learning outcomes. Because of this, it is important to study the predesign and design planning that goes into school construction.

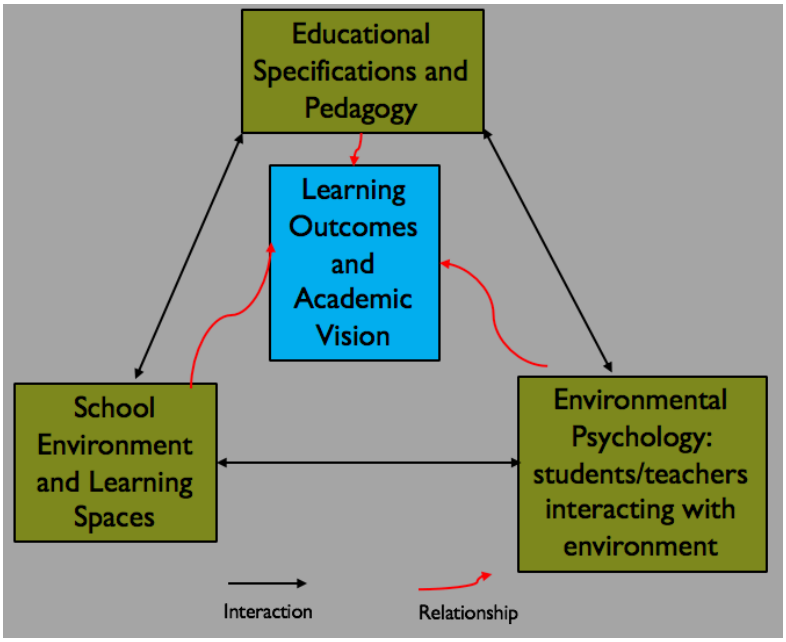

Figure 7. Modified Conceptual Framework (DeGregori, 2007)

Based on the conceptual framework, the purpose of this study was to investigate principal perceptions of their role within the school facility design process as they experienced it as principals in their schools. Studying principal perceptions of their roles and the roles of other stakeholders in school design may uncover a deeper understanding of school facility planning and may transform the way schools initiate the planning process. Fowler (1995) calls peoples' perceptions "subjective states", meaning there are no right or wrong answers. According to Creswell (2018), individuals develop subjective meanings of their experiences. This study was focuses on capturing data on principals' "subjective states" related to their perceptions of their roles in facility design. To this end, the study employed a series of questions during an interview, designed to collect data on the perceptions of principals associated with their involvement in the design of schools.

A detailed explanation of study design, data collection, and analysis methods follows.

3.4 Design

I approached this study as a descriptive study using a semi-structured interview protocol administered during a telephone interview. The telephone interview consisted of both closed and open-ended questions to collect data about the principals' roles in the design of schools. This method helped gather population data, perceptions of high school principals related to their experiences with the school design process, their perceptions of the overall facility project, and their perceptions of the alignment of educational programming goals and physical space. This method was descriptive by design and seeks to provide information about the processes involved in designing a school facility from the perspective of principals.

Phone interviews are increasingly more prevalent in qualitative research (Mitchell & Zmud, 1999, & Seidman 2013). These researchers explain that the foundation of interviewing, whether in person or by other means (e.g. phone or video call), is an interest in constructing meaning of the lived experiences of other people and their interpretation of those experiences. To gain an understanding of the experiences and perceptions of high school principals, the interview protocol included both closed and open-ended question (Appendix A). Though Fink (2003) supports more closed-ended items in research questions, open-ended items are crucial when the answers are too complex to give in a choice or in a few words. According to Fowler (1995), "When knowledge is measure in a true/false or multiple-choice format, some correct answers can occur by chance and not reflect knowledge of the subject. Open-ended answers to questions usually are a better way to find out what they know (p.178). Creswell (2018) indicated that the general premise of the research is to stay focused on the participant's perceptions of the lived experiences. Subsequently, the questions become broad enough in nature so that the participants can form their own meaning of the situation. Specifically, it would be difficult to encapsulate the administrators'

perceptions of their experiences as building principal without asking questions that provide an opportunity for in-depth explanations.

Because of the flexible nature of the one-on-one telephone interviews participants can answer questions more thoroughly and data collection can happen simultaneously (Aboutaleb & Guile; Yin, 2014). Open-ended questions as part of the interview increases the likelihood of the researcher receiving honest answers (Bieniek, 2012). Additionally, O'Cathain (2014) stated that due to participants being in different geographical regions, telephone interviews have proven to be more efficient for interviewing professionals. Because of the scope of this study, using telephone interviews would be ideal given the fact that it is possible that many of the participants work over a widespread geographical region.

By answering the interview questions, participants had an opportunity to provide key information regarding principal's role in school design. However, not all principals had the same experience with school design given that principals may have not been in the current position for the duration of the project or the principal was only there for certain aspects of the design phase. The questions asked during the interview gathered specific demographic information, experience with the school design process, perceptions of the project, and alignment of educational programming. Once, the interview data collection ended, the analysis and interpretation took place, as described in a subsequent section.

3.5 Participants

I conducted phone interviews with administrators who were principals in school districts that were undertaking building construction projects. To determine the school districts used for the

study, several data sources provided information directly obtained through each intermediate unit and the Pennsylvania Department of Education. Only administrators working in districts that were building a new high school or undergoing a major renovation of the high school during the last 10 years were in the study. The rationale behind using this timeframe was the transient nature of administrators and professional movement. Beyond 10 years, it would be difficult to find principals that have been employed at the time of school design. Additionally, only school districts that submitted building projects through PlanCon within the Pennsylvania Department of Education were part of the study. When a school district sets out to begin a major school construction project and seek reimbursement from the Commonwealth, a process known as PlanCon occurs. PlanCon, an acronym for Planning and Construction Workbook, is a set of forms and procedures used to apply for reimbursement through the state (PDE, 2018). PlanCon submissions guided the selection because districts submitting to PlanCon for reimbursement were undergoing projects that were generally larger in scale. This gave a consistent way of defining either new construction and major renovation for this study. Even though, districts continually make improvements to school facilities, they do not always go through a formalized planning process. The scope of these projects without PlanCon submissions would be difficult to include or quantify, and do not necessarily directly impact the school facility from an educational standpoint since the project could be something as straight forward as new roof. Subsequently, another reason to include PlanCon submissions was because districts submitting projects must go through a formalized planning process with specific information included in each part, which aligns with this study.

Within this 10-year timeframe, there have been 26 school districts in western Pennsylvania (IU 1, IU 3, IU 4, IU 5, IU 7, IU 27, IU 28) that fall within these parameters of having high schools

built or renovated (PDE PlanCon Approved Project list, 2018). Understandably, not all administrators included in this study were still in positions of high school principal, but the interviews requested the participant to answer questions related to his or her experiences within the planning process of the project as a building principal.

3.5.1 Participant Recruitment

Table 3 below outlines the proposed school districts in western Pennsylvania with the corresponding school construction project and associated intermediate unit included in this study. I contacted each of these school districts to determine the specific scope of the projects and the name of the principal during the time of the planning process for the project. Once this was determined, I contacted the administrators in their current positions to participate in a phone interview focusing on experiences within the design process as building principals. The interview protocol is in Appendix A along with the interview waiver in Appendix B.

Table 3. School districts and corresponding high school construction project

Intermediate Unit	School District	New Construction or Renovation	School
1	Canon-McMillan	N	Canon-McMillan High School
	Carmichaels Area	R	Carmichaels Area High School
	Chartiers-Houston	R	Chartiers-Houston High School
	Connellsville Area	R	Connellsville Area H. S.
	Laurel Highlands	R	Laurel Highlands H. S.
	Uniontown	R	Uniontown High School
	Washington	R	Washington Junior/Senior H.S.
3	Allegheny Valley	R	Springdale High School

	Bethel Park	N	Bethel Park High School
	Chartiers Valley	R	Chartiers Valley High School
	Fox Chapel Area	R	Fox Chapel Area High School
	Mt. Lebanon	N	Mt. Lebanon High School
	Penn Hills	N	Penn Hills High School
	South Fayette Twp.	R	South Fayette High School
4	Lakeland	R	Lakeland High School
	Mars Area	R	Mars Area High School
	Sharpsville	R	Sharpsville H. S.
	Slippery Rock	R	Slippery Rock High School
5	Fort Leboeuf	R	Fort Leboeuf High School
	North East	R	North East School High School
	Warren	R	Warren High School
7	Penn Trafford	R	Penn Trafford High School
27	Aliquippa	R	Aliquippa High School
	Central Valley	R	Central Valley High School
28	Armstrong	N	Armstrong High School
	Penns Manor	R	Penns Manor High School

3.6 Data Collection: Telephone Interview

Administering a phone interview using a semi-structured protocol is an effective method to collect data in a study spread across a large geographic area in western Pennsylvania.

Data collection occurred in Qualtrics Survey Software for this study. The data collection procedure included the following:

1. The twenty-six school districts that meet the criteria in this study received communication to determine the name, contact information, and current position of the administrator that was the principal during the design phase of the construction project.
2. Once this has been determined, the administrator received the researcher's recruitment letter (see Appendix B).
3. Follow up communication to participate in the study, via email (within 5 days) to those administrators that did not respond to the initial request to participate in the study.
4. Additionally, phone calls occurred to administrators to support recruitment.
5. A pilot study occurred with a middle school principal.
6. Each participant electing to participate received or verbally given the interview questions prior to our actual phone interview (see Appendix A).
7. Coordinated interview times and dates administrators participating occurred.
8. Each participant in the study received information about entering data during the phone interview based on their responses to the open and closed questions. The instrument used in the phone interview consisted of closed and open-ended questions developed by the researcher based on the review of the literature on educational planning (see Appendix A). A cross-referencing of the research questions and the literature

occurred and revised when necessary (Table 2). The table below indicates the link between the interview questions and the research questions posed in this study (Table 4).

9. I recorded each participant's closed-format and open-format responses into Qualtrics Survey System during the interview. After all participants interviewed and their responses entered, I analyzed the data as reported in section 3.7.
10. The following additional steps occurred: data downloaded from Qualtrics, data saved on a USB storage drive and saved in a secure locked box in the researcher's home for seven years, data saved in an electronic file on the researcher's computer, all data protected by password.

3.6.1 Pilot Study

A recommended practice by many experts in the field of qualitative and quantitative research is to use a pilot study to test the instrument used and process implemented for a given study. Because of the limited size of the perspective participants for this study (26), I selected to perform a pilot interview with a principal of a middle school that was employed in that position during the design and construction of the middle school in his district. This principal had nine years of experience and the district is large by this study's description. Through the pilot study, I was able to use the developed questions for this interview and complete this in the same manner the interviews would occur in this study, which was by telephone. By doing this, I was able to test its reliability, and practice the recording and transference of responses into Qualtrics. A formal

data analysis was not part of the pilot study. However, I did review the initial data and made some modifications to the questions and recording procedures based on this pilot. The research questions and the updated / aligned interview questions are in Table 4.

Table 4. Research questions aligned with interview questions

Research Question	Interview Question
Research Question #1 - What are school principals' perceptions about their involvement in the predesign and design phases of school building?	(Question #1) How would you describe your "official role" during the design phase of the school?
	(Question #2) As the school administrator, when were you involved in the process?
	(Question #3) Please indicate the most significant factors influencing the design of your school?
	(Question #4) What role do you believe principals should have in the design planning of a school?
Research Question #2 - What are school principals' perceptions about the involvement of different stakeholder groups in the design of school facilities?	(Question #5) Please tell me what stakeholder(s) had a role in the design and the extent of their involvement?
	(Question #6) What stakeholder group had the most influence on the design of the school?
	(Question #7) How did this person/group exert influence on the design of the school?
Research Question #3 - What are school building principals' perceptions about the connection between the district vision and planning of the building?	(Question #8a) To what extent was a defined educational vision of the district considered in the design of your school?
	(Question #8b) How often would you say academic vision discussions occurred during the design phase of the project?
	(Question #8c) Once informed of the project, to what extent were educational specifications prepared prior to the design?
	(Question #8d) How do you view the connection between the design of the school and the district's academic vision?
	(Question #8e) To what extent were educational specifications prepared prior to the design?

3.7 Data Analysis

This study comprised of both deductive and inductive methods of data analysis to thoroughly explore the role principals have in school facility design.

Once data collection is complete, I immersed myself in the data. This took place by reading the transcripts of the interviews, reviewing participant responses, and the interview notes several times. By doing this, it gave me an opportunity to "get a sense of the whole database" (Creswell, 2013, p. 183). This was important because it provided a clear focus and gave me the opportunity to view the data through the lens of the conceptual framework. Once I did this, I used descriptive statistics focused on responses to interview questions to share findings of the interviews. Tables and figures displayed the responses (besides basic demographic information). A narrative accompanied each table and set of figures.

I organized the data into predetermined focus areas. For this study, the areas of focus were 1) the rating of their involvement school design (Appendix A questions 1-4) 2) responses to factors influencing their decision in school design 3) perception of stakeholder involvement (Appendix A questions 5-7) and 4) rating of school design related to organizational vision and instructional objectives (Appendix A questions 8a-8e). The focus areas were based on research questions derived from the review of the literature (Table 2). General trends based on phrases and key words on the open-ended responses helped organize the data into the appropriate focus areas. Once this was complete, a visual representation of the data guided further analysis. Analysis ultimately included the formation of conclusions and generation of patterns.

3.8 Ethical Safeguards

As part of the Institutional Review Board process, this study included a consent process as part of the research protocol to study in an educational environment. I submitted this study to the IRB and reviewed by the Human Subjects Protection Board. The IRB reviews research projects that involve human subjects ensuring two broad standards: a) that subjects have no undue risk and b) that they give uncoerced, informed consent to their participation. The study followed the necessary steps to receive approval. Protecting those interviewed participants is of utmost importance. Participants in interviews received coding under pseudonyms to ensure anonymity. All participants received the opportunity to examine the completed research outcomes at the end of the study.

3.9 Factors That May Have Influenced the Study

There are several factors that may have influenced the study, and I had to be cognizant of their possible impacts on the findings of the study. It was crucial to take into consideration the amount of time principals spent in their current role. This might have produced a variance in responses based on the experience the principals have pertaining to school design. Additionally, the period when the principals entered the process in relation to its completion may have affected their responses. The overall perception of their experiences possibly impacted responses meaning that if a principal had a very favorable experience then his or her responses may drastically differ from a principal that had a negative experience. Using language in the questions that avoids confusion or misrepresentation attempted to mitigate all these possible factors. As Fowler (1995)

states, “one standard for a good question is that all the people answering it could understand it in a consistent way and in a way that is consistent with what the researcher expected it to mean” (p.2).

For validity purposes, it was important to recognize assumptions and propositions the researcher may have during the process. I experienced school facility design as a principal. Recognizing my own assumptions was important so that I did not misinterpret the participants/responses.

Furthermore, response effect bias was something that needed acknowledged. Butin (2010) describes this as a phenomenon wherein the participants in the study modify their responses to be more socially acceptable or even supply responses that they believe the researcher would want to hear. I attempted to minimize this effect by carefully selecting the language in the questions to prevent any realization of my own bias. Because of the realization of this limitation, this study incorporated a course of action that payed attention to question construction in line with a process that, as Converse & Presser (1985) state, “requires special measures to cast questions that are clear and straightforward in four important respects: simple language, common concepts, manageable tasks and widespread information” (p. 10).

3.9.1 Limitations

The contributions of this study must view through a lens that considers the limitations associated with the study. Although there are many school districts that have either completed or are completing facility design, the scope of this study limited data collection and analysis to a small geographic region in Western Pennsylvania. This was intentionally selected due to my interest I have in this area and the significant criticism and discourse centered on the construction of several high schools in this region. The selection of this small sample size limited the possible

generalizations of the study. The role principals played in the design and planning process characterized a small sample of the role all principals have in the design process. I noted the limitations, but this study does not set out to generalize beyond the original scope of the study. Nevertheless, gaining an understanding of the forces (political, cultural, and social) involved in the design process through the lens of the principal may further the understanding of these phenomena.

Selection process was another limitation of the study. There was a limitation to the districts selected to participate in the study since not all districts have undergone the planning process of building or renovating a high school in the last 10 years. Therefore, the data collected may differ from other districts not presented in the study or other geographic regions in the state of Pennsylvania. Also, instead of trying make sense of the entire school construction process, this study attempted to examine one aspect of the process through a very narrow lens centered on a key member of stakeholders. Consequently, not having the ability to study the design process as it happens was also a limitation.

3.9.2 Delimitations

Several decisions delimited this study because they were decisions that were in my control. First, I realized there were many other elements that could potentially affect the outcomes of this study such as general outlook on current position, attitude, and years of experience. Using the sample size and period selected in this study helped mitigate the possible impact these factors may have. The sample size and period provided a broad cross section including principals with varied levels of experience and different population demographics within the school systems. Additionally, the selection of using high school principals delimits the study because of the general

focus on these construction projects given the monies, time, and impact situated the high school principal as critical influence in the planning process.

4.0 Findings

The focus of this research study was to investigate principals' perceptions of their roles during the school design process and how the design process and project relates to the academic vision. The framework that served as a guide for this study included several key components of school design gleaned from the literature. Specifically, because school designers need to incorporate more progressive instructional designs, the framework used included the interactions between environment, pedagogy, and learning. Modifying the framework then permitted the examination of the design phases and the principal's perceptions of that process. The initial framework was comprised of a synthesis derived from several studies: DeGregori (2007), Kowalski (2002), Tanner & Lackney (2005), and Owens & Valesky (2007).

The research questions in conjunction with the framework guided this investigation. Subsequently, the data presented in this chapter are in response to the following research questions:

1. What are school principals' perceptions about their involvement in the predesign and design phases of school building?

2. What are school principals' perceptions about the involvement of different stakeholder groups in the design of school facilities?

3. What are school building principals' perceptions about the connection between the district vision and planning of the building?

The findings in this study are the result of telephone interviews with each participant.

The purpose of the first research question was to look specifically at the principals' perceptions regarding their involvement in the predesign/design aspects of construction projects. To uncover this, an analysis determined the trends in principal's experiences within this phase of

the construction process. To better understand their perceptions, years of experience, time of employment, and size of school were also part of the analysis.

Research question #2 investigated the participants' views about the potential influences that different stakeholder groups had in the construction project. The importance of this question relates directly to the literature and the likelihood of the overall success of the project. Additionally, this research questions ties together different aspects of the framework used to guide this study. The principals' perceptions of stakeholders' involvement provide a unique perspective to the overall design process. The third research question was related to the academic vision for the school. The participants' perceptions of the inclusion of academic vision, frequency of the inclusion, and whether the design process included educational specifications provided the basis for this portion of the study. For the purposes of this study, academic vision refers to the districts educational philosophy about how students learn and the way the school approaches teaching and learning.

Subsequently, an overall analysis of the data presented for the three research questions occurred. This highlights the connectivity between the research questions and the framework used for this investigation. The chapter then concludes with additional findings collected as participants elaborated in response to some of the interview questions. Lastly, a school/participant profile provided some context for the findings.

4.1 Profile of the Participants, the Schools That Underwent Construction, and the Scope of the Project

Of the 26 school districts (within AUI 1, 3, 4, 5, 7, 27, 28), 54% (n=14) of administrators from 14 different school districts met the study criteria and agreed to participate in the phone interview survey. Several attempts to contact the remaining school districts occurred; however, the administrators during the time of the project could not be located or did not respond, so this limited the number of participants. The participants differed with respect to the number of years as an administrator and the number of years served as principal at the time of the facility design. Seven (50%) of the administrators responded to having 2-5 years of experience at the time of the project and seven (50%) administrators responded to having 6-10 years of experience at the time of the project. Five of the administrators worked in the school system prior to the role of principal as either a teacher or assistant principal. The remaining nine participants came to the district undergoing construction from other school systems; three had experience as a principal in other schools.

The participants in the study represented different types of school systems and communities, geographical locations (urban, suburban, rural), enrollment, and socioeconomic status. Of the 14 participants, 42.86% (n=6) were from schools with enrollment less than 750 students at the time of construction; 28.57% (n=4) were from schools with enrollment between 751-1200; and 28.57% (n=4) were of school with enrollment above 1200 students at the time of construction.

The percent of free and reduced lunch students in the district characterizes the socioeconomic status of the school systems. From the participants schools' data, 7.14% (n=1) of

the schools had 0-10% free/reduced lunch; 14.29% (n=2) had between 11-20% free/reduced lunch; 28.57% (n=4) had between 21-35%; and 50% (n=7) had 36% or more free/reduced lunch.

The scope (size) of the projects for each of these schools were large enough to submit for PlanCon reimbursement, and the participants came from both renovation and new construction experiences. Of the participants, 57% (n=8) had experience with school renovation and 43% (n=6) with new construction.

Table 5 presents the individual demographic profile of the schools, including the size and the socioeconomic status. Within this same table is the profile of the participant based on the years of experience at the time of the design of the project. The table arrangement is by the order in which the interviews took place.

Table 5. Profile of Schools, Participants and Type of Project

School	Size of School (# of Students in High School)	% Free / Reduced	Project Type	Principal Years of Experience
A	Large (+1200)	Over 36	New Construction	2-5
B	Large (+1200)	Over 36	New Construction	2-5
C	Medium (751-1200)	Over 36	Renovation	2-5
D	Small (0-750)	21-35	Renovation	6-10
E	Small (0-750)	Over 36	Renovation	6-10
F	Medium (751-1200)	21-35	Renovation	2-5
G	Large (+1200)	Over 36	New Construction	6-10
H	Small (0-750)	21-35	Renovation	6-10
I	Small (0-750)	21-35	Renovation	2-5
J	Medium (751-1200)	0-10	New Construction	6-10
K	Medium (751-1200)	11-20	New Construction	6-10
L	Large (+1200)	11-20	New Construction	6-10
M	Small (0-750)	Over 36	Renovation	2-5
N	Small (0-750)	Over 36	Renovation	2-5

Table 6. Demographic Information of Principals (N=14)

Number of Participants	**14**	
Years in Principal Role	Mean = 5.2	S.D. = 2.8
Principal at time of design		
Yes	13	
No	1	
Background Employment		
Worked in district	5	
Worked in different district	9	
Experience in another district as principal		
Yes	3	
No	11	

Examining the background demographics for both the schools and the principals (Table 5 and Table 6) provide a context while analyzing the administrators' perceptions of their roles during the construction process. Specifically, Table 6 displays experiential background information about the participants in the study. Including the levels of experience gives insight into the level of involvement or potential involvement each participant had in the predesign or design of the school. Additionally, this table helps contextualize the findings and better understand the principal's role through experience levels and background employment.

4.2 Addressing the Research Questions

The aim of this research was to investigate principals' perceptions about their involvement in the predesign and design phases of school construction, to investigate the roles different stakeholder groups had in the construction process based on the principals' perspectives, and to investigate the connection between the district's academic vision and the planned design implemented in the construction project. This section, for each research question, contains participants' responses from the interview.

4.2.1 What Are School Principals' Perceptions About Their Involvement in the Predesign and Design Phases of School Building?

To answer the first research question, participants heard a series of questions focusing on their roles during the design process. The participants could select more than one role and provide context for their selected answers. The demographics of the school and the participants provide connections to these roles. To further investigate research question #1, participants described ideal roles in the process. This section presented data by specific criterion. The criteria used to frame this part of the study were derived from research in the following areas: administrators' roles in school design (Keller, 2007; Kowalski, 2002; Lackney, 1998; Tanner & Lackney, 2005; Tanner & Lackney, 2006; Washor, 2003), planning models (Akinsanmi, 2008; Baker, 2012; Hines, 1996; Hoy & Meskel, 1996; Locker, 2008; O'Sullivan, 2006; Weinstein, 1979), and collaboration in facility planning (Hoy & Meskel, 1996; Locker, 2008; O'Sullivan, 2006; Weinstein, 1979).

4.2.1.1 Administrator Roles in School Design

Of the 14 participants in the interview, 92% (n=13) of the respondents indicated that they had roles in the design and construction process. Only one respondent reported that he did not have any role in the overall process.

Out of the forty-one indicated roles from the eight descriptors, administrators reported key communicator and safety director as the most significant roles during their time as principal in the design/construction process (Table 7 and Figure 8). As indicated in both Table 7 and Figure 8, administrators reported key communicator (29.27%), safety director (24.39%), design team member (17.07%), educational consultant (12.2%), manager of project (7.32%), and facilitator of stakeholder groups (7.32%) as the roles served during the design and construction process. These percentages represent the ratio of descriptor selection over the total number of selected choices (frequency) multiplied by 100. Only three participants (n=3) elected to provide more background information regarding their perceived roles. Table 8 provides additional information from the three participants.

Table 7. Number and type of roles indicated during the design process

Roles	Count	Frequency	Percent (%)
Design team member	7	.1707	17.07%
Facilitator of stakeholder groups (surveys, meetings, etc.)	3	.0732	7.32%
Manager of project	3	.0732	7.32%
Educational consultant/expert	5	.1220	12.20%
Finance manager	0	0	0%
Key communicator	12	.2927	29.27%
Safety consultant/director	10	.2439	24.39%
Not involved	1	.0244	2.44%
Total	41	1.0	100%

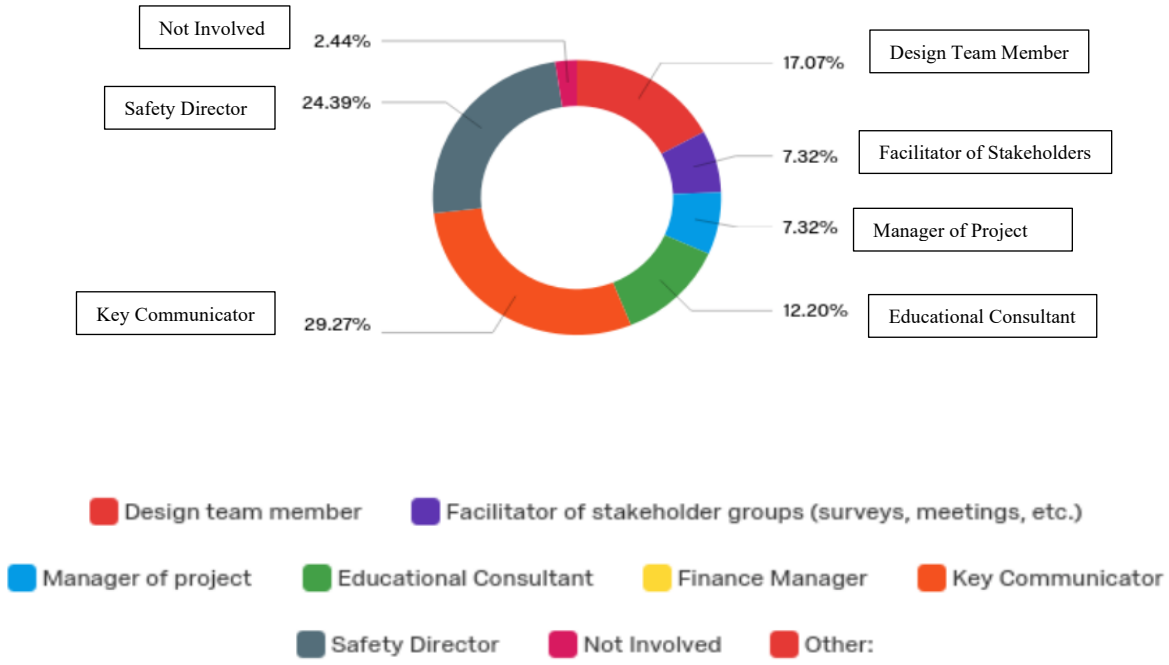

Figure 8. Roles administrators had during the design process of a school construction project

Table 8. Additional background information provided by participants about role in design process of construction project

School	Years of Experience Range of principal at time of school design	Additional Information
L (new construction)	6-10	Administrator indicated that his actual role encompassed everything. He reported that he was manager and designer of the entire project. With that, he delegated certain things to other personnel, but ultimately, he did everything.
I (renovation)	2-5	Administrator reported that the primary role morphed from the initial design team member to more safety and security. He also went on to say that he really became the person that had to trouble-shoot daily concerns so school could continue.
M (renovation)	2-5	Administrator reported being part of the design team, but the input he gave was not included in the design. Reported that even though part of the team, it was evident that input primarily came from other members of the team.

4.2.1.2 Involvement in Construction Project

Participants were asked to indicate *when* they were specifically included in the project, because research (Brubaker, 1998; Castaldi, 1994; Keller, 2007; Tanner & Lackney, 2006; Washor, 2003) noted that the "when" behind stakeholders' involvement could potentially impact the project significantly. All participants (n=14) indicated project inclusion at some point (Table 9). One participant, who reported no role in the design or construction project, did explain he received updates from the onset of the project. Of the 14 respondents, 50% (n=7) reported their inclusion at the onset of the project; 29% (n=4) entered the project after there was an initial design; 21% (n=3) responded to that they were part of the project *before* the construction phase. As a follow up question, I asked if years of experience or time in district affected their level of involvement. Only one respondent indicated that her lack of experience may have limited her involvement.

Table 9. When inclusion of principal occurred in the construction project

When Included	Number of Principals (n)	Percent (%) of Principals
Onset	7	50%
After initial design	4	28.57%
Before construction	3	21.43%
During building phase	0	0%
Not involved	0	0%

4.2.1.3 Principals Perceptions of Ideal Role During the Design Process

Regardless of perceived role or inclusion in the project, each participant responded to a question asking them to describe what would their *ideal* role should be as the principal in a school construction project. Each participant (n=14) indicated that the principal should always have a role in the project. Table 10 displays their responses to the question focusing on the role a principal should have in the project.

Table 10. Participants report of role principal should have in construction project

School	Principal Years of Experience Range	Response
A	2-5	Should have a role in design. Consultant role would be best.
B	2-5	Should be managing the entire project and help formulate educational specifications.
C	2-5	Ideally part of the design team, but it obviously depends on when and how long the principal was there.
D	6-10	Should have a role in the design team. Key member of the construction project because he/she should manage the entire thing.
E	6-10	Manager of project. Feels this is really to most beneficial role for a construction project.
F	2-5	Key communicator in his case, but would be helpful to be part of the design team if part of district for a while.
G	6-10	Should be more than what experienced. I think the principal should have input on the design if the principal

		has experience in the building.
H	6-10	Leader of design team.
I	2-5	The principal should be an educational consultant, but part of the design team.
J	6-10	Integral part of team if not leader. Not current practice, but ideally this would be the case
K	6-10	Should be part of the design team from the beginning.
L	6-10	Principals should be involved in literally every facet of the design of the school.
M	2-5	Integral. They would know how the students and staff would interact with environment.
N	2-5	Principals should be on design team based on what works in the school

4.2.1.4 Factors Influencing Decisions Regarding the Design of the School

Participants provided factors that they thought influenced the overall design of the school. The factors, derived from the literature, served as a basis for their responses; however, each participant could include additional factors or explain the specifics behind each selection. Figure 9 provides a visual representation of the frequency of factors reported by the participants in the study. Overall, financial influences had the highest frequency reported by the respondents (18.52%, n=10). Architectural influences via the selected architect for the project had the second most (16.67%, n=9). Participants reported political and administrative influences to have equal influences in the design of the project (frequency of 14.81%, n=8). Safety and security, athletics, and technology all had a frequency of 7.41%, n=4 through the responses of the participants. The least frequent responses of factors influencing the design of the school were environment and other

factors specific to one participant's project. The participant indicated that one community member was the greatest influence in that specific situation.

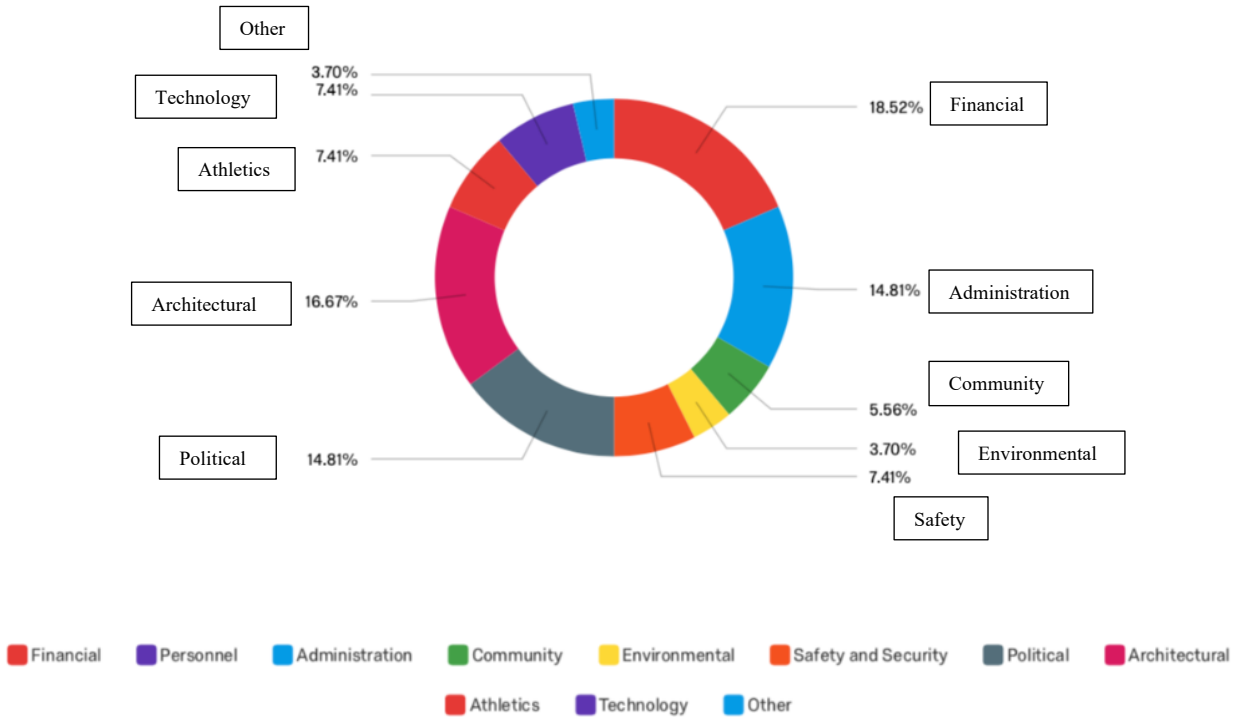

Figure 9. Frequency percentages of reported influences on school design

To summarize the findings, principals participated in the predesign and design aspects of a school construction project even though the roles have varied. The roles each participant had (or in some cases did not have) was based on culture, administration, school board, or architect. These reported influences potentially altered the role the principal had during different phases of the project. Lastly, data highlighted the variability in which participants viewed their own roles in conjunction with project outcomes (discussed in chapter 5).

4.2.2 What are School Principals' Perceptions About the Involvement of Different Stakeholder Groups in the Design of School Facilities?

To answer the second research question, participants responded to a series of questions centered on their perceptions about the roles of various stakeholders in the design process which resulted in a finished project. Again, as indicated in section 4.2.1.2, investigating the perceptions of a stakeholder groups' influence may add to the growing amount of research about the involvement of key people in the design process and help define roles of stakeholders such as principals (Keller, 2007; Kowalski, 2002; O'Sullivan, 2006; Perkins, 2001).

The participants reported which stakeholder(s) had a role in the design of the school. Additionally, they rated the stakeholder involvement in the design process based on the following descriptors:

- Not at all
- Small extent
- Moderate extent
- Large extent

After collecting this initial information from the participants, I then asked them to indicate the stakeholder(s) that had the most influence in the design of the school from the ones indicated in the previous question.

4.2.2.1 Stakeholder(s) Role in the Design

This portion of the study yielded responses from the participants (n=14) indicating twelve different stakeholders who exerted influence on the design process in the participants' schools. Participants also indicated the level of influence each individual stakeholder or group of

stakeholders had on the project. Table 11 outlines the number of reported influential stakeholders and the level of influence each had on the project based on the scale of (1) Not at all, (2) Small extent, (3) Moderate extent, and (4) large extent. Additionally, Table 11 displays the frequency of selected influence (displayed as percentages) given by the respondents.

Table 11. Levels of influence stakeholders had on school design

Stakeholder	Not at All		Small Extent		Moderate Extent		Large Extent		
Superintendent	14.29%	2	0.00%	0	14.29%	2	71.43%	10	14
Board of Directors	7.14%	1	7.14%	1	21.43%	3	64.29%	9	14
Teachers	14.29%	2	50.00%	7	14.29%	2	21.43%	3	14
Students	76.92%	10	15.38%	2	7.69%	1	0.00%	0	13
Sports Boosters	42.86%	6	42.86%	6	7.14%	1	7.14%	1	14
Music Boosters	61.54%	8	30.77%	4	7.69%	1	0.00%	0	13
PTO/PTA	64.29%	9	28.57%	4	7.14%	1	0.00%	0	14
Community Members	21.43%	3	28.57%	4	28.57%	4	21.43%	3	14
Architect	7.14%	1	0.00%	0	7.14%	1	85.71%	12	14
Project Manager	92.31%	12	0.00%	0	0.00%	0	7.69%	1	13
Principal	21.43%	3	28.57%	4	28.57%	4	21.43%	3	14
Other	0.00%	0	0.00%	0	0.00%	0	100.00%	1	1

Of the reported influential stakeholders, the architect had the most influence on the design of the school according to participants. Out of the 14 participants in the study, twelve responded the architect had a large amount (n=12, 85.71%) of influence in the overall design. The superintendent (n=11, 71.43%) and board of directors (n=12, 64.29%) were the next reported groups having the most influence with the participants indicating a large extent of influence. There was no other group or person reported with a large extent of influence above 21.43% (n=3,

community members, teachers, principal). None of the participants indicated that students, PTA members, or music support groups had significant influence on the design.

4.2.2.2 Exertion of Influence

The participants in the study described how the reported most influential stakeholder(s) exerted influence in the design process of the school. Since the participants elaborated on their responses, questions, based on the answers the respondents gave during the interview, ensued. Table 12 displays the responses of the administrators when asked the open-end question. The participants responses reported the superintendent, architect, and board of directors as most influential in the design. As indicated in the previous section, of the reported most influential stakeholders, the architect had the most influence on the design of the school. Twelve respondents indicated that the architect had a large amount (n=12, 85.71%) of influence in the overall design. The superintendent (n=10, 71.43%) and board of directors (n=9, 64.29%) were the next reported groups having the most influence. Overwhelmingly, the superintendent or board of directors exerted influence over the design process by controlling the finances (n=8, 57.14%). Conversely, the architect impacted the process with either having the latitude to design how he/she thought it should be (n=2, 14.28%) or having close relationships with board members or school officials (n=1, 7.14%). One respondent (n=1, 7.14%) indicated that the principal controlled the project and made all major decisions throughout the design and construction. The principal received this control by the board and superintendent giving project leadership to him. Table 12 provides a visual representation of each participants' responses based on the school they were part of during the design of the project.

Table 12. Participant responses of exertion of influence by stakeholders

School	Participant Response (n=14)
A	This was a new construction project and it was a district merger. The board had to control the project because of the finances involved from both previous districts. The superintendent did have some influence due to his role.
B	The board was highly influential because they controlled the finances.
C	The board of directors did, but the superintendent and architect were involved. Private meetings occurred followed by communication.
D	The project was not very big, but the superintendent controlled the entire project most likely due to his status in the community and with the board.
E	Superintendent controlled from the start. Board action took a vote of confidence in him making these decisions.
F	Board of directors was most influential, but it was just two members. They worked with the architect very closely behind closed doors.
G	An outside group of community members worked closely with architect. Apparently, the influence was due to the architect being close with this select group of people.
H	The directive given to principal to see the entire project through from beginning to end.
I	Superintendent controlled by indicating the "when" and "how".
J	The board controlled because of the money, but had no real forethought about the project. Just wanted it done and had the money to do it.
K	Planning team controlled the overall scope. It was a team decision most often.
L	The board dictated what was going to happen from the release of finances.
M	It was a team effort, but the board still had the power because the team had to give recommendations to the board and they decided.
N	Architect controlled the project. The architect drafted plans before school personnel participated in the design process.

Research question #2 investigated the principals' perceptions regarding how the project manifested itself through the influences of key stakeholders. It was evident through the data collected that only one principal viewed himself as the most influential and critical member of the design team. Interestingly, the participants indicated that the architect had the highest reported frequency of influence on the project. This, coupled with the superintendent followed by the school board, provides insight into the level of participation other stakeholders had through the lens of the principal. This information along with the perceived connection (research question #3) to the academic vision provides clarity between the relationship of design team and academic vision or educational intent of the project.

4.2.3 What are School Building Principals' Perceptions About the Connection Between the District Vision and Planning of the Building?

The participants in this study (n=14) focused on their perceptions of how the design of the building connected to the academic vision in the district as part of answering research question #3. The specific questions asked were:

- To what extent was a defined academic vision of the district considered in the design of the school? Not at all (1), Small extent (2), Moderate extent (3), and Large extent (4)
- Can you recall when academic vision was first mentioned in the discussions within the scope of the project?
- How often would you say academic vision was discussed during the design phase of the project? Not at all (1), Seldom (2), Often (3), and Always (4)

- How do you view the connection between the design of the school and the districts academic vision?
- To what extent were educational specifications prepared prior to the design? Not at all (1), Small extent (2), Moderate extent (3), and Large extent (4)

Based on the research (Kowalski , 2002; Lackney & Moore, 1994; Owens & Valesky, 2007), the responses of the participants connected to the design process and the stakeholders involved in that phase.

4.2.3.1 Consideration of Academic Vision in Design of School

When asked these questions all the participants (n=14) were able to convey the extent of the academic vision inclusion and indicate how often. The inclusion of the vision varied from school to school, and half (n=7) of the respondents could only articulate a moderate level of the incorporation of the academic vision into the design of the school. This directly connected to the frequency of inclusion throughout the participants' projects (Figure 15). Also, this coincides with some of the previous data reported regarding who had the most influence in the design of the school (whether a school professional, board member, or architect). Only one participant reported that the academic vision was not in the design of the school at all. Subsequently, four (n=4) participants indicated a large incorporation of the academic vision into the design of the school, and two participants (n=2) indicated a small extent of inclusion. Table 13 provides a visual representation of this data including the overall percentage of respondents choosing the different indicators.

Table 13. Extent of academic vision inclusion in the design of the school

Inclusion extent	Number of Principals	Percent (%) of Principals
Not at all	1	7.14%
Small extent	2	14.29%
Moderate extent	7	50.0%
Large extent	4	28.57%

4.2.3.2 Inclusion and Frequency of Academic Vision in Design and Construction Process

Within the scope of the study, it was important to investigate the timing as to when the academic vision initially entered consideration of the construction project and the frequency in which the academic vision was part of the project focus. This connects to the literature and the theoretical model used to help guide this research. For this portion of the interview, participants recalled when academic vision became part of the design process and how often was it discussed as part of the planning. Overall, most participants indicated academic vision was part of the process and discussed at the onset of the project (n=8, 57.14%). Several participants reported the inclusion was after the initial design (n=4, 28.57%). Only one respondent (n=1, 7.14%) claimed that the academic vision entered the process right before the building phase, and one (n=1, 7.14%) indicated the building phase for its inclusion. There were no participants that indicated no inclusion of the academic vision within the project.

Figure 10 is a representation of the data described above. This figure helps articulate the overall timeframe as to when the inclusion of academic vision happened. Ironically, even though there was significant responses indicating the moderate inclusion of academic vision (n=7) (Table

13), there was an equal number of participants that indicated that the academic vision was only seldomly included throughout the entire project (Figure 11). Comparing data regarding the inclusion, initial mention, and frequency highlights a trend in the data that indicates the academic vision is most often a part of the initial design or discussions, but it quickly becomes secondary after the initial predesign phase of the project concludes. Moreover, only 28.57% (n=4) of the participants could report that the academic vision remained prevalent throughout all phases of the project (Figure 11).

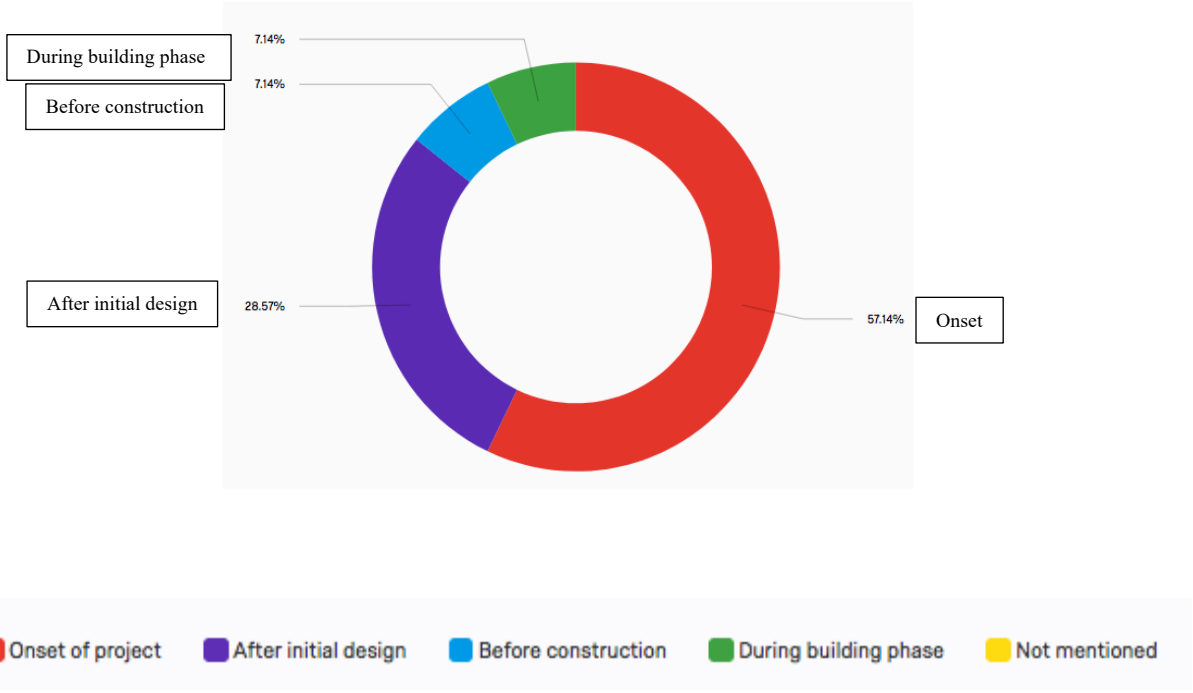

Figure 10. When academic vision became part of the project

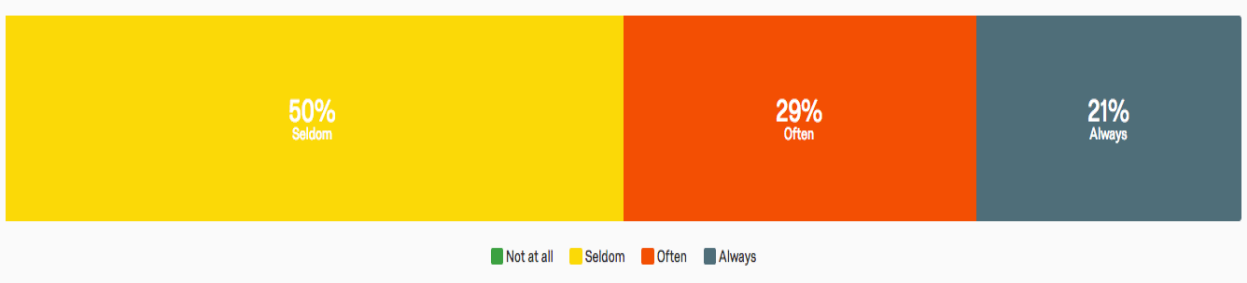

Figure 11. Frequency of inclusion of academic vision as part of the design and construction of the school

Research question #3 synthesizes the information collected through research questions #1 and #2 by investigating the connection between the construction project and the academic vision. Furthermore, the data collected assists in the examination of the influential stakeholders and the overall frequency of the academic vision inclusion. Also, this data reveals a disconnect in the level of principal involvement in the predesign and design phases of the project and the overall incorporation of the academic vision or educational intent. Section 4.3 has further analysis and reporting.

4.3 Additional Findings and Connections

4.3.1 Connection of Principal Involvement, Academic Vision, and Design

Through the investigation, connections were able to be made through the questions and responses of the participants. Specifically, principals who were part of the project at the onset perceived there was a higher connection (n=3) between academic vision and the design of the school (Table 14). When participants added information about educational specifications in the design and to what extent, the data still paralleled the frequency and the inclusion of the academic vision. Any participant (n=12) that was able to articulate that educational specifications received proper focus and that the onset of the project incorporated academic vision, there was an overall perception that the project was in fact connected to the academic vision. Moreover, if educational specifications or academic vision articulations were absent at the beginning of the project, the project only somewhat connected to the academic vision (n=2). Including these questions dug deeper into the actual process of the design. Anecdotally, the administrators struggled with this.

Answering questions about educational specifications after academic vision became increasingly difficult for them. This led to participants wanting to discuss the process more, elaborate on their responses, or even in some cases, change their selections. However, the data indicated reported specifications relatively matched the inclusion and frequency of the academic vision (Table 14).

Table 14. Connection between inclusion of academic vision and educational specifications in relation to when principals were involved in the project (n=14)

School	Project Type	When Involved	Extent of academic vision included	Initial inclusion of academic vision	Frequency of academic vision	Educational specifications included	Perceived connection between project and academic vision
A	New	Before Construction	Moderate	Onset	Seldom	Moderate	Connected
B	New	After Initial Design	Moderate	Onset	Seldom	Large	Very Connected
C	Renovation	After Initial Design	Moderate	Onset	Seldom	Moderate	Connected
D	Renovation	After Initial Design	Moderate	After Initial Design	Seldom	Small Extent	Connected
E	Renovation	Before Construction	Moderate	Onset	Often	Moderate	Connected
F	Renovation	Before Construction	Small	Before Construction	Seldom	Moderate	Connected
G	New	Onset	Not at All	During Building Phase	Seldom	Small Extent	Somewhat Connected
H	New	Onset	Large Extent	Onset	Always	Large Extent	Very Connected
I	New	Onset	Large Extent	Onset	Always	Large Extent	Very Connected
J	New	Onset	Moderate	After Initial Design	Often	Moderate	Somewhat Connected
K	Renovation	Onset	Large Extent	After Initial Design	Always	Small Extent	Connected
L	Renovation	Onset	Large Extent	Onset	Often	Large Extent	Very Connected
M	Renovation	Onset	Moderate	Onset	Often	Small Extent	Connected
N	Renovation	After Initial Design	Small Extent	After Initial Design	Seldom	Small Extent	Somewhat Connected

5.0 Discussion

Three questions developed through an in-depth investigation of the research, which guided this study. The questions are:

- *What are school principals' perceptions about their involvement in the predesign and design phases of school building?*
- *What are school principals' perceptions about the involvement of different stakeholder groups in the design of school facilities?*
- *What are school building principals' perceptions about the connection between the district vision and planning of the building?*

Administrators, who were employed as principal during the design and construction of either a newly constructed high school or a renovated high school participated in an interview via a telephone call. In this chapter, the findings as presented in chapter 4 have several implications meriting discussion. This chapter also includes the discussion of major research findings in connection with research literature. Lastly, it discusses potential implications for practice, future research, and the limitations of the findings of this investigation.

5.1 Findings Related to Existing Research

As stated in the review of literature (Chapter 2), school districts undertaking large facility construction or renovation projects and seeking reimbursement from the Commonwealth must implement a process known as PlanCon (Pennsylvania Department of Education, n.d.). According

to the Pennsylvania Department of Education, “PlanCon, an acronym for Planning and Construction Workbook, is a set of forms and procedures used to apply for Commonwealth reimbursement. The forms are designed to (1) document a local school district's planning process; (2) provide justification for a project to the public; (3) ascertain compliance with state laws, regulations and standards; and (4) establish the level of state participation in the cost of the project” (Pennsylvania Department of Education, n.d.). PlanCon traditionally included an eleven step process; however, in 2016 the Public School Building Construction and Reconstruction Advisory Committee recommended the process be streamlined to only four main components: project justification, construction project document review, project bid awards, and completion (Pennsylvania Department of Education, n.d.). Whether districts requested reimbursement through the previous PlanCon steps or the updated version, the process remains linear by nature, and the actual methodologies imposed and who participates in the process varies greatly from district to district. Because of this, it is the planning process that became the focus of this investigation. In this study, administrators responded to all questions in the interview as principals; however, there were three administrators who were no longer principals at the time of the interview. After collecting some initial demographic information through the interview and through the Department of Education, I engaged with each participant in the interview.

5.1.1 Roles in School Design

One of the first items reported were the roles the participants had during the design process of the school. Currently, there is no widely accepted model of planning to use in school construction, and there is not substantial research indicating design team members. Therefore, leaving this question open gave the respondents an opportunity to identify and explain the role(s)

each of them had in the process. The responses given during the interview confirm the notion, as stated in the research (Castaldi, 1994; Graves, 1993; Kowalski, 2002; Perkins, 2001; Tanner & Lackney, 2006), about planning models and members involved in planning. The research indicates that no common or standard design models exist currently. The participants reported 7 different roles during the design process. This directly connects with the research and substantiates the broad range of potential roles principals possess during design and construction of schools. Even though PlanCon requires school districts to initiate predesign processes that include obtaining feedback from stakeholder groups, principals participate at various levels in accordance with the culture and trends within their district. No principals could isolate their roles as just design team members, which became evident through the multi-layered answers each of the participants gave regarding roles. In fact, all reported additional roles (key communicator, safety, manager, stakeholder groups, educational consultant) regardless of the project. Only one participant reported having no role whatsoever when it came to planning/designing the school.

Three participants elaborated on responses regarding roles when asked. Each indicated a role on the design team, but two of the participants reported their roles changed very quickly once the project moved beyond planning. Additionally, the other participant reported that he was on the design team, but really had no input in the plans. This coincides with the research. It was evident from their responses that nearly all participants (n=13) could not articulate a clear understanding of the planning process. Tanner and Lackney (2006) indicated that design team members and district leaders must develop a solid understanding of the planning process to be successful navigating the political, social, and economic aspects embedded in the design process. Making sense of the dynamics or forces at work and how stakeholders respond to these forces support the idea that planning has less to do with the actual design of the school and more to do with the actual

design process. Moreover, the most heavily reported role was key communicator, but according to a study completed by Lovesmith (2009), superintendents viewed themselves as the key communicators being able to convey rationale and school design. Subsequently, Lovesmith also reported that while input gathered from many stakeholders within the design process is important, the lead role for communication remained with the superintendent. The superintendent serves as the conduit for communication between the architect, community, and school board members. The superintendent provides the necessary information in ways that support the progression of the building project. By communicating effectively with each constituency, the superintendent helps focus the roles of other team members within the project whereby principals possibly assume a more instructional role. Not necessarily refuting Lovesmith (2009), the data collected in this investigation substantiates that most of the participants indicated the principal was the key communicator (n=12) during the design process. If scrutinized a little further, it may be possible that principals are viewing themselves in this role since they generally must communicate daily with teachers, students, and other stakeholders that may be immediately impacted by the project. Superintendents may see themselves as communicators from a much broader perspective. Hoyle et al (2005) refer to the superintendent as the chief executive officer, responsible for conveying the district's vision and community expectations through the design process.

The second most reported role the participants selected was one involving safety (n=10, 24.39%). This is not necessarily surprising given the current climate and the relative focus on safety. Additionally, having served in this role for more than a decade, I understand the increased emphasis during the predesign and design phases of a project. Interestingly, from an anecdotal perspective, none of the participants received any formal training in designing schools with safety in mind. When I inquired further, many of the respondents indicated that from on-the-job training

and just "knowing" the building or culture is what led to their perceived level of input during design. Schneider (2007), claims that architects should primarily address safety through design and the key elements that go along with it (surveillance, access control). By doing this, principals and teachers could then reroute their focus to instruction and learning. Additionally, schools going through renovations force principals at times to assume roles such as safety given the fact that students are still in the building while the project progresses.

One of the least reported roles was educational consultant (12.20%). This refuted any expectations given the role of principal. Principals should possess a strong understanding of pedagogy and learning as part of the design process. In fact, experts researching school facility planning (Castaldi, 1994; Graves, 1993; Kowalski, 2002; Perkins, 2001; Tanner & Lackney, 2006), collectively identify educational planning as one of the most crucial aspects of school design. From my experience, it would make sense that this is where principals and teachers should focus their involvement, which is planning instructional space. Additionally, in a study by Rappold (2008), superintendents responded to an eight-question survey that outlined characteristics needed for designing a school facility. These characteristics were "(a) consideration of a defined educational vision, (b) the integration of educational objectives, (c) teacher involvement in planning, (d) the development of educational specifications, and (e) the integration of long-range goals" (p. 100). Because of the minimal responses from the participants substantiating their role as an educational leader in the pre-design and design process, I reviewed the number of years working as a principal or teacher. In fact, the mean years of experience of the respondents was 5.2. The standard deviation from this mean was 2.8. Additionally, five participants worked in the district they were serving as either teachers or assistant principals. Clearly, experience having an impact on their perceived role as an educational consultant or leader becomes quickly refuted.

Rappold (2008) reported that teachers should be involved in the process as one of the key components of successful facility planning; however, this does not address a principal's role in the process. In fact, Kraft (2009) indicates that facility committees should include principals. The facility committee focuses on the mechanics of how the building works (the flow) through the design. The principal's leadership or abilities can influence the levels of involvement in the design portion of the building project. Superintendents may have reasons not presented in the scope of this study limiting or directing the experiences the principal had during the design process. This could account for smaller frequencies reported by the participants as educational consultants.

There is an educational component focused on instruction and curriculum, but most participants in this study did not indicate they had a large role in this during the predesign and design phases of the project. Kraft (2009) expanded on this notion by reporting that an educational specialist at the district level should be largely filling this role. This may be why the participants in this study did not perceive their role as an educational consultant. Possibly another person filled this role within the district. Kraft also indicated that the absence of the educational consultant at the district level during the design process would negatively impact the positive relationship between design and student achievement.

Actual manager of the project and facilitator of stakeholder groups were least reported roles during school design for principals. Only one of the three respondents reported that his role as manager encompassed everything. The other two reported it as managers of the decisions within the design team. These perspectives are vastly different. The one participant that reported himself as lead person in all aspects, indicated that this is truly the only way to get the desired outcomes needed. This participant controlled the design as part of a leadership decision from the superintendent and board of directors. The participant served as principal for quite some time and

was moving to a superintendent position during the building phase of the project. This was in a large district, so I believe this shift in practice by the exiting superintendent centralized decision-making to ensure the project finishes timely and on budget. Not having any research to substantiate these claims made by this participant regrading principal involvement, it was difficult to expound upon this notion. However, the research does support a differentiated team approach that includes educational leaders such as the principal. According to Locker (2008), planning with administrators (including principals), teachers, architects, and community members is the only real way to have educational delivery align with best practices and the needs of the community. Moreover, superintendents and architects aligned in their beliefs regarding additional team members included throughout the design process (Lovesmith, 2009). This included principals, but no superintendents or architects indicated the principal should manage the entire project. Given the research and the responses from the remaining participants, this appeared to be an isolated case.

5.1.2 Principal as Part of the Design Team

Even though not all the participants (n=14) indicated they were part of the design team (n=7), all indicated that they did have a role in the overall design process (n=13) or at least communicated updates (n=1). Seven respondents participated at the onset of the project during the predesign phase. Other principals in the study entered the project after the initial design (n=4) and before construction (n=3). Follow up questions uncovered the circumstances of some of the participants entering the project after the onset. All but one (n=6) explained that they were aware of the project but had no input in the predesign other than participating as a stakeholder. One participant did not start in the principal position until after the initial design. As indicated before,

Plancon does require stakeholder participation in the predesign phase of a project to collect demographics, teacher and community input, and educational specifications. While this is good, no guidelines or processes exist within PlanCon to outline how this will happen. In fact, the literature does not quantify the amount of input or time needed for any of the stakeholders in a building project. However, there is mounting research that does recognize the effects the built environment has on teaching and learning (Agbenyega, 2008; Bishop, 2009; Bullock, 2007; DeGregori, 2007; O'Sullivan, 2006; Owens &Valesky, 2007; Smith, 2008). Because of this, it would make sense that the people involved either directly in the teaching or evaluating the teaching be involved in the project and design team. Furthermore, from a conceptual model (Figure 7), the design of the built environment interacts with all its occupants. This could then possibly guide principal involvement.

Interestingly, five of the participants in this investigation concur with the notion that principals should be part of the design team and involved at the start of the project. Three elaborated further to claim that the principal should lead the entire design process. Also, when asked to describe their ideal roles, other than being part of the design team, the only other responses received were about key communicator and project manager. Anecdotally, there was an undertone of frustration regarding the level of involvement many of the participants had in the design. This was evident through statements reported to the ideal role question that differed from the level experience reported previously in the interview. This shortfall in participation may stem from either the school board, architect, or superintendent. Kraft (2009) posits that the success of the design process resides with the superintendent establishing a collaborative process that involves all stakeholders. While supported in the research, it still does not specifically address the role principals play in the predesign and design.

5.1.3 Principals Perceptions of the Influence of Different Stakeholders

To completely understand the role a principal has in the design process, it was important to gain insight into their perspectives as to who had major influences on the design and how this connected to the overall success of the project. Because there is not a set criterion guiding the involvement or level of involvement, this leaves the fate of the project at times in the hands of people who could potentially be ill-equipped to lead such a task. Additionally, the motivation behind initiating the project (space, age or condition of facility, finance, athletics, cosmetic, etc.) can provide insight into who has a large extent of influence on the project.

It was somewhat predictable that the participants indicated that the superintendent had a large extent of influence in each of the projects. Interestingly, according to Lovesmith (2009), superintendents acquire the skills and knowledge to successfully interact and collaborate with architects through experience as a superintendent. Moreover, superintendents reported that their preparation programs were helpful in addressing school design process, but the programs were not the primary source to prepare them adequately for school design. Instead, superintendents had to rely heavily on previous experiences in school design or collaboration with other school leaders (Lovesmith, 2009). Examining the findings of Lovesmith in conjunction with the findings in this study poses even more questions about why districts set forth in predesign and design planning the way they do. In this investigation, participants viewed the superintendent as one of the most influential stakeholders. As a principal, I have been involved in two major construction projects from the pre-design to completion in two different districts. My experiences in each were completely different. But the respondents in this study reported (as I would personally) that one of the most influential stakeholders was the superintendent. However, according to Lovesmith (2009), “superintendents were less likely to reference teaching pedagogy and instructional

delivery. Instead, superintendents' responses centered on logistical approaches of design" (p.103). If this is the case, should not personnel, knowledgeable in pedagogy and learning theory, be involved at the onset of any school construction projects? In this study, many participants did not view their role in this capacity, nor were they viewed as such. As previously stated, many superintendents now realize that the knowledge necessary to uphold the educational side of this equation is elusive; the training in facility planning and working with architects to create the types of learning environments their philosophical theories and curricular plans require are missing (Keller, 2007; Kowalski, 2002). Principals, in conjunction with other instructional leaders, possess the knowledge and experience in pedagogy and learning theory to fulfill this role on the design team.

Architects were the most influential people in school design in this investigation. This speaks to the consistency of experience that each of the participants had in the design process. There is no doubt the architect is critical for any school project to be successful; however, architects should not assume an influential role focusing on teaching and learning. In Lovesmith (2009), architects focused on teaching and learning the most in school facility design. From my experience, I feel this focus developed because they do not have a strong understanding of pedagogy and learning theory. So, I did not perceive this as influence, but rather as information gathering to aid in the design. The architects' primary role is to show current design based on the space available, the allocation of money, and the instructional design desired.

The school board of directors merits discussion because they had the same amount of influence as superintendents. The school board consists of community members serving at the will of the community, whereby elected from their constituents. The research points to normative standards that involve all stakeholders in the process of school design (outlined in previous

section). This includes the school board of directors. I agree with this notion from the point of community need, fiscal responsibility, and even architectural style for the community. Participants in this study re-affirmed my concerns in this investigation. Finances guided the design, which the board controlled; however, a few respondents reported influences rooted in special interests and at times misallocation of funds towards the form, while never considering the function (Table 12). Regardless, the school board of directors do have a fiscal responsibility that immediately puts them into a role in school design. According to the findings, because of this aspect they had possibly more influence in the design than education professionals.

Principals, teachers, and community members had the same amount of influence within the design process. While promising that principals and teachers had some influence, this does not explain their level of input or extent of expertise. When the participants reported who was the most influential, only one administrator reported that the principal had the most influence on the design. This influence only came about, according to the respondent, because the school board and superintendent gave him that responsibility and autonomy. As indicated earlier, this was an isolated situation stemming from some personnel moves within a large school system. Not including that one response, possibly the lack of involvement or influence may come from other constituents refusing or not wanting to share control. From my experience, I would not have indicated that I had the most influence on the overall design, but I would report that through the predesign and design phase, I was influential from the standpoint of teaching and learning. Participants in this study reported this role infrequently.

According to Kraft (2009), the involvement of key stakeholders generally resulted in a more meaningful and productive process. This also helps uncover social and political dimensions that could potentially alter or derail the design process. Hoy and Miskel (1996) posit that social,

political, and economic trends beyond the scope of the school district in size will impact the way district leaders, community members, and facility designers approach the overall design of schools. Because of this mirroring affect, one could reasonably conclude that what happens at the regional, state, or national level may affect the school district, but it is possible there is a reciprocal effect as well (Hoy and Miskel, 1996). This may be what was happening in several of the respondents respective school system. However, the principals in this study did have an overall favorable view of the influence and involvement of stakeholders.

5.1.4 Connecting School Design to Academic Vision

The culmination of this study really centered on the connection of each of the participants' construction projects to the academic vision. Because no uniform method of predesign or design practices is set forth, and there are no guidelines for design team members, the perceptions of the principals in relation to the design connecting to the academic vision become even more intriguing. The responses varied regarding the incorporation of academic vision. Most of the respondents reported that the academic vision was either moderately (n=7) or largely (n=4) included in the design process. Only three indicated a small extent (n=2) or not at all (n=1). Looking at this data, in comparison to what the principals indicated, highlights some of the positive and negative aspects of the design process.

For those indicating the academic vision inclusion during the design process also reported having much more involved roles in the design process than those who were not. Even if the principals did not perceive themselves primarily as education specialists, those who had input stated there were connections to the academic vision. The one respondent not included in the design process did remark that the project and the vision connected. The person that remarked

there was no connection to the academic vision also reported that a specific board member and community member controlled the entire project. Even though the principal and superintendent were on the design team, educators had no input. I found it difficult to understand how educational leaders could be part of the design team and not ensure the academic vision be part of the design or only moderately incorporated. From my experience, there is a greater chance of the project not fulfilling the educational intent if project leaders do not convey academic vision throughout the project. By better understanding the effectiveness of new school paradigms, superintendents and building level administrators as learning leaders can better serve their populations to break out of the prevailing traditional design of facilities that has been a central part of high schools (Washor, 2003). Moreover, an analysis of recent literature establishes that educators and architects have agreed that the design of the educational facility must meet the needs of the learner and the community, as well as, reflect the districts vision for education.

The duality of responses from the participants, concerning the inclusion of the academic vision provides insight into a common pitfall in predesign and design planning. Most of the participants in the study reported that the academic vision was part of the process at the onset of the project or even after the initial design. However, the same participants also indicated that the frequency of the inclusion of the academic vision drastically changed after this initial period. 50% of the participants stated that there was a lack of consistency in the inclusion of academic vision beyond the initial design. It is these types of situations that lead to changes in focus. I realized through experience, this can easily happen because the academic vision becomes blurred when financial constraints and strong personalities become major influences in the project. Also, I have seen educational leaders themselves change focus because of possible points of contention. This political strife can have these effects which was evident in the findings in this study. Consequently,

this could also lead to establishing roles in the design team that may be more isolated from these types of derailment.

5.1.4.1 Educational Specifications

An interesting finding in this investigation emerged when analyzing the data from the lens of the need for educational expertise in school design. From the 41 reported roles from the respondents (n=14), only 5 indicated they were part of the design team as an educational expert or consultant. The significance of this, is that if the participants did not view themselves as such and they did not report any educational specialists as having any influence, then this raises questions about how the incorporation of academic vision came about, or who guides potential new program implementations in connection with facility design. Rappold (2008) reports that the normative standard most often ignored is the incorporation of educational experts. This could come from district personnel or educational planning consultants. From a design standpoint, researchers advocate for this in several modern planning resources (Castaldi, 1994; Kowalski, 2002; Tanner & Lackney 2006). Again, I believe this is the role that principals should look to not only embrace, but view as a critical aspect for their input in the predesign and design process. Specialized educational leadership skills are essential for projects of this level of complexity, but for most educational administrators, specific skills related to facility design and construction are absent in formal training and certification requirements (Kowalski, 2002). Moreover, architects, as leaders of design and construction teams, have no training in educational pedagogy and learning theory. So, both design professionals and school leaders falter in their ability to perform their functions by the degree of knowledge accumulated from experience in their field or transferred from other

situations. Hence, it is important to have consistency and a working knowledge of teaching and learning to support the academic vision and advocate for its inclusion.

5.2 Implications for Future Practice

The findings of this study connected to the literature, and the findings do have implications for future practice of school leaders. School leaders must understand the roots of the discourse centered on predesign and design processes. Tanner and Lackney (2006) indicated that design team members and district leaders must develop a solid understanding of the planning process to be successful. As stated previously, school design teams need to make sense of the forces at work and how stakeholders respond to these forces. This upholds the notion that planning has less to do with the design of the school and more to do with the design process. Understanding and valuing the actual design process within the larger school community permits school communities to create a new paradigm for completing construction projects.

5.2.1 Standardization of Design Process

This investigation through the lens of the principal, provides insight into the predesign strategies implemented and design processes incorporated in facility design. This data, as part of growing body of evidence and support, leads to the conclusion that there must be some standardization of design practices beyond following the linear PlanCon workbook in the state of Pennsylvania. According to Tanner and Lackney (2006), potentially just providing information about the process will most likely not challenge conventional thinking. They suggest even further

that stakeholders applying the information presented in an authentic experience will, in turn, encourage "working with people rather than for them and involving them in critical, relevant aspects of the process" (p. 47). In accordance with the literature, school planners select design processes whether it is purposeful or accidental. The member(s) responsible for the project inherently establish a planning model that will regulate decision-making, how information sharing occurs, and who has input into the creation and implementation of the designed school. Planning models take a variety of forms and range across continua from nonlinear to linear and nonintegrated to integrated. No matter what planning model implemented, there are identifiable processes and steps design teams take along the continua of linear and integrated processes. The selection of the mode of planning is largely dependent on the several key factors such as efficiency, philosophy, and constraints (economic, political, time).

This investigation supports this notion referenced above, but regardless of the planning model implemented, there can be a standardization of norms present throughout the entire process. These norms could also include design team members and focus the roles of the participants. The literature supports this, but unfortunately the literature does not go far enough at this point to establish these norms and participants. Once a school system embarks on the journey of facility design, there are specific elements taken into consideration throughout the duration of the project. A myriad of regulations, needs, wants, political trends, and changing priorities affect schools, not unlike other organizations. Ideally, standardizing these elements would give educational leaders and architects a road map for designing schools that optimally promote student learning and teacher effectiveness.

However, there is considerable discourse centered on the level of importance factors have in the design and construction of schools. The findings in this investigation add to the discourse,

but establishing the best practices as part of the PlanCon process as well as structuring the design team roles is the logical next step to increase the level of positive outcomes from school design in Pennsylvania.

Another implication of future practice gleaned from this study is that regardless of what type of design model implemented, architects and educators should share information in a professional collaboration (Bradley, 1996). Collaboration, as part of the whole design process, would most likely not happen without full group participation. With high levels of collaboration, incorporating multiple opinions and key factual elements based on the individual components of a school system, then synthesizing these elements into a comprehensive plan for a school facility, oftentimes leads to a more precise plan and a higher quality of information in the design process (Kowalski, 2002).

Lastly, it is evident from the findings in this investigation, that a future implication of practice would be to make the academic vision integral within the steps of PlanCon. The findings, revealed through the lens of the principal, indicate that this is not always part of planning process and predesign discussions. Because of this, there is an increased level of variability as to how the overall project connects to the academic vision of the school or district. This study could serve as part of the evidence needed to include this in the planning process. Also, current research is beginning to develop correlations between student learning and the design of the physical space beyond the scope of walls, ventilation, acoustics, and safety. Consequently, the processes involved in attaining the design of a quality space greatly impact the success of the school design.

5.3 Implications for Future Research

Several implications for future research arise from this study. Broadening the scope of the investigation to include the entire state would provide data that more accurately depicts principals' perceptions of the design process in Pennsylvania. Subsequently, another strategy to help generalize the findings would be to conduct the study through the lens of other stakeholders in the same schools. Completing this study through the lens of the superintendent, architect, and teacher would give insight from a broader sense into the different roles and processes imbedded in facility design.

Also, the qualitative analysis of the principals perceptions of the predesign and design processes limit the findings of this study. A future quantitative analysis of student achievement and teacher performance in these same newly designed schools may shed light on the validity of the perceptual data collected in this study.

This study also could serve as a foundation for in depth case studies of schools preparing for a school project. Analyzing school construction projects from beginning to end would provide insight into the planning process directly and the members of the design team. In turn, this would extend into further investigations of the overall PlanCon process. Analyzing the linear processes set forth by the state in relation to the overall implementation at the district level could provide further insight into developing criteria supported by the state of normative standards of facility design and the specific roles of personnel in the district.

5.4 Conclusion

This study found that principals had a variety of different roles and involvement in the design of schools. Overall there was no connection between the size of the schools or years of experience with the level of involvement in the design process. Principal involvement predominantly occurred at the onset of the project, and the two most highly reported roles of principals in the design phase of the construction project were key communicator and safety. Additionally, few participants reported roles as educational consultant during design. The roles most of the participants were serving did not coincide with the reported ideal roles principals thought they should have as reported in the study. This provides insight into the disconnect between design team member' roles and perceived levels of knowledge or input of principals within the team.

When principals indicated the stakeholders, who had the most influence in the design process, the superintendent, architect, and school board had the largest extent of influence. In terms of the amount of influence principals reported, the influence varied in the design process. Some principals had the highest amount of influence while others had very little. From a school leadership perspective, it was evident that in all cases but one that the superintendent or board of directors had the most influence largely by controlling the finances. Subsequently, participants reported architects as having a large extent of control in the design as well.

The inclusion of an academic vision and educational specifications was not consistent across each of the design projects as reported by the principals. Additionally, the timing and frequency of the inclusion of the academic vision showed a disconnection between the design process, design team members, and academic vision. If the principal did not report an inclusive

role in facility design, a disconnect occurred between the finished school design and the academic vision.

After completing this investigation, further evaluation of planning models and design strategies must occur, adding to a growing body of research regarding facility design. I hope that these findings will cause school leaders and architects alike to carefully examine the processes they use as they design schools.

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APPENDIX A Interview Questions

Introduction: The following questions refer to the components used within the design educational planning phase of your school. Please answer all the questions as a school building administrator that has been in a position of leadership during the predesign/design phase of a school construction project or major renovation. Also, for this study, the term *design* is referring to the actions and time when the plans for the school were being generated.

1. How would you describe your "official role" during the design phase of the school? Possible roles…
   a. Design team member
   b. Facilitator of stakeholder groups (surveys, meetings, etc.)
   c. Manager of project
   d. Educational Consultant
   e. Finance
   f. Key Communicator
   g. Safety Director
   h. Not involved
   i. Other: _____

2. As the school administrator, when were you involved in the process?
   a. Onset of project
   b. After initial design
   c. Before construction
   d. During the building phase
   e. Not involved

3. Please indicate the most significant factors influencing decisions regarding the design of your school?
   a. Financial
   b. Personnel
   c. Administration
   d. Community
   e. Environmental
   f. Safety and security
   g. Political
   h. Architectural

i. Athletics
j. Technology
k. Other

4. What role do you believe principals should have in the design planning of a school?

_____

_____

5. Please tell me what stakeholder(s) had a role in the design and the extent of their involvement? Not at all (1), Small extent (2), Moderate extent (3), Large extent (4)

a. Superintendent
b. Board of Directors
c. Teachers
d. Students
e. Support Groups / Boosters
    i. Sports (specific)
    ii. Music (specific)
    iii. PTO/PTA
    iv. Other
f. Community members / groups
g. Architect
h. Project manager
i. Other

6. Out of the listed stakeholder groups, which had the most influence on the design of the school?

a. Superintendent
b. Board of Directors
c. Teachers
d. Students
e. Support Groups / Boosters
    i. Sports (specific)
    ii. Music (specific)
    iii. PTO/PTA
    iv. Other
f. Community members / groups
g. Architect
h. Project manager
i. Other

7. How did this person/group exert influence on the design of the school?

   _____

   _____

8. Now I would like to hear your thoughts about the link between your district's academic vision and the building project. For the purposes of these questions *academic vision* refers to the districts educational philosophy about how students will be taught and the way the school approaches teaching and learning.

   a. To what extent was a defined academic vision of the district considered in the design of your school? Not at all (1), Small extent (2), Moderate extent (3), Large extent (4)

   b. Can you recall when academic vision was first mentioned in discussions within the scope of the project?

   c. How often would you say academic vision was discussed during the design phase of the project? Not at all (1), Seldom (2), Often (3), Always (4)

   d. How do you view the connection between the design of the school and the district's academic vision?

      _____

      _____

   e. To what extent were educational specifications prepared prior to the design? Not at all (1), Small extent (2), Moderate extent (3), Large extent (4)

APPENDIX B Interview Waiver

June 29, 2018

Dear School Administrator,

I am a doctoral student at the University of Pittsburgh, as well as lead principal at Fox Chapel Area High School. My dissertation study focuses on school construction. Specifically, I will be collecting data related to the perceptions high school principals have regarding their role in the design process, their perceptions of other stakeholder groups in the design process, and the connection between facility design and school district vision. With your consent, I am asking for you to participate in a 20-30 minute phone interview focused on your perceptions of the design process.

If you decide to participate, I will be contacting you via an electronic invitation to schedule a time that is convenient for you for the interview. This interview protocol will primarily consist of closed questions, with supporting open-ended questions. There are no foreseeable risks associated with your participation in this research study. All responses will be confidential and results will be kept under a secured location. It is my hope that this research will add to the existing research literature relating to school design and design planning.

Your participation in this study is voluntary. If you choose to participate or have any questions, will you please contact me at Michael_hower@fcasd.edu or by telephone at (724) 681-1887. If you would be kind enough to contact me by July 10th, I would greatly appreciate it. Once I receive notification that you are willing to participate, I will email you the interview questions, prior to our phone call.

You are guaranteed anonymity in the project, and you have the right to decline to participate as well. However, I would appreciate and would welcome your support in completing this study. Please be assured that your responses will remain confidential. In addition, if you would like a copy of the completed study, feel free to contact me at the conclusion of the project, which is projected to be in August, 2018.

The benefit of this study could be used to provide valuable information for future districts that are planning on constructing a new school so I am hoping you are willing to participate. If you have further question about the study, please feel free to contact me prior to the phone interview.

Sincerely,

Michael H. Hower

APPENDIX C Phone Interview Script

Introduction:

Thank you for agreeing to participate in this study. The interview will take approximately 20 minutes to complete. As you already know, the goals of my research study are to determine the roles principals have during the predesign and design phases of school construction, collect data from the principal's perspective about influential stakeholders, and determine if the academic vision was included in the design process.

There are no foreseeable risks involved with your participation in this investigation. All the responses to the interview questions will be confidential and the results will be in a password protected file and any notes will be in a locked cabinet. It is my hope that the findings of this study will add to the body of existing research associated with school facility planning.

I am going to ask you questions related to your involvement in the design process of your school. Please answer all questions through the lens of your time as principal.

Prior to beginning, I need your consent to participate. By you indicating I have it I will then proceed by asking the interview questions. Please know that you do not have to answer any of the questions you do not want to, and if you determine at any time that you no longer wish to participate, you are very to withdrawal from this study.

If you have any questions, you can contact me at (412)967-2432.

Begin Interview…see Appendix A

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