EDUCATOR'S PERCEPTIONS OF THE DESIGN COMPONENTS OF NEW ELEMENTARY EDUCATION FACILITIES

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EDUCATOR'S PERCEPTIONS OF THE DESIGN COMPONENTS OF NEW ELEMENTARY EDUCATION FACILITIES

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ABSTRACT

The purpose of this study is to investigate the perceptions of teachers and principals concerning their satisfaction with their new education facility in the areas of outdoor areas and playgrounds, shared amenities, classroom features, equipment and materials, and environment of the facility. The research focuses on changes the teachers would have made and if there are any mistakes in the planning and building process others should attempt to avoid. The research is also designed to identify perceptions of principals and teachers and the level of input into the design of the facility, and analyzing if they have input were they more satisfactory with the facility's impact on the teaching learning process. The study used quantitative and qualitative data to analyze the perceptions of the participants. In addition, common themes were found with this information and compiled to identify best design components of new elementary education facilities.

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CHAPTER ONE

INTRODUCTION

A Study of the Educator's Perceptions of the Design Components of New Elementary Education Facilities

Introduction

This is a mixed method study to investigate key issues surrounding the educator's perceptions of the design components of educational facilities. Schools designed today are a complex system of environments that need to address a wide variety of educational, social, environmental, recreational, and community needs (O'Donnell, 2010). Design features and components have a measurable influence upon student learning (Earthman, 2002).

It is estimated that teachers spend over 2,000 hours each year in the classroom in either teaching or preparing activities (Earthman & Lemaster, 2009). The physical environment and condition of school facilities has an impact on student performance and teacher effectiveness (Earthman, 2002). When classroom size, lighting, acoustics, equipment and school safety work against the teacher, it directly impacts their effectiveness and student learning (Earthman & Lemaster, 2009).

Teacher's perspectives of the design components of new educational facilities have often been excluded in the planning and building processes. School administrators need to consider how much a building design can directly impact student learning and prioritize gathering input from teachers when considering new educational facilities (Riggs, 2000). The researcher is currently involved in a building construction project and is aware of this problem. Chapter one will present the problem statement, theoretical/conceptual framework, and the purpose of the study.

Problem Statement

The principal, teachers, students and parents are all stakeholders in the learning practice and their perceptions may affect the effectiveness of the learning process. Expectations for improved teaching and learning in a new school facility are generally high and if the facility does not provide the improved conditions expected it may impact teacher satisfaction and affect the learning of students (Schneider, 2003). Teacher perspectives of the design components of new education facilities in some cases are not sought in the planning and building of an educational facility (Riggs, 2000). The educator's perspective is important because the quality of the learning environment impacts the teachers' behavior and attitude (Schneider, 2003 and Buckley, Schneider, & Shang, 2004).

This study will collect and examine the perspectives of elementary principals and teachers on newly constructed elementary school building. The study will be designed to determine the overall current and future usefulness of the elementary school design. The researcher also seeks to determine if the level of input into the planning process affected respondents' perceptions about how the facility impacts student learning and teacher instruction.

There is currently limited research available on educator's perspective on school construction projects and climate impact on stakeholders. By conducting this research the researcher will add to the research around educators' perceptions on facilities' effect on teaching and learning processes and if those perceptions are influenced by their level of input prior to the building construction. Perhaps the research may affect the planning of new elementary educational facilities and be beneficial to administrators in the process of planning for new elementary educational facilities.

Theoretical/Conceptual Framework

The repair, renovation and construction of new schools are an increasingly complex endeavor in the United States (Perkins & Bordwell, 2010). There are many multifaceted concepts that have to be considered. Researchers believe it is becoming increasingly difficult due to the ever changing needs of educating students. With the advancement of technology, the speed of this change is more rapid than ever.

Educational facility researchers have consistently found that regardless of improvements in classroom size, spatial configuration, physical features, furnishings or equipment, traditional patterns of direct instruction persist (Sanoff, 2012, Lackney, 2008, Taylor, 2002, Perkins & Bordwell, 2010, and Barrett & Zhang, 2009). This research finding is of significance to the design process of new school facilities intended to support 21st century teaching and learning modalities such as project-based learning, cooperative learning, interdisciplinary instruction and other recent educational reforms (Lackney, 2005).

Purpose of the Study

The purpose of this study is to investigate the perceptions of teachers and principals concerning their satisfaction with their new education facility in the areas of outdoor areas and playgrounds, shared amenities, classroom features, technology, equipment and materials, and environment of the facility. The research focuses on changes the teachers would have made and if there are any mistakes in the planning and building process others should attempt to avoid. The research is also designed to identify perceptions of principals and teachers and the level of input into the design of the facility, and analyzing if they have input were they more satisfactory with the facility's impact on the teaching learning process.

Research was conducted by Riggs (2000) regarding the inclusion of stakeholders in the planning and building process of new educational facilities. The study also determined their satisfaction with the resulting facility. Riggs study assumes the stakeholders had limited inclusion in the planning process and compared teacher satisfaction with the new facility to the satisfaction of staff with the facility. The researcher in this study assumes the changes since 2000 in the participation of stakeholders in all areas of education may result in different responses to the survey utilized. The researcher also would compare responses of principals and teachers with input into the planning of the new facilities to those who did not have input into the planning of the new facility. The researcher seeks to determine if elementary principal and teachers' satisfaction with the new facility differ depending on their level of input.

Null Hypotheses

H_0 Perceptions will not differ between groups as to the satisfaction of the group with the new facility concerning the areas of outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials.

$H_{1:}$ Teachers and principals are not satisfied with the new facility in the area of outdoor areas and playgrounds.

$H_{2:}$ Teachers and principals are not satisfied with the new facility in the area of shared amenities.

$H_{3:}$ Teachers and principals are not satisfied with the new facility in the area of classroom features.

$H_{4:}$ Teachers and principals are not satisfied with the new facility in the area of equipment and materials.

H_5 Teachers and principals indicating they had input into the planning process of the new facility do not have significantly different perceptions as to their satisfaction with the new facility in the area of outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials.

H_6 Teachers and principals indicating they had input into the planning process of the new facility do not have significantly different perceptions regarding the impact of the new facility on improving the teaching and learning process.

Research Questions

1. What would participants change about outdoor areas and playgrounds?
2. What would participants change about shared amenities?
3. What would participants change about classroom features?
4. What would participants change about equipment and materials?
5. What would participants change about the environment of the facility?
6. What mistakes should educators avoid in the planning and building process?
7. Did participants have input into the planning of the facility and if yes then what areas did participants provide input?

Limitations

Data was limited to the integrity of educators' feedback on the surveys. The researcher having been in education for 15 years has observed the integrity of the educators and has confidence in their responses. Research is limited on the specific topic leading the researcher to conclude the conducting of this study would contribute to the overall knowledge base for educators. In addition, researcher bias is probable due to the direct involvement of the researcher in an elementary school construction project.

Delimitations

Teachers and principals employed in Missouri public school districts with elementary schools constructed and occupied after July 1, 2010 were surveyed and responses compared.

Summary

This is a mixed method study to investigate key issues surrounding the educator's perceptions of the design components of educational facilities. Schools designed today are a complex system of environments that need to address a wide variety of educational, social, environmental, recreational, and community needs (O'Donnell, 2010). These design features and components have a measurable influence upon student learning (Earthman, 2002).

In the past, teacher's perspectives of the design components of new educational facilities have not been included in the planning and building process. Schools need to consider this direct impact on student learning and begin to gather input from teachers when constructing new educational facilities (Riggs, 2000). The researcher is currently involved in a building construction project and is aware of this problem.

In chapter two, a comprehensive review of literature is presented on key building design components including: planning and predesign, facility design, grounds and outdoor areas, shared amenities, classroom features, technology, equipment and furniture, sustainability and security. Chapter three will present the methodology to be used in this study. Included in this chapter are the study participants, sample selection, research design, data analysis, and instrumentation.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

This review of related literature served the purpose of examining several key building design components, such as building floor plans, security, traffic flow, acoustics, playground, furniture, landscaping, lighting, Leadership in Energy & Environmental Design (LEED), heating and air-conditioning, and sustainability. This study will investigate issues related to the planning and construction process and the effects of the design components of the new facilities on the stakeholder attitudes.

The repair, renovation and construction of new schools is an increasingly complex endeavor in the United States (Perkins & Bordwell, 2010). The challenge for educators and educational planners is simply this: facilities are expected to last forty years without major retrofit, but the programs they serve may change several times in that time period. Once a new building is built, nobody (taxpayers, nor the politicians) wants to hear about revised facility needs for the life of the building. School buildings must be created in a way that is poised for change (Locker & Olson, 2006, Brady, 2012, and Frith & Whitehouse, 2009). Therefore, the planning and predesign component of the building process is crucial. Today, school districts struggle to create best-value learning environments for students while complying with construction and design deadlines, and working within strict budgets (Hendrickson, 2011). Therefore, it is vital to have a thorough planning and design process in place whether or not the construction is of a new facility or the renovation of an existing site to ensure that the final outcome will meet the needs of the school community.

The school building is influenced by many of the same general changes and trends that influence almost all building types, such as the general economy, construction costs, and development of new building systems and materials, but schools are also affected by issues that are specific to educational facilities. Among the most important issues and trends relevant to school design are the following: enrollment trends, universal preschool, program requirements, condition of the existing facilities, schools as community centers, changes in school utilization, and research (Perkins & Bordwell, 2010 and Kennedy, 2011).

In 2012, Kennedy stated that twenty years ago, many superintendents and principals found themselves in charge of buildings that had been constructed too quickly and were prematurely aging and therefore, no longer providing a suitable learning environment for students. In addition, there were other factors causing school system administrators to put more emphasis on upgrading their facilities. Some of the factors were court rulings which mandated some construction, the push for class size reduction, the enactment of the American with Disabilities to make buildings accessible to all, the increase of technology meant retrofitting classrooms to meet these needs, and demands for improvements in energy efficient buildings (Kennedy, 2012).

This review of literature is organized into seven areas: Planning and predesign; facility design; grounds and outdoor areas; shared amenities; classroom features; technology, equipment and furniture; responsiveness of the facility. Subtopics were used under the main categories to further explain and clarify the literature.

Planning and Predesign

The first step in school construction is the planning and predesign phase. This step must be given adequate time and thought. Since 1995 there has been remarkable advancement in the

process and guidance available to school districts regarding the planning and predesign of school building construction (Perkins & Bordwell, 2010). There continues to be more and more information available from many sources, including the internet and state building standards, to assist schools with building recommendations and requirements.

Each school district is unique and requires an equally varied approach to creating a plan for determining and implementing the needs for a school improvement program.

> According to Perkins & Bordwell (2010), the predesign and planning specifics may vary; however, there are seven common steps to most successful planning processes. Each planning process should include and address these steps:
>
> 1) Assembly the planning committee
> 2) Gather data and assess the facility (if an existing building is involved)
> 3) Define the opportunity for meeting future educational needs
> 4) Generate options
> 5) Validate/evaluate
> 6) Present plans for recommendation and approval
> 7) Prioritize and schedule for implementation. (p. 23)

First, the school district must gather a planning committee. This committee should include Board of Education members, school administration, classroom teachers, building staff, architectural firm members, community members, and student representatives. The overall size of the committee varies, but generally it has 20-40 people. The committee meets on a regular basis for approximately three to six months. The meetings will involve presentations from the consultant team of architects and planners (Lackney, 2005, and Perkins & Bordwell, 2010). The presentations may include the objective of the committee, history of building projects, and

current areas of concern with existing facilities. As an education institution explores creating or updating a master plan, it is important to think carefully about what elements should be incorporated so that the plan truly functions as a roadmap for making decisions- physical, functional and financial. At its foundation, a campus master plan should set a vision for the physical development of a campus. The school administration should work with the committee to discuss the overall goals and mission of the project. One of the most important conversations that should occur at the beginning of the building process is to identify and/or verify the master planning tools that will be most valuable to the campus (Strigens, 2012).

The next step in the planning process is gathering data and assessing the facility. Information on enrollment, demographics, students served and other information related to the building project is collected. Also, during this phase, it is important for the committee to take some time to carefully walk through the existing space with a critical eye using an assessment tool. This tool should help the team to note aspects of the building that work well and areas that need improvement. The assessment will include roof, structural, technology and electric system concerns. The overall goal of this step is to provide the planning committee with a broad base of knowledge of the facility. During this phase, the schedule is verified, committees and subcommittees are assembled, and responsibilities are assigned (Andres & Statz, 2014, and Perkins & Bordwell, 2010).

The third step in the planning process is to continue to hold meetings to determine and confirm the scope of the building project with the planning committee. The number of meetings can vary depending on the size of the project and the amount of concerns being presented. Many times, the consultant team will narrow the focus to the areas with the biggest concern and gives guidelines on the process to be followed and has the planning committee break up into small

groups to discuss specific topics. Some example questions are: 1) How will this building project benefit teachers, students and the community?, 2) What do you think the major public concerns over this project will be?, and 3) What will students be doing in this school five, ten, and twenty years from now? (Andres & Statz, 2014, and Perkins & Bordwell, 2010). During this meeting, the committee offers feedback to help generate the project's opportunities and design challenges. The outcome of this step is to have an overall design direction to be used by the architects and planning committee.

Next, the planning team and the architectural firm analyze the information from the previous meeting to develop a needs assessment statement. This statement is used to summarize the highest needs and narrows the focus for the project. In addition, the team generates two to five options for the proposed facility recommendations and prepares a presentation for the planning committee (WLC Architects, 2012, and Perkins & Bordwell, 2010). This assessment also includes a list of criteria on which the options will be evaluated and prepares a presentation for future meetings.

The next two steps in the planning and predesign phase are evaluating the project options and then make a recommendation to the committee. The architectural and planning team reviews the list of opportunities and limitations for the project. The planning committee works together to come up with the best option for the building project and makes a recommendation to the school board. This includes a presentation from the architectural team on the facility design guideline. The planning committee has time to ask questions and make additional suggestions. When the plan has been approved, the team prepares a final report for presentation to the board of education (Frantz, 2014, Andres & Statz, 2014, and Frantz, 2014, and Perkins & Bordwell, 2010).

The final step in the planning and predesign phase is to set a prioritized schedule for implementation of the plan. Once this is set and the committee members, architectural firm, and school board of education feel comfortable with the proposal, then a plan is established to share the information to the public for finance hearings, bond campaigns, or a referendum, as required in the particular state, to secure financing (Perkins & Bordwell, 2010).

The steps outlined above are a general guide to help with the planning and predesign phase of a building construction project. These steps do not have to be followed exactly and it is important to consider the uniqueness of each building project. After completion of the planning phase and the district has secured financing, then the facility design phase begins (Frantz, 2014).

Facility Design

School facilities have a direct effect on teaching and learning. Our nation's school facilities are a critical part of the educational process (Schneider, 2003). Historically, educational buildings have been designed and constructed with little thought to the creation of a facility designed to meet staff and student needs (Riggs, 2000). Elementary schools can be designed in a wide variety of ways. More than other building types, school facilities have a profound impact on their occupants and the functions of the building, specifically teaching and learning (Vaughan, 2011). Until recently, educators and architects have lacked clear criteria for evaluating educational architecture. Planning teams have struggled to find or invent effective models without a common language of design. Fortunately, a substantial, readily accessed database of educational architecture literature over the last decade has resulted in a rapidly emerging language of best practices for planning and designing 21st Century schools (Fielding, 2006).

School officials responsible for planning, constructing, and renovating facilities should be held accountable not only for whether the cost estimates are met and the air conditioning works, but also for the impact their decisions have on student learning. Bearing this responsibility will force these officials to consult more with front-line educators and to educate themselves in the kinds of learning environments most conducive to effective teaching and learning (Nair, 2006). They are tasked with building schools that are designed to serve the needs of students forty to sixty years into the future. For architects who believe schools are just buildings with walls and floors, ceilings and doors are being simplistic in their actions. The problem with constructing a school building with a lowest-bid mentality is how do you put a price on inspiration? How do you measure the building's impact on the learning, the hopes and dreams of the tens of thousands of students that will read what's on those walls, walk on those floors, stare at those ceilings, and pass through those doors? Architects and administrators must ask, is the building just a shelter or is it an inspiration to future students (Fisch, 2007). Great learning environments exhibit similar characteristics as great cities and great landscapes. Some of the characteristics of great educational spaces are timeless and others change rapidly (Fielding, 2006).

A school facility in the United States will influence the lives of thousands of children and adults in its average 40-year life span. It may remain in use even when all the key decision makers in its design process are long gone. It can impact the attitude of a generation towards learning and is a cause bigger than a designer's need to create a self-glorifying inflexible structure (Akinsanmi, 2008).

Certainly among the most critical elements of an elementary school is the design of the formal learning spaces, typically the classroom in an elementary school. There are many considerations in creating the optimal learning environment and all interact to provide an

adaptable and appropriate setting to learn; these include: space, furniture, acoustics, color, light, technology, and display (Barrett & Zhang, 2009, Nuhfer, 2004, and O'Donnell, 2010).

Flexibility in the classroom is fostered by enabling the teacher and the class to quickly reconfigure the room to suit a range of activity (Barrett & Zhang, 2009). Accordingly, educators and architects need to design flexible environments that can change quickly without requiring renovation. Computer labs are an example of a space that must be able to be reconfigured. These spaces will need to be designed to transform into another productive use over time. Current computer classrooms will need to provide furniture that accommodates the use of laptops and other mobile technologies as they emerge (Strube & Thompson, 2012).

In summary, the design of a 21st Century elementary school requires attention to an abundance of interrelated issues spanning from pedagogy and technology, cognition and perception, demographics, budget and community to cultural goals and values (Barrett and Zhang, 2009, and O'Donnell, 2010). Regardless of the school's configuration, children need a healthful and stimulating environment in which to learn. Elementary schools should be comfortable visually, acoustically, and thermally; they should have excellent indoor air quality; and an emphasis on safety and security (Vaughan, 2011). The next sections will present the most common features of schools being built today and how educators are being challenged to embrace flexibility and multiple learning systems and formats.

Grounds and Outdoor Areas

The best buildings also create great places around them. For elementary schools, the exterior program is a critical part of a school's appearance (Perkins & Bordwell, 2010). Entry plazas, playgrounds and landscapes contribute greatly to the first and lasting impression of a school and create transitional zones where the school and the community can come together.

Playgrounds

Elementary play areas are an important part of the school's educational experience; and therefore careful consideration should be put into the design and development of these areas. The main issue in designing playgrounds is to provide challenging and fun activities while providing for the safety of the children using the playground (Ruth, 2008). Some of the general playground considerations are**:** selecting a site, playground layout, selecting equipment, surfacing, equipment materials, and assembly and installation (U.S. Consumer Product Safety Commission, November, 2010).

According to U.S Consumer Product Safety (2010) , there are important factors to consider when selecting a site for a playground. First, the travel patterns of children to and from the playground. If there are hazards in the way, then they need to be removed. Next, nearby accessible hazards that a child could inadvertently run into need to be considered. Examples of accessible hazards are: roads with traffic, water retentions, and drop-off or cliffs. If nearby hazards exist, then a plan needs to be constructed to contain children within the playground area (A Guide to School Area Safety, 2009). The two most common barriers include fencing or dense hedges/shrubs. Another consideration when selecting a playground site is the amount of sun exposure for the area. Not only should children limit the amount of time to sun exposure, the heat generated from the sun can cause equipment to become extremely hot. Utilizing existing shade, designing play structures as a means for providing shade through elevated platforms with shade below, or creating more shade using canopies are potential ways to design a playground to help protect children's skin from the sun (U.S. Consumer Product Safety Commission, November, 2010, and A Guide to School Area Safety, 2009).

The layout of the playground is another essential component when designing an elementary playground to ensure accessibility, age appropriateness, and supervision. School playgrounds should also be designed to allow staff adequate supervision to see play areas without obstructions. Visual barriers cause supervision concerns and should be minimized as much as possible (U.S. Consumer Product Safety Commission, November, 2010).

Playground designers should be aware that the American with Disabilities Act of 1990 (ADA) is a comprehensive civil rights law which prohibits discrimination on the basis of disability. Equipment selection and location along with the type of protective surfacing are key components to ensuring the opportunity for children with disabilities to play on the playground (Ruth, 2008, and U.S. Consumer Product Safety Commission, November, 2010).

Age-appropriate equipment selection is vital to the safety of its occupants. Playgrounds should be designed to stimulate children and encourage them to develop skills physically, emotionally, socially, and intellectually (National Program for playground Safety,2004, Ruth, 2008, and British Standards Institution, 2012). In addition, playgrounds should be in scale with their sizes, abilities, and developmental levels (U.S. Consumer Product Safety Commission, November, 2010, and Ruth, 2008).

Typically, play equipment is divided into three categories including: Ages 6-23 months, Ages 2-5, and Ages 5-12. Many times, school play areas have unlimited access by the public after school hours; therefore it is important to take this into consideration when choosing the equipment and layout. Since most elementary schools do not have children under four years of age attending, the equipment category typically chosen is Ages 5-12. Examples of age appropriate equipment for Ages 5-12 years old include: swings, vertical slide poles, slides, overhead rings, arch climbers, stairways, fulcrum seesaws, and ladders (U.S. Consumer Product

Safety Commission, November, 2010, National Program for Playground Safety, 2004, and Ruth, 2008). A few pieces of equipment that are not recommended for public playgrounds include: trampolines, swinging gates, climbing ropes that are not secured at both ends and heavy metal swings (U.S. Consumer Product Safety Commission, November, 2010).

Another key component when building an elementary playground is the surfacing under and around the play areas. This is one of the most important factors in reducing the likelihood of injuries. It is a requirement to have a suitable material down under and around play areas. The most common material used is loose-fill surfacing, like pea gravel, shredded rubber mulch, wood mulch, and sand. Loose-fill material compresses at least 25 percent over time due to use and weathering; therefore it is important to allow for this during the initial fill level. Most loose-fill material have a recommendation of not using less than nine inches except for shredded/recycled rubber, which at least six inches is recommended (U.S. Consumer Product Safety Commission, November, 2010, and National Program for Playground Safety, 2004).

The equipment material is also important when constructing a new playground. It is vital to use equipment that is manufactured and constructed only of materials that have a proven durability record (U.S. Consumer Product Safety Commission, November, 2010, and National Program for Playground Safety, 2004). The hardware, metals, woods, paints and finishes must also be researched. Hardware includes fasteners, connectors, bolts, nuts, bearings, and bushings. These items should not loosen or be removed without the use of tool, and they should be resistant to corrosion. Bearings and bushings used in moving joints should be east to lubricate or be self-lubricating. Although, some parts of the equipment should be constructed of metal, avoid using bare metal for platforms, slides, or steps (U.S. Consumer Product Safety Commission, November, 2010).

Bare metal can become extremely hot when exposed to direct sunlight and cause serious burns. The paint and finishes are also important on playground equipment. Metals not inherently corrosion resistant should be galvanized, painted or otherwise treated to prevent rust (U.S. Consumer Product Safety Commission, November, 2010).

Last, the assembly and installation is important when constructing new school playgrounds. All manufacturing instructions, requirements and specifications should be strictly followed when assembling and installing playground equipment. A vital component of the installation process is secure anchoring to ensure equipment is stable (U.S. Consumer Product Safety Commission, November, 2010). Many playground equipment companies recommend installing equipment as part of their warranty agreement.

School grounds are an important part of the school's educational experience and should be considered as carefully as the building plan (Perkins & Bordwell, 2010, and National Playground for Program Safety, 2004). The playground is a critical part of an elementary schools exterior appearance. Specific items to consider are: selecting the site, the playground layout, equipment, surfacing, equipment materials, and assembly and installation (U.S. Consumer Product Safety Commission, November, 2010, and NPPS, 2004).

Traffic Flow

The knowledge of traffic characteristics is useful and a necessity when constructing a new school. It is important to have an engineer conduct a traffic analysis of the area and review applicable local zoning regulations (Valentin, 2011). The traffic analysis helps to evaluate the current city street system and how the school district system operates its campus. The goal of a traffic study is to provide options to the city and school to improve both pedestrian/bicyclists and vehicular traffic safety around the school campus. Although, each school district and city is

unique and should be considered independently, below are some key factors to consider when routing traffic flow in an effort to keep children safe going to and from school.

Many school campuses are experiencing traffic congestion problems during the morning and afternoon school commute times as an increasing number of parents are driving their children to school (Institute for Transportation Research and Education, 2014). The mix of drivers, students, parents, cars, and buses presents the possibility of vehicle and pedestrian accidents (Mahoney, 2014). Some parents are reluctant to allow their children to walk or bicycle to school due to the traffic congestion and perceived traffic danger during student arrival and dismissal (Safe Routes to School Guide, 2007). This often results in more parents driving their children to school which increases congestion and safety problems at school. In order to help with the safety, schools should evaluate the site for traffic flow, pavement markings, signage, walkways, curbing, and entranceways.

One of the biggest areas of congestion at elementary schools is the drop-off and pick-up lane. By studying this area and implementing a few key components, schools can dramatically improve the safety for all stakeholders (Mahoney, 2014, Vigne, 2007, and Safe Routes to School Guide, 2007). First, schools should provide a designated location for student drop-off and pickup that is physically separated from other traffic areas. This lane is designated for drop off and pick up of students from private motor vehicles only. It may be located on school grounds or on a street adjacent to school (Safe Routes to School Guide, 2007). When possible the lane should be long enough for at least three cars to load or unload at one time.

Next, schools should use clear signage, curb striping and pavement markings to improve the safety and efficiency of traffic flow. This is a benefit that is low cost and helps to clarify parking and other curb use rules. Signs should be standard, highly visible, properly installed and

well-maintained (Safe Routes to School Guide, 2007). Schools should work with the city planner and local traffic engineers to gather recommendations on appropriate signs and their placement. In addition, curb striping or painting should be used in drop-off and pick-up zones to clarify parking and other curb rules. In some cases it may be helpful to stripe out the loading area, both for the driver and for the waiting students. Some schools stripe the path the drivers are supposed to use for drop off and pick up, and some schools use pavement arrows and pavement stencils to designate circulation patterns and where loading is to occur (Safe Routes to School Guide, 2007).

Another key component to improving traffic flow and safety is to educate and communicate expectations with all stakeholders. Educating parents, students and community members on proper drop-off and pick-up procedures is essential in developing a safe and efficient system (Safe Routes to School Guide, 2007). School administration should begin the year with a welcome package that includes a diagram and clear directions for people driving on campus (Mahoney, 2014). In addition, school principals should use all communication means available, including emailing information, posting on the district website and other social media accounts to help reinforce the correct traffic flow.

Enforcement of drop-off and pick-up rules is essential in creating a safe environment (Safe Routes to School Guide, 2007). It is vital to train the students and staff on the these procedures. Mahoney (2014) suggests taking the following actions: 1) Train early and often so that they understand the serious nature of mixing pedestrians with cars and buses, 2) stress the importance of waiting in the correct area until the vehicle stops before approaching it, 3) school staff should wear reflective vests and use uniformly enforced hand signage rules to help avoid

confusion for staff, parents and students, and 4) train staff to actively supervise the loading and unloading zone.

School bus traffic is another component that needs careful consideration when evaluating and designing traffic flow around school campuses. When possible school buses should have a separate area for loading and unloading students that is away from other traffic congestion. School personnel should be assigned supervision duty to help load and unload students safely before and after school (A Guide to School Area Safety, 2009 and Mahoney, 2014).

The site layout and parking lot are essential pieces when designing a new school. They should be focused on reducing pedestrian, bicycle and motor vehicles conflicts (A Guide School Area Safety, 2009). When constructing a new school, it is important to consider traffic flow on and around the school site. This includes vehicular traffic, bus traffic, and parking lots. School districts that carefully plan and implement the factors discussed above will increase safety for everyone in route to and from school.

Landscaping

The outdoor area of schools offers many possibilities. However, many times when constructing a new school, the landscaping doesn't seem to be a priority. Many project leaders tend to focus on the building itself and forget what has to go outside the building. Jackson (2014) says, the top reason for site development shortfalls are usually the result of poor budget planning in the predesign phase. It is important when budgeting to be realistic and remember to include the outdoor areas. Waite (2014) recommends having at least 15 percent of a construction budget reserved for site development- which includes landscaping, driveways, parking spaces and other final touches. Waite (2014) says, "A building project isn't complete until the landscaping and site development are complete." (p. 51)

The key is to create a landscape that looks pristine while staying within the budget and putting school safety first. Typically the best way to do this is by using a combination of approaches. It is a good idea to allocate your resources where they will make the most impact (Esselburn, 2006). According to Esselburn (2006), schools should focus on a few key practices. First, use plants and shrubs that are suited for your local climate. Shrubs should be hardy and require low maintenance. Next, provide shrubs and /or groundcover for those areas that are difficult to mow and require soil stabilization. Many schools choose to highlight the entrance with shrubs rather than planting a long border (Mathews, 2014). Trees are also a key component when completing the outdoor site development. It is important to choose trees that are disease resistant and are suitable to the area's soil type and climate. Trees should provide shade for comfortable learning and play space. Plant a few trees in the open, grassy area of the playground to offer a sheltered place during hot months. Schools should try to avoid trees that produce nuts and other items that can fall and cause injury and property damage (Mathews, 2014). Last, flowers can add color and a nice welcoming feel to schools. It is best to plant flowers in lightweight recycled plastic containers for versatility and highlight school entrances with their placement (Mathew, 2014).

The overall goal of schools should be to work to create an engaging exterior space to frame the school just as you display your students' accomplishments in the corridors inside the building. Elements of school landscape should complement the architectural structure and make the favorable first impression on visitors to the building (Mathews, 2014). There are several cost-effective options to keep the outdoor areas looking fresh and welcoming. Schools should work closely with a landscape contractor to create and maintain a healthy and vibrant

environment for students, parents, staff, community members and visitors to your building (Ruppert, 2009).

There are many factors to consider when developing the outdoor areas of a school. As with most aspects of school planning and design, careful consideration should be placed on the site development. Playgrounds, traffic flow and landscaping are essential elements to the overall appearance of the school. It is essential to design, build and maintain these areas in order to create a finished project and a welcoming school environment.

Shared Amenities

Shared school spaces support many functions and activities, each of which may require a different setting, character and tone, but individual spaces should feel like they are part of an overall family of related spaces. Shared spaces need to be comfortable, inviting and functional. With increased community use of school facilities being more common, it is important to create identifiable public, staff, and student zones that are unique in character and scale and are also securable for after school hours. (Perkins & Bordwell, 2010). Many schools rent or lease parts of their buildings for community use after school hours. These spaces may include gyms, libraries and multipurpose rooms. For school and community events held during after school hours, security dictates that the space must be closed off from the rest of the school while providing direct access to restroom facilities (Gordon, 2010).

When designing and constructing school restrooms, there are several important factors to consider. Architects and construction companies must comply with all local and state codes and licensing requirements. The student toilet facilities should be designed to meet the needs of the students, including sink height, fixture size, height of towel dispensers or hand dryers, door latches, etc. (Perkins & Bordwell, 2010). Separate toilets or latrines should be available for girls

and boys. Privacy, cleanliness and safety are major considerations when planning location and design of facilities. In addition, the architects must make sure the toilet facilities are designed and built to meet county and city codes, including Americans with Disabilities Act (ADA).

The library is another shared space within a school. The library should have a flexible design that supports multiple learning and teaching styles (Sullivan, 2011). The library needs to be strategically located within the school for easy access, but away from noisy areas for a greater degree of quiet. Sullivan (2011) believes it is important to make books and magazines more attractive and more visible to students. One way this can be done is by using displays, mobile fixtures, signage and lighting. Next, it is important the library is equipped with a strong infrastructure to accommodate the increase in technology and mobile devices (Perkins & Bordwell, 2010, and Sullivan, 2011). Last, the library floor covering is an integral part of the library design. Most school libraries install aesthetically pleasing, sound absorbent, durable carpet (Sullivan, 2011). Incorporating these key elements will help to ensure a well-designed library.

Another important shared space within a school is the office. Creating a welcoming and safe environment when arriving at school is an essential piece to the overall school culture. The office area should be a separate space for faculty and administrative personnel. Since the office is primarily an adult-use area, such as administrative offices, conference rooms, nurses and counselor offices, along with other public gathering areas, it should support adult users (Perkins & Bordwell, 2010).

The nurses' office is a place that is utilized by students, teachers, parents and other staff members. They are an important resource for the adequate care, support, and development of a student's overall health because health and education go hand in hand (Capparelli, 2003 and

Butin, 2000). According to Butin (2000), there are three key elements of school health centers: privacy, confidentiality and sense of well-being. School nurses must maintain confidentiality within the law. The Family Educational Rights and Privacy Act (FERPA), which is a federal law designed to protect the privacy of student education records that are maintained by a school has increased confidentiality concerns.

It has become more common for the nurse's office to be equipped with an area for a child that is not feeling well to lie down or is hurt. This allows the child to have a place to sit or lie down in a quiet area separate from the other children. Many times these areas have a curtain that can be pulled when privacy is a concern. This area can still be visible to the nurse and allows for adequate supervision. Other ideal features for this room would include: a restroom, sink, dimming lights, and proper ventilation. The nurse's office must have a locked cabinet for necessary supplies (Butin, 2000 and Capparelli, 2003).

Shared school spaces are an important component of the school environment and should have careful thought and consideration when designing a new school facility (Perkins & Bordwell, 2010). The use of materials, colors and furnishings in these spaces should enhance the overall look of the facility.

Classroom Features

School children spend the majority of their time each day in the classroom. Therefore, the design and layout of the classrooms is very important (Barrett and Zhang, 2009). Classrooms come in all different sizes and shapes. They start out as empty spaces but fill up all too quickly with furniture, materials, supplies, books, desks, chairs, tables, curriculum, and many other things (Duncanson, 2014). While bigger classrooms are needed, teachers typically do not have the option to have a larger classroom. Therefore, educators must be flexible and work with the

classroom layout they are given. This means teachers must work to effectively use the space, acoustics, colors, air quality, storage and lighting they are given to enhance student learning (Barrett and Zhang, 2009, and Nuhfer, 2004, and Fielding, 2006).

Space

Classrooms are the core space of a school. Since they are the main body of a school building, they should to be built to respond to the needs of the students they serve. Classroom square footage requirements are driven by the need of the students to move around and participate in a variety of learning activities (Perkins & Bordwell, 2010). General purpose elementary classrooms are usually designed to accommodate 22-30 students (Perkins & Bordwell, 2010). Classroom sizes vary depending on the grade level; however, a standard elementary classroom is 850-900 square foot (Duncanson, 2014) .

In the past, school flooring has primarily been carpet and vinyl, but many being built today are using finished concrete. Concrete floors are considered to be ideal because of the durability, aesthetic potential and low- maintenance requirements (Henry, 2014). Although, carpet helps quiet noisy classrooms it does not last as long and accumulates dust and dirt more (Nuhfer, 2004, and Henry, 2014). According to Nuhfer (2004), most classroom teachers prefer carpeted floors over other types of flooring and will accommodate their classrooms by incorporating area rugs.

Today's classrooms have a larger focus on flexibility due to the variety of instructional delivery methods, from project based learning to small group instruction. Flexibility is also important because of the anticipation of changes in pedagogical goals and educational programs (Barrett & Zhang, 2009). This means the floor space must be as free as possible of permanent

obstructions. Teachers should set a priority on having an appropriate amount of space to rearrange student furniture to match the space needed for the student activity (Lang, 2002). Flexible environments are normally good ones for students: flexibility allows for different kinds of learning activities (Casson, 2013).

Acoustics

Schools are viewed as places of learning where speaking and listening are the primary modes of communication and the most common primary goal of the classroom educational process to share experiences, exchange ideas, and transit knowledge (American Speech-Language Hearing Association, 1995). Research has shown that young children spend a considerable amount of time engaged in the listening process (Ryan, 2008). Dahlquist (1998) estimated children spend approximately seventy five percent of their day in listening activities. Listening activities may include paying attention to the teacher, listening to peer responses, videos, music and other conversations. With so much of the student's day spent in listening activities, an important consideration of the school environment should be the acoustic properties of the school (Ryan and Mendel, 2008).

A number of features within classrooms influence classroom acoustics. In an ideal classroom, words can be heard and understood with little or no effort. According to Perkins & Bordwell (2010), poor acoustical design causes students to have trouble hearing and thus have a significant effect on students' academic success. A large percentage of classroom learning is dependent on clearly hearing the messages being communicated (Edwards, 2005). The construction and mechanical systems of a building greatly affect its acoustics, which should therefore be a consideration as early as possible in the design phase (Perkins & Bordwell, 2010). Noise sources may include background noise from heating, ventilation and air conditioning

systems or electronic equipment in the room, collaborative groups in the classroom, and noise in the hallways or outside the windows (Crandell, Smaldino, & Kreisman, 2004). Music classrooms often are equipped with carpet to help absorb the sound from instruments and singing. Another area of concern with acoustics is gymnasiums. The large open space and tall ceilings often cause poor acoustics. Architects will often recommend placing sound panels on the walls to help improve the acoustics within the room (Douglas, 2010). In addition, proper acoustics within and between classrooms will likely become even more critical over time as the use of audio-visual equipment with multimedia capabilities, such as interactive whiteboards, and the use of individual technology devices continues to proliferate and a more active learning pedagogies are employed (O'Donnell, 2010).

In summary, classrooms with poor acoustics require students to use more effort to attend and concentrate on daily tasks. Architects and school personnel need to be aware of the many components involved in creating an optimal classroom listening environment.

Colors

Color is an important component to successful school design. Today's students are visually oriented and prefer active learning in a welcoming space. School and classroom environments that accommodate the needs of all students while promoting student thinking and individualization are necessary for opportunity to learn (Duncanson, 2014). When discussing color in an educational context, it is important to approach color choices as a functional question rather than solely from the standpoint of aesthetics. Functional color focuses on using color to achieve an end result such as increased attention span and lower levels of eye fatigue (Barrett & Zhang, 2009).

Appropriate color can have a number of effects: it can increase a child's sense of security, it can offer eye relief from the strain caused by heavy use of computers and it can be part of the design strategy to make the school environment fun and stimulating (Barrett & Zhang, 2009).

Color is a powerful tool in the learning environment. Children need a broad and sophisticated introduction to color. It is important not to overload the building project with a large amount and variety of color. Too much color can result in a chaotic environment and over stimulation that does not support learning. Walls, ceilings, flooring and furnishings should be in fairly neutral tones and serve as a backdrop for the colorful objects, images and art found in different parts of the building (Winter and Gyuse, 2011). Colors best suited for classrooms should reduce agitation, apprehension and promote a sense of wellbeing. These colors include light yellow-orange, beige, pale or light green, or blue-green are good choices for three of the four classroom walls (Nuhfer, 2004). Many schools choose to paint the front classroom wall a different color. They often use a medium tone that is a complementary or at least a darker hue than the other walls to help relax students' eyes when they look up from tasks (Perkins & Bordwell, 2010).

Color has an impact on human's psychological reaction and physiological well beings. Color choices are an essential piece in designing a new school that promotes a positive learning environment. Schools should work closely with architects and interior designers to ensure the color choices are functional and achieve the desired goal.

Air Quality

According to the United States Environmental Protection Agency (2014), indoor air quality in schools is important for health, economic, and legal reasons. Indoor air pollutants can cause discomfort, reduce school attendance and productivity, and cause short and long term

health problems. Some of these health problems include asthma, respiratory tract infections, allergic reactions, headaches, nasal congestions, and eye irritations (USEPA, 2014).

Air quality has become more important than ever. With the increase of constant internal conditions, limited fresh air, absence of daylight and universal use of there has been an increase in concern for our students and staff in schools carpets (Barrett & Zhang, 2009). Educators know it is important for schools to create and maintain good and healthy indoor environments in order to accomplish their core mission of educating and improving their students' academic achievements (Behzadi & Fadeyi, 2012). Ensuring quality indoor air in schools is a complex, but essential because children spend significant amount of their time there (Baker, 2012, and Behzadi & Fadeyi, 2012).

There are a few important components to ensure a healthy and safe indoor air quality within a school. First, make sure there is adequate ventilation throughout the school. By having improved ventilation, the school reduces a range of respiratory illnesses, including common colds and allergic reactions (Perkins & Bordwell, 2010, and USEPA, 2014). Next, new buildings should use low-emitting materials. Many adhesives, sealants, paints, carpets, and composite woods can emit indoor air contaminants that are odorous, irritating and/or harmful (Baker, 2012, and Perkins & Bordwell, 2010). Also, the building design should incorporate features that minimize and control pollutant entry. This should include removing dirt and particulates at the main entrances to filtering and blocking emissions such as exhaust systems (Perkins & Bordwell, 2010 and USEPA, 2014 and Baker, 2012). Another key component to ensure quality indoor air is to equip the building with efficient control of lighting and heating systems. The lights and thermal comfort systems should be easily controlled and adjusted to suit the individual room needs and preferences (Perkins & Bordwell, 2010). By having improved

temperature control there is improvement in productivity, teaching quality and student performance (Kats, 2006).

Clearly, indoor air quality and adequate building ventilation are closely linked and is often a common problem in schools (Winter & Gyuse, 2011, and Barrett & Zhang, 2009). The research from USEPA (2002) says that good indoor air quality contributes to a favorable learning environment. As new school facilities are designed, it is essential to incorporate key components to ensure excellent indoor air quality.

Storage

One of the many challenges teachers of elementary children have is where to store all the stuff necessary for creating a fun and engaging learning environment. Storage needs within the classroom are often underestimated. Lack of storage space can be very frustrating to classroom teachers and research is limited related to classroom storage. Larger classrooms provide greater opportunities for built-in or movable equipment to help meet this need; however, teachers often do not have a large classroom at their disposal. At the elementary level, cubbies for backpack and coat storage are often provided within the classroom to facilitate the monitoring of students belongings (Perkins & Bordwell, 2010).

Having enough storage allows teachers to better organize classroom space. It is important to have ample, convenient storage that is accessible so teachers spend their time interacting with the students and less time looking for things (Educational Furniture Information, 2014). According to Perkins & Bordwell (2010), the recommended amount of storage area for a classroom is 50 square feet while art, music and physical education need approximately 600 square feet. Due to the minimum storage space, teachers have to keep supplies to a minimum and very organized.

Lack of classroom storage is a problem many schools face and often look for areas outside the classroom to store materials. One of the most common spaces used has been the stage area or even hallways. Some schools have realized the lack of planning for building storage and have purchased mobile storage carts that can be rolled to different areas of the facility when needed (Duncanson, 2014). Space and storage continues to be a crucial factor in determining how teaching and learning time is used (Duncanson, 2014).

Lighting

Appropriate lighting is one of the most critical performance attributes of the learning environment (O'Donnell, 2010). Research suggests that students learn better in settings with balanced natural light (Dale, 2010). When designing a new school facility architects and school leaders need to take a close look at the lighting options while considering the variety of daily instructional activities.

The most common lighting options include fluorescent, natural or daylighting, and light-emitting diode (LED). In the past, the most common choice for lighting has been fluorescent, mainly because of its energy efficiency. There are convincing studies to show significant benefits to replacing the common fluorescent bulbs, which emit wavelengths with an artificial loading toward longer red and yellow wavelengths, with bulbs that produce whiter light or, in the best case, full spectrum light that's also more enriched in blues and violets and is closer to natural sunlight (Fielding, 2006, and Nuhfer, 2004). Olszewski and Breiling (1996) note that one practical reason for needed change is that artificial light that is rich in yellowish wavelengths produces a glare from white paper that results in eyestrain. According to Nuhfer (2004), another factor of fluorescent lighting that affects humans is the 60 cycle per second flicker associated with common fluorescent lights with older magnetic ballasts. The flicker is thought to produce

exhaustion and negative moods. Although, there are times when fluorescent lighting may be appropriate there are times when other options may be better suited for the learning environment.

More and more schools are beginning to use LED lights which may be able to provide full spectrum light with power consumption below that of fluorescent bulbs (Nuhfer, 2004). LED lighting represents the quickest energy efficiency payback for schools compared to many other building components. There are many benefits of using LED lighting instead of fluorescent fixtures including: reduced maintenance costs, reduced energy consumption, virtually glare-free, elimination of ultraviolet and infrared rays, a longer life span, and they are fully recyclable. Another important benefit of using LED lighting is the increased adaptive and wireless controls. It is important that classroom instructors have the ability to control room lighting; the more lights that are equipped with controls that permit continuous adjustment, the better (O'Donnell, 2010).

Poor lighting conditions in a classroom can cause a variety of negative effects including: glare, poor visibility, constant adjustment to conflicting brightness, muscular eye strain, increased blinking and pupil dilation (Fielding, 2006, and Perkins & Bordwell, 2010). According to Perkins & Bordwell (2010) there are a few key components schools should implement to help prevent eye strain and increase student concentration. First, overhead lighting levels should be kept low to avoid excessive glare and shadows. Second, window coverings should be used to eliminate glare. Third, it is important to reduce the contrast for students looking up at the teacher and down at their books. Next, designers should ensure desks, walls, whiteboards, and screens are adequately lit to ensure clear visibility.

The most important factors in school lighting systems are energy efficiency and visual comfort (Dale, 2010, Barrett & Zhang, 2009, and Perkins & Bordwell, 2010). Lighting in a 21st

century classroom should draw upon natural and electric light sources because of the variety of learning activities taking place in today's classrooms. It is important school architects, administrators and teachers understand the importance of planning school and classroom designs. Steps should be taken to restructure classrooms so they are built with maximum open space, clear pathways, sound acoustics, welcoming colors, simplistic organization and appropriate lighting. By incorporating these characteristics, more flexible spaces are being created and allowing schools to enhance the educational environment.

Technology, Equipment and Furniture

An essential component in today's schools is the technology and equipment available to students and teachers. Students need educators to re-envision the role of teaching and learning in the classroom. Students today are not the same twenty-first century learners we came to know over the first decade of the new millennium (Blair, 2012). The classroom environment needs to be flexible, mobile and support technology to meet the variety of daily learning activities.

Technology

It is an exciting time for schools and technology. Greg Estell, president of SMART Education says, "Schools are not just focusing on the three Rs anymore. They're really focusing on the four Cs: collaboration, creativity, communication and critical thinking" (School Construction Magazine, May 2014, p. 17). The improvement in the economy is allowing for more money to be spent on technology in classrooms. Technology is everywhere in schools. It has infiltrated and changed the world of education over the past few decades. In addition, new generations of teachers are also promoting the use of technology to change student learning in the classroom. Teachers are moving from instructors to facilitators.

There continues to be a movement to ‘one to one’, where in more and more schools every student has either a laptop or tablet. This trend along with wireless within schools, provides for flexibility for learning to take place anytime, anywhere on school grounds. With the increased use of personal devices in schools, the need for increased bandwidth is a necessity. Another trend involving technology is the elimination of specific rooms being designed as computer labs. Every room is now a computer lab (Blair, 2012).

Technology is a fast moving target, so designing and planning for the future is extremely difficult. A key component of the planning process should involve investigation, discussion and decisions. However, technology has been and will continue to evolve in ways most of us cannot begin to imagine, but we cannot sit and wait, we have to be proactive. It is more important than ever to have technology consultants involved from the beginning who know the current technology application and how to get it into the classrooms and make it effective (Blair, 2014, and Strube, M. & Thompson, A., 2012).

School districts should develop and have a technology plan. Strube & Thompson (2012) suggest, the plan should address infrastructure, equipment, software, management, support and training. Technology planning is important because it provides direction and helps school personnel understand clearly where they are now and imagine where they want to be. The purpose of technology planning is not just to produce a document, but to produce continuous action that creates and maintains a technology-rich educational environment.

Another key component when building a new school is the importance of fusing technology into the school design process (Strube, M. and Thompson, A., 2012) . In the past, technology has been perceived as a stand-alone content area with its own dedicated spaces within a school. However, today’s schools should be designed to incorporate technology into every

learning space and all curriculum areas. That is why flexibility in design of educational spaces has never been as important as it is today. Strube and Thompson (2012) state, the classroom is emerging from a room with four walls in which the teacher stands at the front of the classroom delivering the daily lecture, to a space which needs no physical boundaries and where students are actively seeking knowledge on their own and in groups.

In summary, schools should be designed for today's educational needs and include opportunities for adaptations to meet future educational and technology needs. Teachers and students should have access to technology that is easily available and promotes collaboration, creativity, communication and critical thinking skills.

Equipment/Furniture

By the time most building projects arrive at the furniture, fixture and equipment stage, school officials have already invested so much time in the building's design they may not realize how important the outfitting of the interior is in creating the best learning environment for students (Hendrickson, 2011). However, it can be one of the most important parts of the construction project (Hendrickson, 2011).

Today's active learning styles require multipurpose spaces that can be easily adapted for large groups, small teams or individual learning activities. Equipment and furnishings that are flexible, mobile and support technology should be considered to enhance the learning process and improve student outcomes. School administrators should make buying decisions for equipment and furniture based on many factors, including cost, durability, functionality, safety and ergonomics and aesthetics (Hendrickson, 2011).

Gay, purchasing manager for Baltimore County (Md.) Public Schools, advises schools to ensure their furniture is conducive to its educational mission. According to the *Partnership for*

21st Century Skills (Washington, D.C.)- A 21st Century Learning Environment, the new learning environment and furnishings should:

1) Support the teaching and learning of 21st century skill outcomes by integrating learning practices, human support and physical environments.
2) Support professional learning communities by enabling educators to collaborate and integrate 21st century skills into classroom practice.
3) Enable students to learn within the context of relevant, real world 21st century project-based methods and "hands on" applied work.
4) Allow equal access to quality learning tools, technologies and resources.
5) Enable group, team and individual learning through creative, innovative 21st century interior designs and flexible, adaptable furnishings.
6) Support expanded community and international involvement in learning, by engagement with others- both face-to-face and through the use of technology. (pg. 2)

Schools should select equipment and furnishings that support learning and is the right fit for the building project needs. By careful planning and working with the architect and design team, the school administration can equip and furnish a new building project that will maximize the teaching and learning environments, supporting the best interests of faculty, staff and students (Hendrickson, 2011).

Environment of the Facility

According to Lackney (2005), an effective school facility is responsive to the changing programs of educational delivery and should provide a physical environment that is comfortable, safe, secure, accessible, and aesthetically pleasing. Today's architects are faced with the

challenge of designing and building schools that meet sustainability, as well as, providing a secure environment. The following subtopics will discuss the most important security measures and key sustainability factors to consider when constructing a new school facility.

Safety and Security

It is important to integrate safety and security into the design when constructing educational facilities. Since the 1990's, safety and security have come to the forefront of schools and policies. Administrators, teachers, students and parents agree that everyone should feel safe at school. However, when constructing a new school, Kenneth Trump, president of National School Safety and Security Services (2011), says, "Too often, school administrators, school security officials and school resource officers are not involved in the early processes of new school design. District officials need to require architects to fully engage the input from them on the most practical and useful design that would facilitate education, supervision and safety" (p. 72). The following explain key components to help build and achieve a school campus that is safe and secure.

The first security priority is entry control. This is the most important way to help ensure student and staff safety. When designing a school building it is important to keep in mind, the fewer entrances, the safer the school will be (Ray, 2014, and Spicer, 2014, and McLester, 2011). In addition, entrances should be well lit, equipped with alarms, locked from the inside, and require non-school personnel to undergo screening before admittance (McLester, 2011). Before a visitor is inside, they should be required to sign in at the main office, state the reason for their visit and show proper identification. Another component to school safety and design is to make sure interior doors lock on the inside. This allows school personnel to lock their doors quickly without stepping into the hallway or corridor (Schneider, 2010, and McLester, 2011).

Next, it is important to design a facility that has clear sightlines and no dead spaces (NCEF, 2008). This helps to create natural surveillance and can increase safety and security. Many schools today, build the main office area with large glass windows with unobstructed views to the parking lot and street. This allows the building secretaries and administrators to easily spot people approaching the school. In addition, the outside layout of the school building should be designed to have an open view without areas that are closed in by three sides. Areas that are recessed or blocked on three sides allows for limited visibility from the outside or street (Spicer, 2014, and NCEF, 2008).

Surveillance cameras are also an important way to increase school safety and security when constructing a new school building. Cameras should be placed at all entrance and exits, the parking lot, main vestibule, and hallways. In addition to security cameras, schools must invest in a camera monitoring system because a camera without eyes watching can be a waste of school funds. Although, many businesses are already using Smart cameras, they are still too expense for most schools. Cameras are helpful because they detect motion and can be programmed to trigger a desk bell or other alarm. As technology continues to advance and prices begin to lower on these types of camera systems, more schools will have the opportunity to install and use the systems (McLester, 2011, and Spicer 2014).

Technological security improvements have evolved from an exotic possibility into an essential safety component. When considering a school security system, do not start by choosing a technology and looking for a problem it can solve. The process should be in reverse: identify and prioritize the problems before jumping to solutions, and analyze solutions carefully before committing funding (Schneider, 2010). The top priorities when considering safety and security for the building are: lock-and key systems v. electronic access control systems, visitor

screening and badging, surveillance equipment, weapons detector, communications equipment, and alarms.

School security is an essential component when designing a new school. Architects must evaluate and integrate access control, security location, sightlines, and surveillance systems to ensure the safety and well-being of students and staff while at school.

Sustainability

People are realizing their future depends on protecting the health and wellbeing of our children and planet. As more schools are being designed today planners are considering sustainable designs. Sustainable or green designs specifically incorporate energy savings and health and wellness factors as part of the overall design. According to Green Schools National Network (2014), "a green or sustainable school enhances student health and learning while conserving natural resources and empowering students to develop sustainable behaviors, enabling them to become the stewards of the future" (1).

With the increase in both green school construction and research linking green schools to healthier students, higher performance and financial return on investment, it is no surprise that the green school design practices are quickly becoming standard practice (Barr, Dunbar, & Schillar, 2012). According to Green School Initiative (2014), one in five Americans, 55 million people, spend their days in K-12 schools. These people include students, teachers, administrators, nurses, and janitors.

According to Green School Initiative (2014), there are four main areas when considering designing a green school. First, schools should be designed to be toxic free. This includes not using pesticides or lead based products, while using only green building and cleaning products. The second consideration is to use resources that are energy efficient and environmentally

friendly. In addition, green schools try to reduce, reuse, and recycle whenever possible. The third consideration is to create a healthy space, which includes outdoor and indoor reflection. Outside, schools may consider creating gardens to produce foods for school lunches, and creating water collection facilities that can be used to flush toilets or water gardens (Barr, Dunbar, and Schiller, 2012). The last component of designing a green school is to teach the staff and students about environmental education. The thought is when students see first-hand the positive impact of their actions; they feel empowered for the role they play in the sustainability.

Schools are considering upfront costs versus long-term operating costs. Schools must weigh if they are willing to pay more for an efficient mechanical system upfront that has a substantial payback in operational savings. Although, schools continue to make progress in the area of school sustainability, the majority have a long way to go (Green Schools Initiative, 2014).

LEED

Leadership in Energy & Environmental Design (LEED), is a green building certification program that recognizes best-in-class building strategies and practices. Leadership in Energy & Environmental Design is changing the way we think about how buildings and communities are designed, constructed, maintained and operated. Buildings with LEED certification are designed to save money and resources and have a positive impact on the health of occupants, while promoting renewable, clean energy.

To receive LEED certification, building projects satisfy prerequisites and earn points to achieve different levels of certification. Prerequisites and credits differ for each rating system, and teams choose the best fit for their project.

Optimizing operational and maintenance practice need to be a focus of schools today (Rydeen, 2012). According to Rydeen (2014), whether seeking LEED certification or just

emphasizing sustainable design principles, school should request their architect and engineers identify the advantages and disadvantages of each and then make an informed decision.

School facilities that are built today have an obligation to create safe, secure and sustainable environments (Lackney, 2005). School leaders must work closely with architects to create a facility that is right for their community (Barr, Dunbar, & Schiller, 2012).

This review of related literature served the purpose of examining several key building design components, such as building floor plans, security, traffic flow, acoustics, playground, furniture, landscaping, lighting, LEED, heating and air-conditioning, and sustainability. This study will investigate issues related to the planning and construction process and the effects of the design components of the new facilities on the stakeholder attitudes.

The school building is influenced by many of the same general changes and trends that influence almost all building types, such as the general economy, construction costs, and development of new building systems and materials, but schools are also affected by issues that are specific to educational facilities. Among the most important issues and trends relevant to school design are the following: enrollment trends, universal preschool, program requirements, condition of the existing facilities, schools as community centers, changes in school utilization, research (Perkins & Bordwell, 2010 and Kennedy, 2011).

CHAPTER THREE

METHODOLOGY

Introduction

This is a mixed method study to investigate key issues surrounding the educator's perceptions of the design components of educational facilities. Included in this chapter is a description of the study participants, sample selection, research design, data analysis and instrumentation. This chapter describes the methodology used for this study. Quantitative and qualitative techniques were utilized to analyze the perceptions of the participants. Data was collected by administering a survey through electronic mail.

Schools designed today are a complex system of environments that must address a wide variety of educational needs (O'Donnell, 2010). In the past, teacher's perspectives of the design components of new educational facilities have often been excluded in the planning and building processes. School administrators need to consider how much a building design can directly impact student learning and prioritize gathering input from teachers when considering new educational facilities (Riggs, 2000).

Participants

The participants for the study will be elementary principals and teachers employed in newly constructed elementary school buildings occupied after July 1, 2010. The researcher collected and summarized the following demographics of the respondents: 1)Years of experience in education: 1-5 years, 6-10 years, 11-15 years , 16-20 years, or 21+ years, 2) Years of experience in new facility: 1-5 years, 6-10 years, 11-15 years , 16-20 years, 21+ years, 3) Highest degree held: BS, MS, EdSp, EdD, PhD, 4) Gender: Male, Female, 5) Position: Administrator, PK teacher, 1st-3rd teacher, 4th-5th teacher, Instructional support teacher, 6)

Number of students within the district: Less than 1,000 students, 1,000-3,000 students, 3,000-6,000 students 6,000-10,000 students, More than10,000 students, and 7) Number of students within the elementary building: Less than 250, 250-500, 500-750, More than 750.

Sample Selection

The researcher used a purposive sampling of principals and teachers who served as the research participants. A purposive sample is a sample of interest for a researcher. The sample must meet criteria established by the researcher. The criteria established by the researcher for selecting participants were they must be an administrator or teacher and must currently be working in an elementary school building considered a public school in the state of Missouri. The participants also must be employed in a facility newly constructed and occupied after July 1, 2010. All administrators and teachers employed in an elementary school building identified as meeting the above named criteria will have an opportunity to complete the survey. If during the research process, the initial participants identify additional elementary school buildings meeting the criteria the researcher contacted the other qualified participants and provided them with the opportunity to complete the survey.

The researcher contacted the Missouri Department of Elementary and Secondary Education's nine area state supervisors to collect information about school buildings in their area meeting the criteria for inclusion. Area supervisors were contacted because of their familiarity with school facilities across the state of Missouri. The area supervisor should have knowledge regarding new building construction in their assigned area of the state. Area supervisors provided the requested information on newly constructed elementary school buildings in their area meeting the established criteria. The researcher compiled the list of potential participants from

the information received and all administrators and teachers working in those school facilities were then selected as the sample.

Research Design

Quantitative and qualitative techniques were utilized to analyze the perceptions of the participants. The researcher first contacted all nine area state supervisors from the Missouri Department of Elementary and Secondary Education requesting a list of elementary school buildings in their area meeting the established criteria. After identification of elementary schools meeting the established criteria the researcher created a listserv of email addresses of the building principals. The survey was sent to all building principals requesting their participation and the participation of their building teachers. The researcher used Question Pro and surveys were coded to identify the elementary schools not responding to the initial survey. Participant confidentiality was protected by using an administrative assistant to collect surveys and identify the participants that did not responded. The administrative assistant did not share individual names or schools with the researcher. After a two week waiting period an additional request was sent to participants who had not responded. The administrative assistant then made a personal contact with the principal of the elementary schools not responded.

When the researcher determined an appropriate number of responses were received the data collected was inputted into SPSS and calculated with a MANOVA and ANOVA's to determine if the respondents were satisfied with the new facility in the four areas of facility categories; outdoor areas and playgrounds, shared amenities, classroom features, technology, equipment and materials. The analysis compared these four areas to determine if there was a significant difference in the responses of principals and teachers related to their satisfaction of the new building. The researcher utilized the perceptions of principals and teachers as to their

perceptions related to the teaching and learning process improvement in the new facility. An ANOVA was calculated to determine if there was a significant difference between the two groups. An ANOVA is the proper statistical procedure to test for a significant difference with two independent variables. A MANOVA is the proper statistical procedure to test for a significant difference when two or more independent variables are compared for a significant difference.

Data Analysis

The researcher determined the use of both quantitative and qualitative data in a single study develops a depth and richness for the study. A MANOVA test was used for H_0 as it is a test to determine difference in two or more vectors of means. The MANOVA does so by measuring several dependent variables in a single process providing a better chance of discovering which factor is truly important and some protection against Type I errors. The independent variables tested were teacher and administrator's perceptions of four dependent variables including the following: outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials.

An ANOVA was performed for H_1, H_2, H_3 and H_4 as the researcher desired to see if any individual dependent variable would indicate a significant difference as an ANOVA may indicate a significant difference between two groups where a MANOVA may not have identified.

The researcher also calculated an ANOVA rather than repeated t-tests for the data analysis for H_5. This statistical application analyzed the responses from the group of teachers and the results from the group of principals to identify differences in perceptions related to having input or not having input into the design of the facility. A series of *t*-tests raises statistical problems concerning distortion of the probability of a Type 1 error (Gay, Mills, & Airasian,

2012). The quantitative results are provided with the hypotheses stated and the data results are indicated through a table format.

The researcher choose to utilize an ANOVA for the data analysis for H_6 related to survey questions number 52 and 53 to determine if there was a significant difference between perceptions in learning and teaching improvement in the new facility between teachers and principals having input into the design of the facility and those with no input.

The researcher chose to do a constant comparative analysis of the qualitative questions posed at the end of each survey area. All of the open-ended question results were analyzed for common themes. The results were coded in order to determine common themes that emerge from the responses of the participants. The themes revealed answered the research questions presented in chapter one.

1. What would participants change about outdoor areas and playgrounds?
2. What would participants change about shared amenities?
3. What would participants change about classroom features?
4. What would participants change about equipment and materials?
5. What would participants change about the environment of the facility?
6. What mistakes should educators avoid in the planning and building process?
7. Did participants have input into the planning of the facility and if yes then what areas did participants provide input?

The environment of the facility questions was analyzed by response averages using a Likert scale. The Likert scale included a five point rating from 1-to-5 noting participants' ranking from 1-inadequate to 5-extreme satisfaction related to the following statements:

1. Design of the facility positively impacts student learning.
2. Design of the facility positively impacts teacher instruction.

Instrumentation

Data was collected by administering surveys through electronic mail. The researcher had obtained written permission to use an existing instrument created by Peggy Riggs. Riggs (2000) conducted a similar research project utilizing the Facility Evaluation Questionnaire (FEQ). The existing Facility Evaluation Questionnaire with a few modifications met the requirement of the hypotheses and research questions.

The reliability of the Facility Evaluation Questionnaire was determined by having the questionnaire reviewed by professionals considered to be knowledgeable about the construction of school facilities. Riggs (2000) also field tested the survey with elementary school personnel not involved in the research. The pilot data was analyzed using test-retest methods of analysis to determine reliability. The Facility Evaluation Questionnaire (FEQ) a 39-item instrument measuring four primary dimensions involved in building a school. A Likert-type scale, ranging from 1= Inadequate to 5 = extremely satisfactory, was used by Riggs to collect the participants' perceptions. The dimensions and internal consistency estimates based on the test-retest analysis are outdoor areas and playgrounds (.82), shared amenities (.84), classroom features (.88) and equipment and material (.84) (Riggs, 2000). The validity is assumed by the developers' determination in the original research. The responses given were the responses expected and utilized for analysis.

Summary

Chapter three presented the methodology to be used in this study. This is a mixed method study to investigate key issues surrounding the educator's perceptions of the design components of educational facilities. Quantitative and qualitative techniques were utilized to

analyze the perceptions of the participants. Data was collected by administering a survey through electronic mail.

Chapter four provides a discussion of the findings from the surveys. Findings and descriptions were analyzed and reported.

CHAPTER FOUR

RESULTS

Introduction

The researcher determined the use of both quantitative and qualitative data in a single study develops a depth and richness of data. Other researchers agree quantitative and qualitative research methods may not individually provide as precise a presentation of the results (Creswell, 2014; Gay, Mills, & Airasian, 2012).

An ANOVA was performed for H_1, H_2, H_3 and H_4 as the researcher desired to see if any individual dependent variable would indicate a significant difference as an ANOVA may indicate a significant difference between two groups where a MANOVA may not.

The researcher also calculated an ANOVA rather than repeated t-tests for data analysis of the groups having input and those not having input into the design of the facility for the survey question number eight concerning learning and teaching improvement addresses H_5. A series of *t*-tests raises statistical problems concerning distortion of the probability of a Type 1 error (Gay, Mills, & Airasian, 2012). The quantitative results follow with the hypotheses stated and the results in tables.

The researcher choose to utilize an ANOVA for the data analysis for H_6 related to survey questions number 52 and 53 to determine if there was a significant difference between perceptions in learning and teaching improvement in the new facility between teachers and principals having input into the design of the facility and those with no input.

The researcher chose to do a constant comparative analysis of the qualitative questions posed at the end of each area to determine themes that emerge from the responses of the participants. The survey item numbers for the qualitative data were questions 18, 31, 41, 51, and

54. The themes revealed answered the research questions presented in chapter one. The qualitative results follow the quantitative results.

Quantitative Results

Survey questions 10-17, 19-30, 32-40, and 42-50 were analyzed using a MANOVA calculation through SPSS. Questions 52 and 53 were tested for significant difference utilizing an ANOVA. Descriptive data is presented first in tables 1, 2 and 3. The MANOVA results are presented in table 4 and the ANOVA results follow the MANOVA.

Descriptive Data

The researcher received 79 useable responses. The responses were from eight administrators and seventy one teachers. Descriptive data for H_0 from participant responses to the questions for the four dependent variables of interest are presented in table 1.

Table 1: Descriptive Statistics for perception differences between Administrators and Teachers

	TeacherAdm	Mean	Std. Deviation	N
Outdoor1	Administrator	3.4238	.45264	8
	Teacher	3.4441	.70622	71
	Total	3.4420	.68265	79
Shared2	Administrator	3.7625	.97385	8
	Teacher	3.7493	.84834	71
	Total	3.7506	.85498	79
Classroom3	Administrator	3.7625	.97385	8
	Teacher	3.7493	.84834	71
	Total	3.7506	.85498	79
Tech/Equip4	Administrator	3.7625	.97385	8
	Teacher	3.7493	.84834	71
	Total	3.7506	.85498	79

The descriptive statistics presented in Table 1 are the responses of the eight administrators and 71 teachers responding. The responses are the perceptions of principals, teachers for survey questions 10-17, 19-30, 32-40, and 42-50, and a measurement of both groups

satisfaction with a new school building. Specifically the participants were asked to rate their perceptions around the outdoor spaces, shared amenities, classroom features, and technology, equipment and materials. The means for teachers and administrators were all in the positive satisfaction.

Table 1 indicated the means for all four areas are similar between teachers and administrators with all means indicating a positive satisfaction rating. The standard deviation in responses connected to the satisfaction with the outdoor spaces category is greater satisfaction among the teachers' group than for the administrators' group indicating a greater difference of teachers' satisfaction than administrators' satisfaction. The smaller standard deviation in the administrator perceptions may be due to the smaller sample size.

Table 2 provides descriptive results for survey questions 10-17, 19-30, 32-40, and 42-50 representing the data for H_1, H_2, H_3 and H_4. The ANOVA was used to determine if the respondents were satisfied with the new facility in the four categories; outdoor areas and playgrounds, shared amenities, classroom features, and technology, equipment and materials.

Table 2: Descriptive Statistics for perception differences between administrators and teachers

					95% Confidence Interval for Mean	
		N	Mean	Std. Deviation	Lower Bound	Upper Bound
Outdoor1	Administrator	8	3.00	.756	2.37	3.63
	Teacher	71	3.01	1.165	2.74	3.29
	Total	79	3.01	1.127	2.76	3.26
Shared1	Administrator	8	3.50	.926	2.73	4.27
	Teacher	71	3.52	1.263	3.22	3.82
	Total	79	3.52	1.229	3.24	3.79
Classroom1	Administrator	8	3.63	.916	2.86	4.39
	Teacher	71	3.28	.865	3.08	3.49
	Total	79	3.32	.870	3.12	3.51
Tech/Equip1	Administrator	8	3.63	1.302	2.54	4.71
	Teacher	71	3.48	.924	3.26	3.70
	Total	79	3.49	.959	3.28	3.71

Descriptive statistics noted in Table 2 indicated the means for all four areas were similar between teachers and administrators and were positive satisfaction means. These results were similar to those found in the analysis of the MANOVA noted in Table 1. Standard deviation was greater among teachers than administrators in the outdoor area category as was noted in the MANOVA. In the area of the technology, the standard deviation was higher for the administrators' results. The larger standard deviation in the administrator perceptions in technology may be due to a smaller sample size.

Table 3 provides descriptive data for the null hypotheses $H_{5.}$ This table includes descriptive data of survey questions #52 and #53 regarding teachers' differences in perceptions of satisfaction of the new building when they were allowed input compared to when they did not have input. The researcher ran an ANOVA instead of two individual t-tests to reduce the possibility of a type one error in the calculations. The ANOVA determines if there is a significance difference between the two groups and the two dependent variables both within the groups and between the groups.

Table 3: Descriptive Statistics for teachers indicating input into the design and those not indicating input.

		N	Mean	Std. Deviation
Learning	Yes	11	3.8182	.60302
	No	52	3.9615	.83927
	Total	63	3.9365	.80067
Teaching	Yes	11	3.5455	.68755
	No	52	3.9615	.86232
	Total	63	3.8889	.84455

Teachers indicated input into the design process have lower means than teachers indicating no input into the design. Lower means could indicate less satisfaction with the facility than those without input even though the mean is greater than three indicating satisfaction but the

difference is statistically not significant. Teachers indicating input into the design process have lower standard deviations than teachers indicating no input into the design.

MANOVA

Table 4 provides results for the MANOVA statistical calculation utilizing SPSS. The results indicated perceptions did not differ between the teachers and principals as to their satisfaction with the new facilities' areas of outdoor spaces, shared amenities, classroom features, and technology, equipment and materials.

H_0 The perceptions of teachers and principals did not differ between groups as to their satisfaction with the new facility concerning the areas of outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials.

Table 4 provides the specific analysis related to the H_0 null hypothesis.

Table 4: Multivariate Tests[a] MANOVA calculations H_0

Effect		Value	F	Hypothesis df	Error df	Sig.
TeacherAdm	Wilks' Lambda	1.000	.010[b]	2.000	76.000	.990

b. Exact statistic

The Wilks' Lambda test was determined as the appropriate test for analyzing the data because it allowed for testing two independent variables and multiple dependent variables. The Wilks' Lambda indicated no significant difference in opinions between perceptions of teachers and administrators in their satisfaction with the four areas of outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials for a new building in which they currently work.

ANOVA

An ANOVA was calculated to test for a significant difference between groups' perceptions of the dependent variables for null hypotheses H_1, H_2, H_3, and H_4.

H_1: Teachers and principals do not have different perceptions as to their satisfaction with the new facility in the area of outdoor areas and playgrounds.

H_2: Teachers and principals do not have different perceptions as to their satisfaction with the new facility in the area of shared amenities.

H_3: Teachers and principals do not have different perceptions as to their satisfaction with the new facility in the area of classroom features.

H_4: Teachers and principals do not have different perceptions as to their satisfaction with the new facility in the area of technology, equipment and materials.

No significant differences were indicated in the ANOVA calculations between teacher and administrator perceptions of satisfaction with a new building in outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials at the $< p = .05$. Classroom features had the highest significance levels at .293 which would indicate a slightly higher perception of satisfaction, but does not meet from the required $> p = .050$ level that would indicate a significance difference.

The number of participants who completed the research survey indicating they had input into the design of the new facility was seventeen. Sixty-two respondents indicated they had no input into the design of the new facility.

H_5: Teachers and principals indicating they had input into the planning process of the new facility do not have significantly different perceptions as to their satisfaction with the new

facility in the area of outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials.

The researcher calculated an ANOVA to determine if a significant difference of perception was present between participants who responded they had input into the design of the facility and those indicating they had no input into the design of the facility. The results of the ANOVA indicated no significance difference at $< p = .05$.

H_6 Teachers and principals indicating they had input into the planning process of the new facility do not have significantly different perceptions regarding the impact of the new facility on improving the teaching and learning process.

The researcher choose to utilize an ANOVA for questions number 52 and 53 to determine if there was a significant difference between perceptions in learning and teaching improvement in the new facility between teachers and principals having input into the design of the facility and those with no input.

The significance levels calculated where $< p = .05$ therefore the researcher determined no significant differences existed between those indicating input into the design of the new facility and those not having input into the design of the new facility.

The ANOVA calculations produced a significance level of .594 for the survey question #52: Design of the facility positively impacts student learning. Teaching was the area that indicated the possibility of a difference in perception. The ANOVA calculations produced a significance level of .139 for survey question #53: Design of the facility positively impacts teacher instruction. The significance levels are both above the probability level established by the researcher $> p = 0.5$

Quantitative Data Analysis

The MANOVA and ANOVA calculations indicate the researcher must fail to reject all null hypothesis stated as no significant difference was established > p = .05.

H_0 Perceptions did not differ between groups as to the satisfaction of the group with the new facility concerning the areas of outdoor areas and playgrounds, shared amenities, classroom features and equipment and materials. Researcher failed to reject based on statistical analysis.

$H_{1:}$ Teachers and principals did not have different perceptions as to their satisfaction with the new facility in the area of outdoor areas and playgrounds. Researcher failed to reject based on statistical analysis.

$H_{2:}$ Teachers and principals did not have different perceptions as to their satisfaction with the new facility in the area of shared amenities. Researcher failed to reject based on statistical analysis.

$H_{3:}$ Teachers and principals did not have different perceptions as to their satisfaction with the new facility in the area of classroom features. Researcher failed to reject based on statistical analysis.

$H_{4:}$ Teachers and principals did not have different perceptions as to their satisfaction with the new facility in the area of equipment and materials. Researcher failed to reject based on statistical analysis.

$H_{5:}$ Teachers and principals who indicated they had input into the planning process of the new facility did not have different perceptions as to the impact of the facility on the teaching learning process. The researcher failed to reject H_5 based on statistical analysis provided by the ANOVA calculations.

H_6: Teachers and principals indicating they had input into the planning process of the new facility do not have significantly different perceptions regarding the impact of the new facility on improving the teaching and learning process. The researcher failed to reject H_6 based on statistical analysis provided by the ANOVA.

Qualitative Results

Qualitative data was also collected through the open-ended survey questions numbered 18, 31, 41, 51, and 54. The researcher chose to do a constant comparative analysis of the qualitative questions posed at the end of each survey area. All of the open-ended question results were analyzed for common themes. The results were coded to determine the common themes that emerged from the responses of the participants. Two-to-three key themes emerged from the categories of outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials. The themes revealed answered the research questions presented in chapter one.

Outdoor Areas and Playgrounds

Table 5 provides a summary of the responses from survey question #18 and addresses Research Question 1: What would you change about outdoor areas and playgrounds? The results were compiled based on the number of participants' providing a common response and these common responses were then categorized into themes.

Table 5: Themes from Outdoor Areas and Playgrounds

Themes	Number of Responses
Less Muddy/Better Drainage	7
More Equipment	21
2 separate play areas for younger and older students	1
Walking track	2
Add fence around play area	2
Add landscaping/more grass area/need more shade	16
Rearrange layout for better supervision	1
Add ball field area	10
Location is too far from the nurse's office	2
Better ADA needed	3
Area still not finished at this time	4
Separate entrance and exit for parent PU lane	2
Better clearly marked PU lanes	2

Analysis of the first open-ended survey question about outdoor areas and playgrounds noted three significant emerging themes including; the need for more equipment, the need for more grassy and shaded space and the need for additional ball fields.

From the seventy-nine surveys completed, twenty-one participants would like to have seen more equipment added to the playground area. In addition, sixteen participants would like more grassy and shaded areas for students to play. The third biggest change noted was the need for ball fields to be added to the outdoor areas to incorporate more gross motor and cooperative play activities. One participant specifically stated "there is not a sufficient amount of equipment for the number of students on the playground at one time". In addition, several respondents said they would like to see "more open grass area with shade trees and less mud".

Shared Amenities

Table 6 provides a summary of the results from the survey question #31: What would you change about shared amenities? The results were compiled based on participants' responses and categorized into themes.

Table 6: Themes from Shared Amenities

Themes	Number of Responses
Add more student restrooms	13
Add more adult restrooms	12
Bigger workroom needed	10
Larger conference room needed	1
Office location is too far away	5
Library is too close to café/ it's too noisy	1
Library is too small	5
Need more storage	3
Need better security	1
Stage area is too small	2
Wider hallways	1

Table 6 describes the change the teachers and administrators would have made related to shared amenities and the number of times it was suggested. The top three themes emerged as the following: the need for more student restrooms, more staff restrooms and a bigger teacher work area. A total of thirteen participants out of seventy-nine felt the addition of student restrooms were needed in the new facility, while twelve stated more adult restrooms would be beneficial. Also, a total of ten respondents would like to see a larger space for the teacher workroom. One participant specifically stated this need by noting the building could have been improved by "adding staff restrooms to each wing of the building." Other respondents noted: "There are not

enough student restrooms for the number of students in the building" In addition, a respondent noted the teacher's workroom is too small and does not provide enough room for teachers to do the necessary work."

Classroom Features

Table 7 provides a summary of the results from the survey question #41: What would you change about classroom features? The results were compiled based on participants' responses and categorized into themes.

Table 7: Themes from Classroom Features

Themes	Number of Responses
Classroom needs window	1
HVAC vibrates/issues	7
Add storage/closet to classrooms	16
Add more bulletin boards	5
Larger classroom	17
Windows that open	6
Add tack strips in hallways	4
Add ceiling fans	6
Add noise barriers	1
Add ore electrical outlets	1

Table 7 describes the change the teachers and administrators would have made related to classroom features and the number of times it was suggested. The top three themes emerged as the following: the need for a larger classroom, additional storage/closet space and an efficient HVAC system. Seventeen teachers and administrators would like to see a larger classroom built in the new facilities, while sixteen would like to have more storage and closet space. In addition, seven thought the HVAC system needed to be more efficient. One participant specifically stated

this need by noting the building could have been improved by "providing better air quality and more comfortable temperatures." Other respondents noted: "The temperature fluctuates greatly from classroom to classroom." In addition, responses indicated the new building was "too cold in some rooms, while other rooms are too warm."

Technology, Equipment and Materials

Table 8 provides a summary of the results from the survey question #51: What would you change about equipment and materials? The results were compiled based on participants' responses and categorized into themes.

Table 8: Themes from Technology, Equipment and Materials

Themes	Number of Responses
Add Smart boards	3
Add technology to SPED	1
Need different type of student desks	5
Better teacher workspace needed	3
Need more technology	22
Need more storage space	6

Table 8 describes the change the teachers and administrators would have made related to equipment and materials and the number of times it was suggested. The top three themes emerged as the following: the need for additional technology, more storage space for equipment and different style of student desks. A total of twenty-two participants would like to see more technology including Smart boards in all classrooms and more access to iPads and laptops. Another change stated is the need for more space to store equipment and materials. The third most noted change would be to provide a different style of desk. Teachers stated "desks should

be shaped in a rectangle because it makes it difficult when they have a rounded front to set up in collaborative groups."

Responsiveness of the Facility

Table 9 provides a summary of the results from the survey question #54: What would you change about responsiveness of the facility? The results were compiled based on participants' responses and categorized into themes.

Table 9: Themes from Responsiveness of Facility

Themes	Number of Responses
Better hallway visibility	1
Overall closer design, bldg. is too spread out	3
Intercoms do not work	1
Clocks not synchronized	1
HVAC	1
Flow of bldg. needs improvement	1
More parking is needed	1
Add commons area or large M/P room	4
Add windows that open	2

Table 9 describes the change the teachers and administrators would have made related to responsiveness of the facility and the number of times it was suggested. The top three themes emerged as the following: an addition of large multipurpose room, an overall closer building design and operational classroom windows. Four survey respondents believe the addition of a large multipurpose space would be beneficial to allow for grade level collaboration activities and large gross motor area when inside recess is needed. Also, two survey participants stated they believe the need for classroom windows that "actually open".

Qualitative Data Analysis

A constant comparative analysis was completed of the qualitative questions posed at the end of each area to determine themes that emerged from the responses of the participants. It was determined a low number of respondents had input in the planning of the facility. Only seventeen had input in the process. This qualitative data allowed additional insight uncovered in analyzing the quantitative data provided evidence for findings and conclusions noted in Chapter 5.

Summary

Chapter four provided the results for the mixed method study investigating the key issues surrounding the educator's perceptions of the design components of educational facilities. A purposive sampling of teachers and principals served as the research participants. An electronic survey served as the source for data collection.

Both quantitative data and qualitative data was used and presented in tables with commentary following. The researcher also analyzed the data and provided rationale for rejecting or failing to reject hypotheses. Qualitative data was presented to further support quantitative findings with examples for each theme identified.

Chapter five provides a summary of the study and major findings. This chapter also includes conclusions of the findings, recommendations for future research and a summary.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this study was to investigate the perceptions of teachers and principals concerning their satisfaction with their new education facility in the areas of outdoor areas and playgrounds, shared amenities, classroom features, equipment and materials, and environment of the facility. The research focused on changes the teachers would make and if there were any mistakes in the planning and building process others should attempt to avoid. The research was also designed to identify perceptions of principals and teachers and the level of input into the design of the facility, and analyzed if they had input were they more satisfied with the facility's impact on the teaching learning process.

Research was conducted by Riggs (2000) regarding the inclusion of stakeholders in the planning and building process of new educational facilities. The study also determined their satisfaction with the resulting facility. Riggs study assumes the stakeholders had limited inclusion in the planning process and compared teacher satisfaction with the new facility to the satisfaction of staff with the facility. The researcher in this study assumed the changes since 2000 in the participation of stakeholders in all areas of education may result in different responses to the survey utilized. The researcher also compared responses of principals and teachers with input into the planning of the new facilities to those who did not have input into the planning of the new facility. The researcher strived to determine if elementary principal's and teachers' satisfaction with the new facility differ depending on their level of input.

This chapter reviews and analyzes the findings of this mixed method study. Schools designed today are a complex system of environments that need to address a wide variety of

educational, social, environmental, recreational, and community needs (O'Donnell, 2010). These design features and components have a measurable influence upon student learning (Earthman, 2002).

The first section of chapter five will present the conclusions and present common themes that emerged from the qualitative survey questions. The next section includes recommendations and the final section summarizes the results of the study.

Summary of Methods

The researcher used a purposive sampling of principals and teachers who served as the research participants. A purposive sample is a sample of interest for a researcher. The sample must meet criteria established by the researcher. The criteria established by the researcher for selecting participants were they must be an administrator or teacher and must currently be working in an elementary school building considered a public school in the state of Missouri. The participants also must be employed in a facility newly construction and occupied after July 1, 2010. All administrators and teachers employed in an elementary school building identified as meeting the above named criteria will have an opportunity to complete the survey. If during the research process, the initial participants identify additional elementary school buildings meeting the criteria the researcher contacted the other qualified participants and provided them with the opportunity to complete the survey.

The researcher contacted the Missouri Department of Elementary and Secondary Education's nine area state supervisors to collect information about school buildings in their area meeting the criteria for inclusion. Area supervisors were contacted because of their familiarity with school facilities across the state of Missouri. The area supervisor should have knowledge regarding new building construction in their assigned area of the state. Area

supervisors provided the requested information on newly constructed elementary school buildings in their area meeting the established criteria. The researcher compiled the list of potential participants from the information received and all administrators and teachers working in those school facilities were then selected as the sample.

Quantitative and qualitative techniques were utilized to analyze the perceptions of the participants. The researcher first contacted all nine area state supervisors from the Missouri Department of Elementary and Secondary Education requesting a list of elementary school buildings in their area meeting the established criteria. After identification of elementary schools meeting the established criteria the researcher created a listserv of email addresses of the building principals. The survey was sent to all building principals requesting their participation and the participation of their building teachers. The researcher use Question Pro and surveys were coded to identify the elementary schools not responding to the initial survey. Participant confidentiality was protected by using an administrative assistant to collect surveys and identify the participants that had not responded. The administrative assistant did not share individual names or schools with the researcher. After a two week waiting period an additional request was sent to participants who had not responded. The administrative assistant then made a personal contact with the principal of the elementary schools not responded.

When the researcher determined an appropriate number of responses were received the data collected was inputted into SPSS and calculated with a MANOVA and ANOVA's to determine if the respondents were satisfied with the new facility in the four areas of facility categories; outdoor areas and playgrounds, shared amenities, classroom features, technology, equipment and materials. The analysis compared these four areas to determine if there was a significant difference in the responses of principals and teachers related to their satisfaction of

the new building. The analysis also provided data to determine if there was a significant difference between principals and teachers as to their perceptions related to opportunities they had for providing input into the planning of the facility. A MANOVA is the proper statistical procedure to test for a significant difference when two or more independent variables are compared for a significant difference.

Summary of Findings

There are several findings from the data analyzed from this study that could help inform school district leaders when planning and constructing new educational facilities. The results from the quantitative data indicated the teachers and principals do not have different perceptions as to their satisfaction with the new facility in the four areas surveyed including: outdoor areas and playgrounds, shared amenities, classroom features, and technology, equipment and materials. The means for all four areas were similar between teachers and administrators with all means indicating a positive satisfaction rating with the new facility.

The descriptive statistics indicated the means for all four areas were similar between teachers and administrators based on a MANOVA statistical analysis. The results indicated perceptions did not differ between teachers and principals as to their satisfaction with the new facilities' with the four areas of outdoor areas and playgrounds, shared amenities, classroom features and technology, equipment and materials. The standard deviation was greater among teachers than administrators in the outdoor area indicating a greater difference of opinion about the satisfaction of outdoor spaces among teachers than administrators. The standard deviation was greater among administrators in the area of technology, equipment and materials. These differences are thought to be due to the smaller sample size.

The ANOVA analysis resulted in no significant differences between teachers and administrators perceptions in outdoor areas and playgrounds, shared amenities, classroom features, and technology, equipment, and materials. Classroom features had the highest significance levels which would indicate a slightly higher perception from .293 but is still not close to the required .050 to show significance.

The researcher utilized an ANOVA for questions number 52 and 53 to determine if there was a significant difference between perceptions in learning and teaching improvement in the new facility between teachers and principals having input into the design of the facility and those with no input.

The significance levels calculated where $< p = .05$ therefore the researcher determined no significant differences existed between those indicating input into the design of the new facility and those not having input into the design of the new facility.

The ANOVA calculations produced a significance level of .594 for the survey question #52: Design of the facility positively impacts student learning. Teaching was the area that indicated the possibility of a difference in perception. The ANOVA calculations produced a significance level of .139 for survey question #53: Design of the facility positively impacts teacher instruction. The significance levels are both above the probability level established by the researcher $> p = 0.5$. A possible reason for this finding may be those that had input felt more confident or valued and therefore perceived their teaching as better than before.

A constant comparative analysis was completed of the qualitative questions posed at the end of each area to determine themes that emerged from the responses of the participants. It was determined a low number of respondents had input in the planning of the facility. Only seventeen had input in the process. This is contrary to what the literature states about the

importance of having a planning committee that includes Board of Education members, school administration, classroom teachers, building staff, community members and student representatives (Perkins & Borwell, 2010).

The qualitative results noted key themes administrators might find useful in future planning and design for school buildings.

Outdoor Area and Playground Themes:

Analysis of the first open-ended survey question about outdoor areas and playgrounds noted three significant emerging themes including; the need for more equipment, the need for more grassy and shaded space and the need for additional ball fields.

Age-appropriate equipment selection is vital to the safety of its occupants. Playgrounds should be designed to stimulate children and encourage them to develop skills physically, emotionally, socially, and intellectually (National Program for playground Safety,2004, Ruth, 2008, and British Standards Institution, 2012).

Shared Amenities Themes:

Analysis of the open-ended survey question about shared amenities noted three significant emerging themes including; the need for more student restrooms, more staff restrooms and a bigger teacher work area. A total of thirteen participants out of seventy-nine felt the addition of student restrooms were needed in the new facility, while twelve stated more adult restrooms would be beneficial. Also, a total of ten respondents would like to see a larger space for the teacher workroom.

Architects and construction companies must comply with all local and state codes and licensing requirements. The number of student toilet facilities should be designed according to

the square footage of the school building and the total enrollment number and the (Perkins & Bordwell, 2010).

Classroom Feature Themes:

Analysis of the open-ended survey question about classroom features noted three significant emerging themes including; the need for a larger classroom, additional storage/closet space and an efficient HVAC system. Seventeen teachers and administrators would like to see a larger classroom built in the new facilities, while sixteen would like to have more storage and closet space.

Duncanson (2014), stated classrooms start out as empty spaces but fill up all too quickly with furniture, materials, supplies, books, desks, chairs, tables, curriculum, and many other things. While bigger classrooms are needed, teachers typically do not have the option to have a larger classroom. Therefore, educators must be flexible and work with the classroom layout they are given. This means teachers must work to effectively use the space, acoustics, colors, air quality, storage and lighting they are given to enhance student learning (Barrett and Zhang, 2009, and Nuhfer, 2004, and Fielding, 2006).

According to the literature from Duncanson (2014), space and storage continues to be a crucial factor in determining how teaching and learning time is used; therefore it is important schools are designed with adequate space to optimize the learning that is occurring each day.

Seven participants from the survey thought the HVAC system needed to be more efficient. Educators know it is important for schools to create and maintain good and healthy indoor environments in order to accomplish their core mission of educating and improving their students' academic achievements (Behzadi & Fadeyi, 2012). Ensuring quality indoor air in

schools is a complex, but essential because children spend significant amount of their time there (Baker, 2012, and Behzadi & Fadeyi, 2012).

Technology, Equipment and Materials Themes:

Analysis of the open-ended survey question about technology, equipment and materials noted three significant emerging themes including; the need for additional technology, more storage space for equipment and different style of student desks. A total of twenty-two participants would like to see more technology including Smart boards in all classrooms and more access to iPads and laptops. Another change stated is the need for more space to store equipment and materials. Technology is a fast moving target so designing and planning for the future is extremely difficult. It is more important than ever to have technology consultants involved from the beginning who know the current technology application and how to get it into classrooms and make it effective (Blair, 2014, and Strube, M. & Thompson, A., 2012). Teachers and students should have access to technology that is easily available and promotes collaboration, creativity, communication and critical thinking skills.

The third most noted change would be to provide a different style of desk. It is important to consider many factors when purchasing furniture and equipment. According to the literature from Hendrickson (2011), school administrators should make buying decisions based on factors, including, cost, durability, functionality, safety and ergonomics and aesthetics.

Several findings noted from the data analyzed from this study were supported from the literature. These conclusions should be considered when schools are constructing new educational facilities.

Limitations of the Study

Data was limited to the integrity of educators' feedback on the surveys. The researcher having been in education for 15 years has observed the integrity of the educators and has confidence in their responses. Research is limited on the specific topic leading the researcher to conclude the conducting of this study would contribute to the overall knowledge base for educators. In addition, researcher bias is probable due to the direct involvement of the researcher in an elementary school construction project.

Significant Difference of Study with Previous Research

This study identified some important findings for school leaders related to planning and designing new buildings. These findings provided additional insight and expanded on the current literature related to school construction projects.

1. Having opportunities for input did not significantly improve the satisfaction of the final building project for both teachers and administrators. The literature indicated input was important when designing and building a new facility because the quality of learning environment impacts the teachers' behavior and attitude. This finding would indicate a contrary perspective. The researcher inferred part of this difference may be due to the lack of those with decision-making authority possibly not effectively utilizing the input. It would be recommended for superintendents, boards of education, or other decision-makers to communicate more directly how the input was utilized or possibly indicate why input was not utilized.

2. The study indicated a low number of respondents had input into the planning of the facility. This finding may have been due to the difficulty of decision-makers to find opportunities to meet with stakeholders or to create venues where various opinions could be heard. Additionally, building projects are often under tight timelines, so decision-makers most

likely struggle to create opportunities for gathering input when they are also dealing with the busy schedules of architects and/or construction managers. The literature indicated the importance of gathering input (Perkins & Bordwell, 2010), which would demonstrate it is essential to work through these barriers to ensure teachers, principals and other community stakeholders have ample opportunities to share their thoughts on the design of a new building project. Buildings are a major fiscal community investment, so school leaders must prioritize the gathering of input throughout the planning and design process to ensure a higher level of satisfaction of the finished project.

3. Overall, teachers and principals were somewhat satisfied with their new building project's shared amenities after its completion. Participants of this study provided suggestions for planning a quality building project through the open-ended comment's section of the survey. Key suggestions included the need for more technology, outdoor equipment, and student restrooms. Respondents also mentioned the need for larger classrooms.

Recommendations for Future Research

The following are recommendations to be considered for future research.

1. Future research in this area should include a broader population of school districts. By expanding the scope of the research to states surrounding Missouri, it would increase the number of participants and provide better data representation.

2. Future research in this area should include superintendents as a survey participant. The researcher believes the responses from superintendents would indicate a significant difference from the teachers and principals.

3. Modifications of the survey if used in the future would be beneficial by clarifying some of the questions. The researcher believes by clarifying questions, participants' would have been more specific on the qualitative responses.

4. Conduct further research on the design components of school facilities and their impact on teaching and learning. Expectations for improved teaching and learning in a new school facility are generally high and if the facility does not provide the improved conditions expected it may impact teacher satisfaction and affect the learning of students (Schneider, 2003).

5. Conduct further research on the key themes that emerged from the qualitative findings. The researcher believes the findings are accurate and common problems among schools and further research on how to prevent these from reoccurring in future building projects.

Summary

The goal of this study was to identify the perceptions of teachers and principals concerning their satisfaction with their new facility in the areas of outdoor areas and playgrounds, shared amenities, classroom features, and technology, equipment and materials. The research focused on the changes the teachers and administrators would have made and if there were mistakes in the planning and building process others should attempt to avoid.

This study provided opportunities to reflect on the current building project the researcher was involved in and use the information to make informed decisions about the new facility.

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APPENDIX

Facility Evaluation Questionnaire

DEMOGRAPHICS					
1. Years of experience in education	**1-5**	**6-10**	**11-15**	**16-20**	**21+**
2.Years of experience in new facility	**1-5**	**6-10**	**11-15**	**16-20**	**21+**
3.Highest degree held	**BS**	**MS**	**EdSp**	**EdD**	**PhD**
4. Gender	**Male**	**Female**			
5. Position	**Administrator**	**PK teacher**	**1st-3rd teacher**	**4th-5th teacher**	**Instructiona Support teac**
6. Number of students within the district	**Less than 1,000**	**1,000-3,000**	**3,000-6,000**	**6,000-10,000**	**More than 10,000**
7. Number of students within the elementary building	**Less than 250**	**250-500**	**500-750**	**More than 750**	
PLANNING & DESIGN					
8. Did you have input in the planning of the new facility?	YES	NO			
9. If yes, then what areas did you provide input?					

OUTDOOR AREAS & PLAYGROUNDS	**Inadequate**	**Somewhat Inadequate**	**Satisfactory**	**Strongly Satisfactory**	**Extremely Satisfactory**
10. Playground is adequate for the number of students enrolled.	1	2	3	4	5
11. Students are able to access the playground from the school.	1	2	3	4	5
12. Playground is accessible for exceptional students.	1	2	3	4	5
13. Playground equipment is safe.	1	2	3	4	5
14. Playground offers a variety of activities.	1	2	3	4	5
15. Landscaping is attractive.	1	2	3	4	5
16. Bus lane is separated from the parent pick-up lane.	1	2	3	4	5
17. Parent pick-up lane is marked for safely.	1	2	3	4	5
18. What would you change about outdoor areas and playgrounds?					

SHARED AMENITIES	**Inadequate**	**Somewhat Inadequate**	**Satisfactory**	**Strongly Satisfactory**	**Extremely Satisfactory**
19. Restroom facilities are well designed for student use.	1	2	3	4	5
20. Hallways are spacious for easy movement between classes.	1	2	3	4	5
21. Kitchen facilities are well designed.	1	2	3	4	5
22. Cafeteria or All Purpose Room is well designed.	1	2	3	4	5
23. Offices are centrally located in the building.	1	2	3	4	5
24. Nurse's office is centrally located in the building.	1	2	3	4	5
25. Library is spacious.	1	2	3	4	5
26. Conference room is well designed.	1	2	3	4	5
27. Secretary's office is well designed.	1	2	3	4	5

28. Teacher's workroom is well designed.	1	2	3	4	5
29. Adult restrooms are centrally located.	1	2	3	4	5
30. Principal's office is well designed.	1	2	3	4	5
31. What would you change about shared amenities?					

CLASSROOM FEATURES	**Inadequate**	**Somewhat Inadequate**	**Satisfactory**	**Strongly Satisfactory**	**Extremely Satisfactory**
32. Classroom lighting has little or no glare.	1	2	3	4	5
33. Air movement exists within classroom.	1	2	3	4	5
34. Fresh air circulates throughout the classroom.	1	2	3	4	5
35. Windows are easily opened and closed.	1	2	3	4	5
36. Acoustical level is adequate in the classroom.	1	2	3	4	5
37. Classroom colors are aesthetically pleasing.	1	2	3	4	5
38. Classroom colors are calming.	1	2	3	4	5
39. Areas are sufficient to display student work.	1	2	3	4	5
40. Classrooms have adequate space for large and small group discussions.	1	2	3	4	5
41. What would you change about classroom features?					

TECHNOLOGY, EQUIPMENT & MATERIALS	**Inadequate**	**Somewhat Inadequate**	**Satisfactory**	**Strongly Satisfactory**	**Extremely Satisfactory**
42. Student desks are comfortable.	1	2	3	4	5
43. Student chairs are comfortable.	1	2	3	4	5
44. Teacher's desk has sufficient work space.	1	2	3	4	5
45. Teacher's chair is comfortable.	1	2	3	4	5
46. Classroom storage is available.	1	2	3	4	5
47. Classroom technology (teacher and student computers, SMART board, doc camera, etc) is provided.	1	2	3	4	5
48. Number of student desks and chairs are sufficient.	1	2	3	4	5
49. Adequate classroom materials are provided.	1	2	3	4	5
50. Library is sufficiently stocked with material.	1	2	3	4	5
51. What would you change about equipment and materials?					

ENVIRONMENT OF THE FACILITY (Sustainability & Security)	**Inadequate**	**Somewhat Inadequate**	**Satisfactory**	**Strongly Satisfactory**	**Extremely Satisfactory**
52. Design of the facility positively impacts student learning.	1	2	3	4	5
53. Design of the facility positively impacts teacher instruction.	1	2	3	4	5
54. What would you change about responsiveness of the facility?					
ADDITIONAL COMMENTS ARE WELCOME:					