

A Study of the Effect That a Change of Facilities of a Middle School Population Has on Teacher
Instructional Practices

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ABSTRACT

The purpose of this study is to examine how a change of facilities from a modern school building designed for educating middle school students, sixth through eighth grade students, to a facility that was over 50 years old and not configured to educate middle school aged children influenced teacher instructional practices. The review of the literature is related to the effect school facilities have on student measures of performance and the impact instructional methodologies have on student achievement. The investigation is a case study of the effects the change of facilities of the Blacksburg Middle School population had on selected student measures of performance and what influence the teaching staff had on the resulting improvement of student academic measures. The conflicting findings of previous research and the unique circumstances involved in the Blacksburg Middle School situation reveal the need for further research.

DEDICATION

This accomplishment is dedicated to my daughters Katy and Caroline, and my sons Michael and Luke. As always they provide purpose and inspiration to my life each day. Their dedication to our family, our faith, and love for each other is truly motivating. I want to thank my mother and father whose love for life, education, and our family has given me the desire to pursue all of my goals. I would not of not accomplished this goal without my brother Paul and my sisters Joanie and Kathy who have always taken care of and encouraged their little brother. I especially dedicate this work to my wife Kelly, my best friend, who through her commitment and love for our family and life makes the world a better place for so many people each day of her life.

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Chapter 1: Context of Inquiry

Introduction

School leaders around the United States have been pursuing excellence in education since the first school was formed in the original thirteen colonies. The last two decades have seen the advent of the No Child Left Behind Act (NCLB) which outlined the accountability standards for all public school leaders (Koebler, 2012). The education profession is currently experiencing a revision to the NCLB in the Federal Accountability Standards in the waiver component approved by the Obama Administration in 2011. These initiatives require knowledge of the multiplicity of variables that influence student achievement on a daily basis (U.S. Department of Education). Many of the variables involve events over which educational leaders do not have direct control.

An unforeseen variable that influenced student achievement occurred in Blacksburg, Virginia when on February 13, 2010, at approximately 1:30 p.m., the roof of Blacksburg High School (BHS) gym collapsed under the weight of accumulated snow. Blacksburg High School was built in 1974 and had stood the tests of numerous winter events, but during the winter of 2009-2010 record snowfall amounts for the region occurred. The temporary solution for housing the high school was to have Blacksburg High School and Blacksburg Middle School (BMS) populations share the BMS facility on Prices Fork Road. Beginning on February 23, 2010, the BMS students attended class from 7:35 a.m. until 1:32 p.m. Blacksburg High School students attended class from 2:00 p.m. until 7:45 p.m. for the remainder of the school year. The Montgomery County Public School leadership team provided opportunities for stakeholders to give input into the best solution for housing both BMS and BHS for the 2010-2011 school year. A decision was made the first week of July of 2010 to relocate BMS students to an older school facility located in neighboring Christiansburg, Virginia. The facility was housing an alternative program and some school board personnel offices.

The middle school population transitioned from a modern facility designed for middle school age students to a facility that had multiple buildings and was not constructed for middle school education. The modern facility used forced air heat pumps with boilers to heat the facility while the alternate facility used steam heat with radiator units in each classroom. The modern facility is cooled through a cooling tower and the alternate facility utilizes window units in the classrooms. There are two gyms with locker rooms for students in the modern facility and one gym in the alternate facility which also had two locker room areas. There is no stage or auditorium in the alternate facility as there is in the modern facility. The alternate facility included one building that was built in the 1950s as an elementary school, two other buildings that were original structures from the 1930s, and the main building that was constructed as a high school in the late 1930s.

The existing buildings were not able to house the entire Blacksburg Middle School population so a modular campus with 12 classrooms was constructed in a field behind the main building and housed the eighth grade population. The classrooms on the modular campus were for the core subject areas of English, mathematics, civics, and science for eighth grade students. This modular campus was composed of one large unit containing eight classrooms and four individual mobile classrooms directly in front of the large unit that comprised the science rooms and one mathematics classroom. The average square footage per classroom in the mobile campus was approximately 680 square feet. There were three other stand-alone mobile units used for mathematics and health classrooms situated behind one of the other buildings on the campus which had approximately 790 square foot of instructional space. These mobile units did not have built in storage as did the classroom in the modern facility therefore bookshelves, file cabinets, or storage containers were used in some classrooms decreasing the usable square

footage. The classrooms in the other building on the alternate campus had a square footage of approximately 780 to 800 square feet. The modern facility on Price's Fork Road had classrooms that 840 to 900 square feet and included built in storage areas in the classrooms and in the pod hallways.

The condition of the alternate facility was enhanced prior to the middle school moving into the facility. The enhancements included painting all classrooms and hallways with appropriate neutral colors, and installing and upgrading technology resources such as wireless access, smart boards, document cameras, desktop computers, and carts with class sets of lap top computers. Other modifications on the alternate facility included repairing roofs, upgrading the kitchen in order to serve lunch and breakfast to the middle school population, installing a mobile campus to house a grade level, and remove the unusable gym floor and install a new gym floor. The grounds were maintained and some older fences were removed. The school was regularly cleaned including hallways, bathrooms, and classrooms which is normal practice for the maintenance of school facilities.

Statement of the Problem

The data from Blacksburg Middle School (BMS) on the academic performance on the standards of learning (SOL) assessment in Virginia for reading and mathematics at the sixth, seventh and eighth grade level while located in the alternate facility have provided results that are contradictory to previous research on the influence of school facilities. Earthman (2002, p. 1) stated "Based on my own studies, my review of pertinent research studies, and my background and experience in the field, my conclusion is that school facility conditions do affect student academic achievement." BMS experienced consistency in the SOL test scores in reading and mathematics while housed in an older school facility. Test scores on the SOL assessments were

similar or higher in some areas over a two year period while housed in the alternate facility compared to the two prior years in the Prices Fork modern school building. The SOL scores while in the alternate facility were the highest in school history. Further, research has shown the condition of the school facilities has an impact on attendance and student behavior. During the time in the alternate facility the BMS attendance increased or remained consistent and student behavior improved based on discipline data as indicated in the information below from the Montgomery County Public Schools attendance and discipline reports on Blacksburg Middle School.

Table 1.1

Blacksburg Middle School attendance and discipline data

BMS Attendance and Discipline Data	Attendance	Decrease in Discipline Incidents from Previous Year
2008-2009	95.00%	
2009-2010	91.39%	6.25%
2010-2011	92.08%	19.05%
2011-2012	96.30%	41.48%

The unique circumstances surrounding the Blacksburg schools created a situation which provides an opportunity to continue the research of prior studies that have investigated the relationship between school facilities, instructional methodologies, and student academic achievement. The Blacksburg Middle School situation involves the population of sixth through eighth grade students transitioning from a modern facility designed for middle school level education to an older facility. The motivation for the study evolved from the unexpected consistency and in some areas an increase in student achievement while being housed in the alternate facility as shown in Table 1.2 demonstrating the overall Standards of Learning (SOL)

pass rate for each of the years being investigated as well as Table 1.3 which displays the SOL scaled scores for Blacksburg Middle School (Virginia Department of Education).

Table 1.2

Blacksburg Middle School standards of learning pass rate 2008 – 2012

School Year	English-Reading	Mathematics
2008-2009	89.61%	74.82%
2009-2010	90.15%	80.14%
2010-2011	92.64%	82.91%
2011-2012	93.73%	78.30%

Table 1.3

Blacksburg Middle School standards of learning scaled scores 2008 – 2012

School Year	English-Reading	Mathematics
2008-2009	488.68	456.33
2009-2010	485.25	466.92
2010-2011	492.08	471.87
2011-2012	502.70	441.47

The data from the Standards of Learning in mathematics and English broken down by grade level for the four years of study is displayed in Table 1.4 which displays the pass rate on the assessments and Table 1.5 which involves the scaled scores by grade level.

Table 1.4

Blacksburg Middle School standards of learning pass rate by grade level 2008-2012

School Year	English Reading			Mathematics		
	Sixth Grade	Seventh Grade	Eighth Grade	Sixth Grade	Seventh Grade	Eighth Grade
2008-2009	90.68%	92.11%	86.07%	73.84%	62.50%	53.51%
2009-2010	91.44%	90.29%	88.69%	82.52%	71.10%	50.51%
2010-2011	90.79%	92.93%	93.63%	78.97%	78.50%	57.14%
2011-2012	97.13%	91.94%	92.57%	78.80%	67.61%	45.26%

Table 1.5

Blacksburg Middle School standards of learning scaled scores by grade level 2008-2012

School Year	English Reading			Mathematics		
	Sixth Grade	Seventh Grade	Eighth Grade	Sixth Grade	Seventh Grade	Eighth Grade
2008-2009	495.55	494.79	491.46	464.25	428.96	414.25
2009-2010	484.20	496.69	492.28	488.43	441.14	390.66
2010-2011	506.07	498.58	496.67	480.35	471.06	413.65
2011-2012	514.00	500.76	510.29	445.92	428.84	390.75

The outcomes on student achievement, attendance, and behavior at Blacksburg Middle School during the time in the alternate facility were maintained or improved compared to the same data from the student population when housed in the modern facility on Prices Fork Road. Previous research presented suggests there is a negative impact on the learning environment and student achievement when school facilities are inadequate. Uline and Tschannen-Moran (2008) presented research on the relationship between school facilities, school climate, and student academic achievement. The authors discovered:

...that when learning is taking place in inadequate facilities, there tends not to be as clear a focus on academics, and the learning environment is less likely to be perceived as orderly and serious. Where school buildings are shabby and inadequate, there is less likely to be the kind of community engagement that supports teaching and learning. Teacher attitudes and behaviors are related as well, as teachers are less likely to show enthusiasm for their jobs and to go the extra mile with students to support their learning when they teach in buildings they judge to be of poor quality (Uline, 2008, p. 66).

Determining the factors that influenced the results of sustained student performance measures would assist in understanding how the conditions of school facilities influence student

performance. Understanding these factors would also assist teachers in implementing successful teaching practices that would offset negative influences of building conditions. An awareness of these factors could improve student performance in a variety of educational settings.

Research Questions

The following questions will be investigated utilizing the literature and research reviewed on the influence of school facilities on a school population:

1. What did the faculty do to account for the maintained consistency and improvement in student achievement based on the Standards of Learning assessments in reading and mathematics?
 - a. What did the teachers do differently relating to instructional strategies?
 - b. What activities did the teachers do with students outside the regular core class instructional routine that provided supports for students that could account for the sustained student academic performance?

The purpose of the study is to understand why the outcomes of the specific student measures of performance on the mathematics and reading Standards of Learning tests for sixth, seventh, and eighth grade students were achieved while the Blacksburg Middle School population was in the older facility as compared to the previous two years attending school in a modern facility. Further investigation may provide information on how to ensure the positive outcomes continue and the negative results are avoided for a variety of school aged populations in various facility conditions. The intervening variables being investigated are the teacher attitudes and actions while instructing in the alternate facility as compared to the instruction in the modern school facility. The dependent variables which will be analyzed

are the standardized test scores in reading and mathematics for grades six, seven, and eight, student discipline, and student attendance.

The data will be from a two year time period in the original facility and a two year time period in the alternate facility. The investigation into what variables may have influenced the improvement in student performance combined with how these student outcomes contradict the prior research suggests the need for a study of the unique situation Blacksburg Middle School experienced.

Significance of Study

The findings of the study may provide functional data for schools that are transitioning to another facility whether because of a disaster or entrance into a new facility. The knowledge of how to approach certain factors differently while in transition in order to provide improvement in specific student measures of performance could result from this research. The situation investigated could provide insight into the effectiveness of instruction regardless of negative conditions such as the building environment. These findings could provide potential means for policymakers to understand the necessities for improved instruction and focus the financial application to such provisions. The research reviewed determined that there were mediating variables that may explain the effect of a change of facilities had on student achievement.

The empirical research investigating the influence of school facility conditions on student measures of performance has had some mixed results. Uline and Tschannen-Moran (2008) found in their study of schools in Virginia that no relationship existed between the building condition and student achievement. O'Neill and Oates (2001) determined in their investigation of impact of school facilities on student achievement that a positive relationship between the building condition and how students achieved academically existed. Cash (1993) investigated the

relationship between the condition of school facilities and student achievement and behavior in 47 rural high schools in Virginia. The author used the Commonwealth Assessment of Physical Environment (CAPE) assessment tool to determine the condition of each facility. The student academic achievement was based on the eleventh grade student scaled scores on the Test of Academic Proficiency and adjusted for the socioeconomic status of each school (Cash, 1993). Student behavior was gauged through a ratio of the number of incidents involving violence or substance abuse or resulting in an expulsion or suspension and the total student population. Cash found the schools that were in better condition had higher student achievement results and a higher student discipline incident rate.

These findings are important for moving forward in the proposed investigation of the Blacksburg Middle School students' academic performance being maintained or improved upon based on the Virginia Standards of Learning mathematics and English assessments even though the quality of the school facility which BMS was relocated to was lessened due to the age, layout, and overall condition of the alternate facility. Understanding the teacher's perceptions and alterations to the teaching strategies the staff may have initiated due to the change in environment is a focus of the research planned. The similar populations and data utilized made this study pertinent to the research and relevant to a variety of educational settings. The hypothesis of mediating factors that Uline and Tschannen-Moran (2008) pursued in their study is applicable to the Blacksburg Middle School study because the researchers looked to reveal mediating variables such as instructional variations and the correlation between these variables and the quality of school facilities and student achievement. The study of the unique setting which the Blacksburg Middle School population experienced concerning the quality of the

facilities and resulting student achievement measures presents an opportunity for further research that may be able to isolate mediating variables that will allow for improved student achievement.

Definitions

The key terms used throughout this study are defined below. The definitions will allow for an understanding of the research reviewed.

School facility. Refers to the all buildings utilized by students and staff in an educational setting. School facilities may include all buildings in a campus setting.

Middle school. The National Middle School Association (NMSA), which has evolved to be known as the Association for Middle Level Education, defines an exemplary middle school as one that focuses on the intellectual, social, emotional, moral, and physical development of young adolescents (Clark & Clark, 1994). The five components of an exemplary middle school as determined by the NMSA are: a) Interdisciplinary teaming, b) Advisory programs, c) Varied instruction, d) Exploratory programs, and e) Transition programs (National Middle School Association).

Student measures of performance. The measures for the purposes of this review involve state standards of learning assessments as well as data associated with student behavior and student attendance.

Student achievement. The state standard assessments are used to determine student achievement in the studies. The Commonwealth of Virginia utilizes the Standard of Learning tests.

Limitations

The study involves various limitations. A small percentage of the respondents had not taught in the modern facility located on Prices Fork Road thus having no reference point to

compare with the alternate facility. The variety of years of teaching experience possessed by those surveyed may also be a limitation to the responses to the teacher survey. Teachers participating in the survey who were on staff for less than three years may provide less insight than those who had taught in both facilities.

The data analyzed were limited to the two years in each facility for a total of four years of data. The Standards of Learning (SOL) tests for mathematics and reading were created with different questions and formats during the four year span of the study. This variance may be a factor in the results of the SOL assessments. The results of the SOL tests do not reflect the fact that a different cohort of students completed the SOL assessment each year for the different grade levels, sixth, seventh, and eighth. Another limitation was the variance in the mathematics SOL test during the years being investigated which included technology enhanced format test items which were not present in previous years of the test.

The condition of the two facilities involved in the study was determined by the administrators and staff who had worked in both facilities which may be a limitation. The buildings of the alternate facility were designed and constructed over 50 years apart and the purpose of the design of each building was documented. The bias of the administration is also a limitation when determining the alternate facility condition as compared to the newer facility where the students were housed previously. Thus researcher bias must be considered as a limitation because the researcher was directly involved as an administrator with the school used in the study. The instrument utilized for the study could also be a limitation because the instrument may not identify all the activities that teachers did during the time of the study. The participants in the study may have chosen not to answer every question in the survey which would also be a limitation to the research.

Delimitations

There are certain delimitations in conducting the study. The restricted student population investigated was from one school and limited to grades six through eight. This also only allowed for the population studied being from a specific geographical area. Another delimitation was the population surveyed involved teachers from one middle school. Some of those participants were not employed as teachers while the population was housed in Blacksburg prior to the move to the alternate facility.

Organization of the Study

The organization of this study includes five chapters. The contents of each chapter is described in the following paragraphs.

Chapter 1 is the context of inquiry and includes an introduction, statement of the problem, the research questions, the significance of the study, definitions, limitations, delimitations, and the organization of the study.

Chapter 2 contains an introduction, the background information, the search process, the literature review, and a synthesis and conclusion.

Chapter 3 explains the methodology and contains an introduction, the research questions, the population, data needs, method for obtaining data, instrument design, obtaining consent, and a section on analyzing the data.

Chapter 4 includes an introduction, the survey procedures, and the finding.

Chapter 5 provides the summary and implications of the study, conclusions from the findings, a discussion section, study concerns, and recommendations for further study.

Chapter 2: Review of Literature

Introduction

Background

This literature review offers research that provides insight into the influence condition of school facilities has on student measures of performance. Various prior studies have suggested that the relationship between the condition of the school facilities and students' measures of performance form a positive correlation. The research community investigating the influence of school facilities has also generated contradicting findings, suggesting that a direct relationship does not exist but mediating factors are the cause of the results of the analysis in each study. When summarizing other studies on the influence of facility conditions on student academic achievement, Earthman stated in his document *School Facility Conditions and Student Academic Achievement* written in October 2002, "All of these researchers found the same range of differences in achievement scores of students in substandard verses above standard buildings when controlling for socioeconomic differences between the various school districts" (Earthman, 2002, p. 8). The research reviewed also suggest that facilities designed for specific educational purpose will improve student performance overall (Uline, 2008). The purpose of the literature review is to determine the diverse methods of investigation used in the research studies and create an understanding of the analysis of each study and how it is unique to the situations researched.

The influence of facilities has been in the forefront of factors that are investigated to determine how students can learn more effectively because of the increased accountability for public schools in the United States. The literature reviewed focuses on the influence building conditions have on student academic achievement and the relationship that was discovered

between the two factors. The literature also includes research on instructional practices utilized by teachers which improve student academic achievement. The necessity of the research also lies in the financial decisions that are critical to create a successful learning environment.

Search Process

Literature was selected based on the substantial research done in each study relating to facility influence on student academic achievement as well as the creditability of the researchers. Studies were excluded based on the lack of focus on the relationship facility conditions have on a specific population of students' academic achievement as well as the investigation on factors that were not present in this case study. Some of the researches reviewed were not included because the methodologies utilized were not reliable and exhaustive.

A variety of research sources were utilized through Virginia Polytechnic Institute and State University library's online data bases as well as the Interlibrary Loan process. The online research databases that were primarily used were ERIC, Addison, Summons, National Center for Educational Statistics, Educational Research Complete from EBSCOhost, National Clearinghouse for Educational Facilities (NCEF), Google Scholar, and Project Muse. Parameters were set in the search discover tools to include peer reviewed materials and all print and electronic versions of the research. Table 2.1 below provides an organization of the research sources, keywords, and outcomes of the searches in terms of the number of viable topics available.

Table 2.1

Literature review search process

Database	Keywords	Number of Hits
National Clearinghouse for Educational Facilities	Do AND school AND facilities AND affect AND academic AND outcome	References to Books and Other Media - 331 References to Journal Articles - 284
ERIC	School facilities, academic achievement, effect	14932 then selected articles in the last 5 years, peer reviewed, full text, and ED documents for 121 sources.
Addison	Building conditions, student academic achievement	3
Summons	Relationship, students passing the standards of learning, condition of the educational facilities	23 Selected dissertations to narrow the search down further
National Center for Educational Statistics	age of school facilities in America	2410 2 sites were the primary suggested resources for review
EBSCOhost	School facility, quality, student achievement, school climate	4844 then selected only scholarly reviewed to narrow down the studies
Project Muse	School Facility, student achievement	Journals 3604 Books 2
Google Scholar	School facility, conditions, student academic achievement	98,600 to 18,100 by limiting date to after 2000 Relevant studies were the first 50 hits in each of the drill-down searches

A literature search through the Virginia Department of Education was also used to understand if similar situations to the case study being investigated were experienced in Virginia. An understanding of the purpose of the research and the finding of each study were of interest in order to understand how student performance improvement occurs while students experienced the adverse factors of inferior building conditions.

Literature Review

The understanding of what factors caused the consistent results in student achievement with an increase in some academic areas even with the negative factors created by the condition of the school facility and the transition itself is the intention of this research. Uline and

Tschannen-Moran (2008) explored the possibility of other factors as mediating influences in the relationship between the quality of school facilities and student academic achievement. The authors sought to examine the possibility that part of the reason for the finding of the prior research can be explained by the “mediating influence of school climate” (Uline & Tschannen-Moran, 2008, p.2). Uline and Tschannen-Moran described school climate as an assessment of the social dynamics in a school. The purpose of the studies reviewed was based on a similar premise to that of Uline and Tschannen-Moran, which was to determine mediating factors that caused the outcome of the student measure of performance.

Uline and Tschannen-Moran (2008) summed up their research by stating “It may be that dilapidated, crowded, or uncomfortable school buildings lead to low morale and reduced effort on the part of teachers and students alike, to reduced community engagement with a school and even to less positive forms of school leadership” (p. 3). The authors presented a variety of research studies which associate the quality of school facilities with student academic performance. Uline and Tschannen-Moran reviewed research that addressed the influence of teacher attitude and the connection to the quality of education in America. The research reviewed by Uline and Tschannen-Moran utilized an assessment instrument to evaluate the condition of the building which was developed by the researchers. These instruments allowed the quality of the school facility to be determined. The studies presented by Uline and Tschannen-Moran also controlled for variables such as socio-economic status, student motivation, and ethnicity. The findings from the research were consistently determining that modern facilities, high quality of school facilities, and positive aesthetic features of school facilities resulted in increased or maintained student achievement.

Uline and Tschannen-Moran's (2008) research investigated the concept that school climate is effected by the condition of a school facility and may indicate that school climate is a factor explaining why students perform poorly academically in a substandard school facility that is inadequately equipped for instruction. The authors challenge that even though much research exists on the influence of school facility on student achievement, the research does not delve into mediating factors to the extent possible. The researchers suggest the focus of the influence of low quality school facilities should not just be on students but on teachers as well. There are also other factors outside the physical components of a school that could possibly influence student and teacher performance such as the social environment.

Uline and Tschannen-Moran (2008) examined the possible relationship between physical environment and the social environment by surveying teachers in 80 middle schools in Virginia. The survey instrument consisted of statements concerning the perception of the quality of the school facility, the school climate, and available resources (Uline & Tschannen-Moran, 2008). The statements were to be answered based on how often the teacher perceived the statement to be true. The questions included seven items concerning the quality of the school facility, three items concerning teacher perception on resource support, and the School Climate Index (SCI), which is a 28 question assessment of school climate. The student achievement data used were the eighth grade Virginia Standards of Learning test in mathematics and English. Mathematics and English were chosen because the two measures were highly correlated and formed a factor that accounted for 96 percent of the variance. The percent of students receiving free and reduced lunches was used to determine the socioeconomic status of students.

A descriptive analysis was compiled to determine the measure of the quality of the school facility. The analysis on the measure of the quality of the condition of the school facilities

revealed six items that formed a factor that accounted for 66 percent of the variance in perceptions of the quality of the school facilities. Items that did not have high communality with the other six items were excluded from further analysis. Table 2.2 below displays each of the items; the mean, standard variation, and the factor relating each item together (Uline & Tschannen-Moran, 2008):

Table 2.2

Measure of the quality of a school facility (Uline & Tschannen-Moren, 2008)

Item	Mean	SD	Factor 1
The facilities here are adequate to support learning	3.58	0.53	0.90
The building is a comfortable place to be	3.74	0.49	0.79
This building is pleasing in appearance	3.75	0.57	0.75
There is adequate space for teaching and learning here	3.37	0.55	0.73
Classroom equipment and furniture are in disrepair	3.35	0.53	0.68
The facilities here are lacking in regular maintenance	3.32	0.51	0.49

The analysis of the data also included a bivariate correlational analysis to understand the relationship between the condition of the school facilities, resource support, the school climate, student achievement, and student socioeconomic status at the school level (Uline & Tschannen-Moran, 2008). The correlation revealed a strong relationship between student socioeconomic status and academic achievement at the $p < 0.01$ level. There was a similar relationship between the perceptions of the quality of schools and resource support also at the $p < 0.01$ level. There was a correlation between perception of the quality of school facilities and the School Climate Index as well as between student achievement and the School Climate Index at the $p < 0.01$ level. The student socioeconomic status and the perception of building quality were not correlated at the $p < 0.05$ level. The perceptions of the quality of school facility were related to student achievement. Resource support was positively related to student achievement at the $p < 0.05$ level as well.

School climate as a mediating variable between student achievement and school facility conditions was tested by running a multiple regression. The results demonstrated that the School Climate Index made a significant contribution to the equation at a ($b = 0.70, p < 0.01$). Uline and Tschannen-Moran (2008) went on to determine that school climate was a mediating factor by using a correlational analysis involving the perceptions of the quality of the facilities and the product of coefficients procedure.

The results of the tests clearly demonstrated the relationship that exists between the quality of school facilities and student achievement as measured by the Virginia Standards of Learning in eighth grade mathematics and English. Uline and Tschannen-Moran (2008) demonstrated that school climate is a mediating variable in the relationship between the quality of the facilities and student achievement. The hypothesis of mediating factors that Uline and Tschannen-Moran (2008) pursued in the study is applicable to similar studies in regards to determining mediating variables such as instructional variations to offset the results that research has shown to prevail between the quality of school facilities and student achievement.

O'Neill and Oates (2001) conducted a study of middle schools in Central Texas with the purpose of determining the impact the condition of school facilities has on student achievement, behavior, attendance, and teacher turnover. The authors also wanted to identify certain environmental aspects of the school facility that would improve learning (O'Neill and Oates, 2001). The study was referenced by Uline and Tschannen-Moran (2008) in order to establish that prior research had determined there was a positive relationship between school facility conditions and student achievement. O'Neill and Oates as well as Uline and Tshannen-Moran based the need for the studies on the deteriorating state of schools in America which was causing an increase in school construction. The perceived low quality of education provided by public

schools was another factor in determining the need for the research. The purpose of the studies was to inform individuals who were making decisions on renovations and construction of schools that school facility design should be based on research determining the impact of school facilities on student achievement.

O'Neill and Oates (2001) used a population consisting of 76 middle schools located in a 48 school district region. Each school was sent a questionnaire which allowed the participants to compare the mediating variables of student achievement, behavior, attendance, and teacher turnover rate. Three schools did not return the questionnaire and three other schools did not have data available through the Texas Education Agency (TEA) making a total of 70 middle schools participating in the study. The TEA was the source of the data on student achievement, behavior, student attendance for the 1998-99 school year, and teacher turnover rate for the school years 1996-97, 1997-98, and 1998-99. Student achievement was based on the student results on the Texas Assessment of Academic Skills (TAAS) test. The TAAS was used to evaluate two measures: percentage of eighth grade students passing all subjects and the percentage of eighth grade students passing reading, writing, and mathematics. The student population was limited to eighth graders who were present in the schools that participated at the time of the study. Qualitative data were gathered through interviews and a survey questionnaire with ten percent of the participating principals regarding the influence of school facilities on student achievement, behavior, attendance, and teacher turnover (O'Neill & Oates, 2001). The condition of each of the school facilities were rated by the middle school principal themselves. O'Neill and Oates believed the principals were the most qualified to determine the facility conditions. The principal evaluation of the facilities can be considered a limitation in the study. The study was conducted during December of 1999 and January of 2000.

The survey instrument used was developed by O'Neill and Oates (2001) using the middle school components of the Guide for School Facility Appraisal, a previous appraisal tool created by the Council of Educational Facility Planner International. The instrument was named the Total Learning Environment Assessment (TLEA) and was composed of 82 items using a four-point Likert scale to assess the degree school facilities incorporate each of the identified features in the survey (O'Neill & Oates, 2001). The TLEA consists of multiple sections with the first section providing information on the age of the facility, the second section determining the educational adequacy, the third section involving questions on the educational environment, and an additional section to request information on the facility that was not covered in the prior sections.

The data were analyzed using the relational statistical method (O'Neill & Oates, 2001). A *t-test* was incorporated to compare the dependent variable of student achievement, behavior, attendance, and teacher turnover rate to the independent variable of school facilities assessed using the Total Learning Environment Assessment (TLEA) questionnaire. O'Neill and Oates also provided more support to the data by utilizing the Pearson product-moment correlation at the question, section and total score level.

The results O'Neill and Oates (2001) discovered on the correlation analysis were that each of the independent facility variables making up the subsections of the Total Learning Environment Assessment (TLEA) were significantly related to the overall rating score at the 0.01 level of statistical significance. This proved a high degree of interrelatedness existed between the independent variables and the overall rating of the school facility. The independent variables were academic learning space, specialized learning space, support space, community and parent space, exterior environment, interior environment, visual reinforcement, educational adequacy,

environment for education, and the building age. An important finding of the analysis involved the significant correlation between the building age and the other independent facility variables included in the TLEA. The issue of the assessment of the building may raise concerns on the accuracy and unbiased responses because the assessments were performed by the building principal.

The correlation of the dependent variables which were the measures of student achievement using the Texas Assessment of Academic Skills (TAAS) test and the sections on middle school of the Total Learning Environment Assessment (TLEA) was significant at the 0.01 level and the 0.05 level. The measures of student achievement consisted of the percent of eighth graders passing reading, mathematics, science, social studies, writing, and passing all sections. The data exposed the influence of the teacher through the positive relationship the variable teacher turnover rate exhibited with the two dependent variables of the percentage of eighth grader students passing all subjects and the percentage of eighth graders passing reading, writing, and mathematics. The teacher turnover rate was positively correlated with the measures of student behavior (O'Neill & Oates, 2001).

The overall finding of the O'Neill and Oates (2001) study indicated that the condition of school facilities had an impact on student achievement. O'Neill and Oates through the use of the *t-test* for the dependent variable means across the independent variable categories proved there were significant differences between the top 25% and the bottom 25% of school facilities. This finding would prove contradictory to future research reviewed. O'Neill and Oates pointed out that prior studies using a self-evaluation tool for assessing the school facility had similar results.

O'Neill and Oates (2001) made the connection between the relationship between the age of the building and student achievement being the strongest of the correlations. Upon analyzing

the data further a strong correlation between the age of the building and the percentage of eighth grade students passing reading was evident. Combine these specific results with the strong relationship that was shown between teacher turnover rate and student achievement and behavior one could hypothesize that positive relationship with adults and the ability to read successfully may be underlying mediating factors existing in educational facilities.

O'Neill and Oates (2001) summarized their research by stating: "When school facilities are well designed and maintained, they enhance the learning environment for student, teacher, and the community" (p. 21). The study does require the attention of stakeholders in educational settings to review the facility conditions and understand how renovation or new design impacts the learning environment.

Uline and Tschannen-Moran (2008) and O'Neill and Oates (2001) found similar results when investigating the relationship that exists between the quality of school facilities and student achievement but the results are not completely supported by other studies and researchers. Picus, Marion, Calvo, and Glenn (2005) conducted a study for the purpose of giving scholarly input into the necessity of financing new school facilities or renovations for the improvement of student learning. Picus et al (2005) believed there was a lack of empirical evidence to support the belief that high-quality school facilities promote student achievement. Picus et al. presented information which conveys the lack of adequate knowledge on the condition of schools and the inability to assess the building conditions accurately. The questioning of the level of sophisticated student testing systems needed to run statistical comparisons using building condition measure in states was also a reason Picus et al. pursued this study in the state of Wyoming. Picus et al. stated that Wyoming possessed effective systems in gathering data on building conditions, student achievement, and student characteristics.

The study performed by Picus et al. (2005) did not use a self-gathering instrument for building conditions but relied on a Wyoming state database containing the standardized information on the condition of every school facility in the state. The gathering of these data was mandated by the state government of Wyoming in order to provide accurate information on school facilities and ensure all facilities are kept to a standard that allows for successful learning. This database was the first time a state utilized such standardized methods to record school facility conditions which made it consistent throughout the school districts in Wyoming. The student achievement data used in the research were from the Wyoming Comprehensive Assessment System (WyCAS) which tests students in grades four, eight, and eleven on reading, writing, and mathematics (Picus, et al., 2005). The WyCAS is a standards-based measure and provided a high quality sample because essentially all students in the identified grades participate. The student data system in Wyoming made it possible for Picus et al. to control for a variety of variables and not just student socioeconomic status and ethnic background. The WyCAS also provided a means to control for any unusual circumstances occurring in school divisions that may skew the accuracy of the analysis of the data. Picus et al. stated “we now can empirically estimate the role school facilities play in student achievement, thereby making a contribution to the school finance literature on equity and adequacy” (p. 72). The statement has implications for all school systems because of the accuracy to determine the need for school facilities allows for states to look at equal funding and a precise cost effectiveness of constructing or renovating facilities.

Picus, Marion, Calvo, and Glenn (2005) solidified their reason for the research by dissecting several previous studies that have shown a relationship between school facilities and student achievement into areas of concern involving the self-assessment of building conditions to

the lack of statistical comparison of means and insufficient methods of data acquisition. Because of these weaknesses in prior studies Picus et al. believed that the school system in Wyoming provided the best opportunity to study the relationship between school facilities and student performance.

The database on the condition of school facilities in Wyoming was constructed by employing a consulting firm which utilized an instrument the firm designed to calculate the building condition score. The instrument was tested and designed to be objective. The instrument involved up to 20 questions depending on the school being assessed. The answers for each question were formed through agreement by school representatives and an assessor with the consulting firm. Picus et al. also used the suitability tool to measure building conditions but this information was predominately self-reported by the district personnel. Student achievement data from the Wyoming Comprehensive Assessment System (WyCAS) used in the analysis were from a three year period spanning from 1999 to 2001 which involved over 60,000 students (Picus, et al., 2005). The multiyear average was used to provide a more stable estimate of the school's achievement. Picus et al. used the three year average of the percentage of students scoring proficient and advanced on the WyCAS test as well as the three year average of the scale scores. The use of the scaled scores allow for all students' scores to be taken into account.

Picus et al. (2005) reasoning for using multiple subject scores over the three year time allowed for more items and students to be incorporated statistically into the proxy creating a more stable and reliable statistical image than using data from a single year. The school building was used as the unit analysis in the bivariate correlational analysis method applied in the study. The bivariate correlational analysis allows for two variables to be analyzed which strengthens the analysis. The authors make a valid point when suggesting the information on socioeconomic

status may not be accurate because it is common that families of middle and high school students do not utilize the free and reduced meal program. Multiple regression was used to factor out the effect socioeconomic student scores may have on the analysis.

The results of the correlation coefficients between building scores and the Wyoming Comprehensive Assessment System (WyCAS) average and composite scale scores found basically no relationship existed whether using single year scores or multiple year scores as the independent variable. The findings were the same even if the scaled scores of all the students were substituted for the percentage of students scoring proficient or above in the three content areas in the analysis. Picus et al. (2005) summarized these findings by stating that “as building scores improve, there is no likelihood that the WyCAS score will either improve or decline” (p.84). The multiple regression analysis controlling for student’s socioeconomic status produced the same results, no correlation between building condition scores and WyCAS scores. Picus et al. determined through the multiple regression analysis that the correlation between the building condition scores and the percentage of students receiving free and reduced lunch was essentially zero, showing no relationship between the poverty level of the school and building conditions.

Picus et al. (2005) also used the suitability scores, which were more subjective than the building condition scores, and ran the same statistical tests. The results were similar except for the finding of a slightly positive relationship existed between the suitability score of a building and the Wyoming Comprehensive Assessment System (WyCAS) scores at the eleventh grade level. Picus et al. stated that given the overall results this relationship is just an anomaly in the data. When determining the relationship between the improvements to the WyCAS scores and the building suitability scores a negative result was found at the $p < 0.05$ level which means the higher the building suitability score the lower the rate of improvement on the WyCAS. Picus et

al. explained this as the existence of weak relationships between the variables. The results did show that when controlling for students' socioeconomic status no relationship existed between the building suitability score and the WyCAS scores.

The purpose of the research completed by Picus et al. (2005) was to ensure school officials become cost efficient by eliminating the unnecessary spending on school facilities and utilize funds in more productive areas to increase student achievement such as employing more effective teachers. Picus et al. expressed the following concerns of the previous research on the influence of school facilities on student achievement: the inadequate knowledge of the condition of schools which state agencies possess, overly subjective process used to assess the building conditions, and the lack of sophisticated student data system. The author's research methods and choice of population, Wyoming school systems, were purposeful in order to eliminate the concerns of past research on the influence of school facilities on student achievement. These findings from the research indicated that a relationship between the condition of the school facility and student achievement did not exist (Picus et al., 2005). These findings could be useful to policy makers when determining how to distribute funds effectively in education. The reasoning and methodology used by Picus et al. provided factors to be aware of for future researchers in the area of school facilities influence on student achievement. The thought process that the authors applied to this study may allow for researchers to understand how to carefully extract the mediating variables that may not be obvious in studies involving school facilities and student achievement. The extraction involves a critique of the data source for accuracy and relevance as well as the consistency of the instruments used to form the data over the entire population.

The study by Bowers and Urick (2011) was completed because the researchers determined a need to find data that may inhibit the massive amounts of funding being used unnecessarily on capital expenditures and facility maintenance by school systems in the United States. Along with the fact that current research points to the possibility that facility maintenance and disrepair rather than structural issues are more related to student achievement present the need for the research done by Bowers and Urick. The purpose of their research was to determine the independent effects of high school facility quality on student achievement. There are numerous variables that affect student achievement and Bowers and Urick set out to find a way to accurately record data and control for variables in the statistical analysis just as Picus, et al. (2005) set out to accomplish. Bowers and Urick (2011) sought to determine if there is a relationship between facility disrepair and student achievement in order to provide policy makers another alternative to school improvement other than new building construction. Bowers and Urick's identified and addressed previous methodologies used in researching the relationship between school facilities and student achievement. Through identifying other research methods previously used, Bowers and Urick (2011) proposed to answer the following research question: "...to what extent does school facility disrepair directly affect student achievement while controlling for both student-level and school-level achievement covariates?" (p.79).

Bowers and Urick (2011) preferred that independent ratings of school facilities be used in order to reduce subjective views tainting the database. Picus et al. (2005) brought the same beliefs in their research. Bowers and Urick believed that the problems with past methodologies was that a) data were based on opinions of school personnel and too subjective to use in a statistical analysis, b) there was a lack of controlling for known covariates in determining the school quality and student achievement measures such the nested effects of students within a

school, c) the majority of the research has used small samples which were limitations in the studies and did not account for nesting of students in the student achievement data, and d) the quality of the facility was determined by age, inaccurate cost estimates of the facilities, or inappropriate checklists that inaccurately rate the sections of the facility and are not related to educational outcomes. The reasoning for these criticisms are founded in Bowers and Urick's belief that the structural parts of the facility do not directly influence how teachers teach and students learn. The hypothesis formed by Bowers and Urick (2011) was that "facility effect may be a maintenance effect, in which the cleanliness and general state of repair of the school can positively influence teaching and learning" (p. 73). The hypothesis created by Bowers and Urick is just as important for future research as the results of the analysis.

The objective of Bowers and Urick (2011) was to use a population comprised of a large national representation to determine the independent effects of school facility maintenance. The database used for the population was the Education Longitudinal Survey (ELS) of 2002 which consists of 8,110 students from 520 schools across the United States. This subset of the ELS:2002 included only students in public schools with total data on each variable analyzed (Bowers & Urick, 2011). Using the public school component and facilities checklist of the ELS:2002 survey, which enlisted independent raters who visited each school using a multi-item checklist, Bowers and Urick estimated the longitudinal independent effect of facility disrepair on student growth in mathematics, the dependent variable, during the last two years of high school by using a two-level hierarchical linear model. The two-level hierarchical model allowed for students to be nested within schools. Multiple covariates were controlled for at the student and school level. The research was conducted to extend the research of Picus et al. (2005) to a

national sample and eliminate the concerns of previous methodologies. These concerns are listed in the previous paragraph.

The facility disrepair composite variable was composed of 18 ratings across the 520 schools. The following is a listing of the ratings: 1) trash on front hallways floors, 2) overflowing trashcans in hallway, 3) broken lights in hallway, 4) graffiti on hallway walls/doors/ceiling, 5) graffiti on lockers in hallway, 6) chipped paint in hallway, 7) hallway ceilings in disrepair, 8) graffiti on bathroom walls and ceilings, 9) graffiti on bathroom stall doors/walls, 10) trash on bathroom floor, 11) overflowing trashcans in bathroom, 12) classroom ceiling in disrepair, 13) broken lights in classroom, 14) graffiti on classroom walls/ceiling/doors, 15) graffiti on classroom desks, 16) trash on classroom floor, 17) overflowing trashcan in classroom, and 18) classroom windows broken.

The 18 items had a reliability of Cronback's alpha of 0.729 which indicate that together these items are an accurate measure of the facility disrepair composite variable (Bowers & Urick, 2011). The student level control variables were: female, African American, Hispanic, if the student was from a non-traditional family, if the student had transferred from their 2002 high school to a different high school in 2004, socioeconomic status, and student's grade 10 standardized mathematics test scores in 2002. The school level variables included a determination of whether the school was urban or suburban, school enrollment levels, percent of free lunch students, percent of minority students, and student-teacher ratio. The last three school level variables were Common Core Data variables. Bowers and Urick (2011) used chi-square to determine if there was a significant difference by facility disrepair for each variable.

The research was designed to "estimate the direct effects of facility maintenance and disrepair on student mathematics achievement during the last two years of high school" (Bowers

& Urick, 2011, p. 84). The results showed that the mathematics scores for grade 10 and grade 12 did not vary between scores in facilities that were considered in disrepair and those that were not in disrepair. The findings using the two-level hierarchical linear model using grade 12 standardized mathematics scores as the dependent indicated that 14.55% of the variance in the scores was at the school level and 85.45% variance in the scores was at the student level. The results showed that only 14.55% is explained by school-level variables which included facility disrepair. Facility disrepair did not show to be significant on overall student mathematics achievement using the two-level hierarchical linear model thus having no effect. The limitation of the study by Bowers and Urick (2011) are the population used limits the application to high school students in the final two years and to standardized mathematics tests. Another limitation is that results may only apply to the use of specific facility conditions.

Bowers and Urick (2011) provided research results which indicated no direct effect of facility disrepair on the student mathematics achievement. Although no direct effect was discovered the variety of school and student variables used did produce differences by facility disrepair. These differences indicate that there may be the presence of an indirect influence of facility disrepair on student achievement. Because of these findings Bowers and Urick created a mediated effects model, Figure 1, to describe their findings. The reasoning for the creation of the mediating model of facility quality and achievement was to encourage future research to include the independent ratings of facilities and to understand that if an effect is found then it is important to know what exactly should be changed in regards to the facility. The cyclical model took into consideration the facility quality as well as the perceived facility quality of school leaders, teachers, students, and parents. The perception of these stakeholders creates the motivation and attitude of all involved which forms the school academic climate (Bowers &

Urlick, 2011). The school academic climate in turn influences student achievement and the perceptions of the stakeholders continues into the following year thus creating an ongoing cycle that produces mediating variables which eventually may affect student achievement. The recommendations Bowers and Urlick made for future research were to direct the focus of research to include the possibility of mediating effects of facility conditions on the professional and academic climate of the school and not solely on direct effects of the school facility on student achievement.

The effect facility conditions can have on teachers' perceptions has shown to influence teaching practices (Bowers & Urlick, 2011). Facility conditions have been found to impact the teaching and learning environment through acoustical, lighting, and temperature inefficiencies. The indirect effect of the physical conditions of facilities includes the influence of the facility on the attitudes of the teachers, students, and families (Cash, 1993). How do teachers use instructional strategies to overcome facility deficiencies such as age of the building, non-effective acoustical barriers and lighting, or inability to control temperature within the classroom? Darling-Hammond contributed to the book *Teaching for intelligence*, edited by Presseisen (2008), with a chapter titled Teacher learning that supports student learning. Darling-Hammond (2008, p. 91) explored the question "What do teachers need to know to teach all students according to today's standards?"

Darling-Hammond (2008) believed there were certain knowledge based skills teachers need to know in order to provide quality and effective instruction to all students. Teachers must have a mastery of their subject matter which allows for flexibility and passion when conveying the knowledge to students. A thorough understanding of the content area allows teachers to see how concepts connect through the different curriculums. The understanding of the students

provides teachers insight into the developmental, social, and intellectual level of their students. An awareness of the students' attitudes and beliefs as well as what motivates students will assist teachers in providing teaching strategies that encourage the learners to work hard and achieve their goals (Darling-Hammond, 2008).

Utilizing different strategies in accomplishing the goals of success for all students is necessary to overcome the learner's perceptions and any external barriers such as facility conditions of the learning environment. Darling-Hammond (2008) believed teachers need access to curriculum resources and technologies that provide instructional differentiation. Teachers also should possess a thorough knowledge of the resources available. The understanding of how teachers were taught and how teachers learned in the past as compared to how students learn today is a reason for new strategies for learning being implemented continuously in today's classrooms. In order for this type of knowledge to be acquired teachers need to be able to analyze their teaching methods and reflect on what is working and what exactly constitutes non-productive practice. Accessing their teaching styles allows educators to refine their instructional strategies no matter if limits are presented due to the physical condition the school facility. Darling-Hammond believed teachers learn best when collaborating with other teachers and sharing their strategies and ideas. A good setting for teacher learning involving collaboration, reflection, and analysis of student work is essential for student and teacher growth (Darling-Hammond, 2008).

Determining teacher qualities that allow for productive teaching practices to be applied in the classroom is relative to answering the research questions presented in this document. The teaching strategies utilized by teachers in order to build resiliency in adverse situations was investigated by Patterson, Collins, and Abbott (2004) in their descriptive research project. Prior

research dealt with resilient qualities of school leaders but not specifically with strategies used by classroom teachers to sustain a high standard of instruction in difficult situations. The researchers also wanted to contribute to the understanding of why some successful teachers remain in the urban classroom while others leave after only one or two years of service. The urban educational setting includes situations that present difficulties for educators such as overcrowded classes, lack of instructional resources, and high level of student absenteeism (Patterson, Collins, & Abbott, 2004). Patterson, et al. studied the resiliency of high school teachers in urban schools whose students achieved an equal or higher score than the state average on the standards of learning in reading and mathematics.

The purpose of the research was to determine what strategies classrooms teachers utilized that made them resilient and allowed them to sustain results that were at the state average or above while other colleagues were not experiencing such results teaching in the same urban environment. Patterson, et al. (2004, p. 3) defined resilience as “using energy productively to achieve school goals in the face of adverse conditions.” The research questions Patterson, et al. (2004, p. 3) set out to answer were: “1). What drives those resilient teachers who maintain their tenure in urban environments, i.e.” and “2). Why do successful teachers stay in the schools facing the toughest challenges?”

The population for the study was identified by first determining large urban school districts that had student populations that scored equal or above the state standard scores in reading and mathematics (Patterson, et al., 2004). Four school districts were selected that met the criteria above and eight teachers and eight teacher leaders were then purposely chosen that matched the following criteria: 1). The participants had been teaching in an urban educational setting for at least three years, and 2). The schools the teachers and teacher leaders work in score

above the state average in reading and mathematics and face adverse conditions present in the urban setting. The final 16 educators were then selected from the pool of possible participants based on recommendations from local school district staff and the Council of the Greater City Schools. Interviews with teachers and teacher leaders were conducted and used as the primary source of data and analyzed using descriptive qualitative analysis (Patterson, et al., 2004).

Patterson, et al. (2004) found information that allowed them to comprise a list of strategies that the resilient teachers used to assist in coping with adverse conditions while achieving average to above average results in student achievement on the standards of learning in mathematics and reading. The strategies are:

1. Resilient teachers have a set of personal values that guides their decision-making.
2. Resilient teachers place a high premium on professional development and find ways to get it.
3. Resilient teachers provide mentoring to others.
4. Resilient teachers are not victims - they take charge and solve problems.
5. Resilient teachers stay focused on the children and their learning.
6. Resilient teachers do whatever it takes to help children be successful.
7. Resilient teachers have friends and colleagues who support their work emotionally and intellectually.
8. Resilient teachers are not wedded to one best way of teaching and are interested in exploring new ideas.
9. Resilient teachers know when to get involved and when to let go. (Patterson, et al., 2004, p. 4)

Patterson, et al., 2004 also reported that the resilient teachers believed it was their responsibility to ensure students succeeded in adverse conditions. The presence of productive professional development opportunities including a collaborative atmosphere amongst the faculty and positive support from school leaders also assisted resilient teachers to achieve high standards for their students. The information discovered by Patterson, et al. may be helpful in understanding what

qualities to look for when hiring teachers so retention of good teachers will occur when those teachers are faced with difficult teaching environments.

Synthesis and Conclusions

The common theme in the studies reviewed on the influence of school facilities on student achievement was in the purpose of the researchers: to broaden their investigations of the relationship between school facilities and student achievement so to determine any mediating variables that may provide a more complete analysis of how student achievement is affected. The continual search for different research methods that may provide more accurate results was evident in each of the studies. An understanding of mediating variables in each of the studies allows for the findings to be transferable to a broader range of situations involving school facilities and effective learning. The instruments used in these studies were specifically designed to match the methodology used in the research. The instruments applied in the studies were created using previous instruments which were tested and modeling the design of the instrument for the unique purpose each study possessed.

Bowers and Urick (2011) and Picus et al. (2005) conducted their research in part to address how varied methodological practices used when investigating the relationship of school facility conditions and student achievement may provide more complete answers. The studies reviewed were grounded not only in the educational elements but in the need to produce reliable research so financially prudent decisions concerning education could be executed. The necessity and demand for effective utilization of school funds drives the need for more research on school facilities. Because of the natural deterioration of school facilities, the unfortunate events that prevent the use of school facilities, and the immediate need for the improvement in student achievement an awareness and understanding of all variables that affect educational institutions

is necessary to maximize learning while minimizing costs not directly associated with instruction is necessary. The methodological approach of each of the studies provided insight into the thought process of approaching research concerning school facilities and student achievement. The criticisms of prior studies by the researchers were valuable for future research.

Bowers and Urick (2011) presented the argument that it is more accurate to use the building condition as a variable than the age of the building. Picus et al. (2005) stated that the use of building age does not account for the lifespan of the building or how frequently building maintenance occurs. Uline and Tschannen-Moran (2008) as well as O'Neill and Oates (2001) used methodologies that were criticized by other researchers yet their results provided useful information for further research. The reliability of the rating systems for school facilities is a factor when determining whether the results of the study are accurate and transferable. Surveying to find the perceptions of the participants, specifically teachers' perceptions of the quality of the school facility, was criticized by Picus et al. (2005) but proven by the research of Uline and Tschannen-Moran (2008) as having a positive association with student achievement in mathematics and English.

Determining the extent that the quality of school facilities have on student achievement is critical in the process of educating students as well as in educational leadership decision making. Research has produced mixed results from strong relationships between school facilities and student performance to the existence of no relationships. There are important findings in the methodologies used and the accuracy of the data applied in each of the research studies. The research studies reviewed did have similar findings in that in each of the conclusions referred to the possibility of mediating variables may influence the relationship between the condition of school facilities and student achievement. The studies reviewed also investigate teachers'

instructional practices that may contribute to improved student achievement. Further research is necessary to determine the variables, the role of these variables in maximizing the financing of public education, and how certain variables can be enhanced to improve student achievement. Awareness of these mediating variables will allow for the appropriate decisions which in turn will result in school facilities that are financially efficient and academically effective.

The review of the literature on teaching strategies was explored in order to understand the qualities and actions teachers may take in order to improve or maintain student achievement in adverse learning environment. Darling-Hammond (2008) views on teacher needs and teaching strategies revealed that it is necessary for teachers to have technologies available as well as curriculum resources in order to provide effective instruction. Patterson, Collins, and Abbott (2004) in their descriptive research investigation on the qualities of resilient teachers discovered a list of nine common strategies that were considered strengths in remaining resilient and providing a learning environment that allowed students to keep a high standard of academic achievement. The researchers found that resilient teachers possessed values that focused on students as individuals and on the students' ability to learn. Resilient teachers were mentors and understood the importance of maintaining professionalism and being leaders in finding solutions collaboratively to issues that influence students and academic achievement. The findings from Patterson et al. provide insight into understanding how teachers may have adjusted to a change of facility that allowed student achievement at Blacksburg Middle School to be maintained at a high level and in some academic areas increase.

Chapter 3: Methodology

Introduction

The purpose of this chapter is to explain the methodological approach utilized in the investigation of why the achievement remained consistent in student achievement based on the Standards of Learning (SOL) assessments in reading and mathematics while the students from Blacksburg Middle School were housed in an alternate school facility as compared to the modern school facility the prior two years. The research questions for the study will be reviewed. The data necessary to conduct the research as well as the specific populations participating in the study are explained. The procedure for acquiring consent to conduct the survey for the study is outlined in the chapter. The reasoning behind the creation of the items in the survey is expounded upon and the sections of the survey including sets of questions for each section are explained. The method for obtaining data used in the survey is clarified in this chapter. The process of analyzing the data collected for the study is also described.

Research Questions

The unique situation that provided the opportunity to investigate the effect of school facilities on the student achievement of a middle school population as they resided in a modern facility designed for middle school education as compared to the student achievement of the same population when housed in a substandard facility has raised specific questions. The purpose of the study was to explore answers to the following questions:

1. What did the faculty do to account for the maintained consistency and improvement in student achievement based on the Standards of Learning assessments in reading and mathematics?
 - a. What did the teachers do differently relating to instructional strategies?

- b. What activities did the teachers do with students outside the regular core class instructional routine that provided supports for students that could account for the sustained student academic performance?

The results of the student achievement data have indicated sustained academic achievement with an improvement in some areas while students attended school in the older, less equipped facility for a two year period compared to the prior two years of student achievement data while the students were located in the modern facility. These results are contradictory to prior research that suggests substandard and obsolete school facilities influence student academic progress and teachers' perceptions and performances in a negative manner.

Population

The population for the study are the faculty members who completed the survey instrument. The teacher survey consent form was distributed to the 58 teachers on the Blacksburg Middle staff. These individuals were certified employees and each held a teaching license in the Commonwealth of Virginia. Signed consent forms were returned from 51 of the teachers which equates to an 88% return rate. The staffing changes since the 2008-2009 school is summarized in the following sentences. The staffing in 2008 included 68 teachers in the areas of English, mathematics, history and social science, science, career and technical education, special education, health and physical education, fine arts, English electives, foreign language, and English as a second language. There were two retirements in sixth grade English and sixth grade mathematics which were filled with new hires for the 2009-2010 school year. The number of staff members was 66 for the 2009-2010 school year. There was a career and technical education teaching position at the end of the 2009-2010 school year that was reassigned to another school and also a sixth grade history and social science teacher retirement with that

position not being filled. There was a reduction in staff by two positions for the 2010-2011 school year bringing the total staff to 64 teaching positions. The 2011-2012 school year staffing remained the same total teaching positions of 64 with one seventh grade English teacher leaving and a teacher was hired for that position. The survey was designed with questions so the data could be analyzed based on the years of teaching experience overall as well as years of teaching experience at Blacksburg Middle School.

Data Needs

Because student academic achievement and attendance remained consistently high while the school population experienced a relocation which resulted in a change in facilities design and overall layout of the campus, classroom furnishings, and a difference in the conditions of the school facilities, it is natural to speculate that perhaps the faculty had some influence upon the students to perform better. Therefore the data needed to understand what influence the faculty had on student performance could be obtained by asking the faculty if they did anything differently relating to instructional strategies during the years the students were in the alternate facility. A survey instrument was designed to obtain responses from the faculty. The data on the teachers' perception and instructional methodologies were essential information in order to understand the influence the change may have had on student achievement. The data from the teachers were obtained through the administration of a survey.

Method of Obtaining Data

The data involving the teachers' perceptions were obtained through the use of a survey administered to the teachers at Blacksburg Middle School. The survey was created in order to gain information on the teachers' perceptions of the influence the change of facility had on instruction and the impact the facilities had on student achievement and behavior.

Instrument Design

The purpose of the survey is to allow teachers the opportunity to provide data on their own teaching experiences and background as well as their perceptions and attitudes concerning the change of facility and the influence the facility may have had on their teaching methodology. The years being investigated in the study are from the 2008-2009, 2009-2010, 2010-2011, and 2011-2012 school years. The survey was administered to staff members present at the time of the survey.

The survey also provided an opportunity for teachers to elaborate on how the change in facilities influenced student achievement and attitude. The survey was designed with three sections: 1) Demographics of Teachers, 2) Teacher's Perceptions and Instructional Practice, and 3) Influence on Students. The section on the Demographics of Teachers included three questions with two being in the multiple-choice format and one being short answer. The purpose of the demographic questions was to determine the years of experience of the participants, the years of experience as a member of the Blacksburg Middle School staff, and the subject areas taught.

The Teacher's Perception and Instructional Practice section involved 12 questions with seven of the items providing multiple-choice answers and all questions having a comment segment. The questions addressed how the decision to relocate the middle school population made the teachers feel and if the move changed their attitudes toward education. The questions provided an opportunity for teachers to elaborate on the conditions of the alternate facility and compare the two facilities in terms of instructional space, furniture, and overall physical plant. Questions were included that required the participants to comment on possible compensations that were made to instructional techniques which were deemed necessary due to the features and conditions of the alternate facility.

The Influence on Students section of the survey included 10 questions with seven having multiple-choice answers. Each of the 10 questions provided the opportunity for comments from the participants (see Appendix A). The questions were created to gather information from the teachers that would give insight into the possible effects of the alternate facility on student morale. The purpose of the research is to understand why there was an improvement or results remained consistent in student achievement based on the Standards of Learning assessment in the alternate facility and what the faculty might have done differently to allow for the improvement or consistent results. The teachers' perceptions of why there was an improvement or consistency in student achievement in some scores and a sustained level of high achievement in other scores were gathered through the questions in this section of the survey. Teachers were able to provide direct comments about why they believed the consistency and improvement in student achievement occurred and what, if any, effect the facility had on student achievement. The influence of lighting and physical elements of the school facilities, such as furniture, on student achievement was a focus in two of the questions.

The Commonwealth Assessment of Physical Environment (CAPE) instrument will be used as a guide in creating the sections of the survey that pertained to each teacher's perception of the building conditions and the influence of the facilities on student achievement and teaching techniques (Cash, 1993). The CAPE instrument allows for building conditions to be assessed through the use of a survey. The areas of the CAPE assessment that were used as a guide in creating the teacher survey are questions pertaining to furniture, lighting, and school grounds. The Teacher Perception Survey was submitted to the Virginia Tech Institutional Review Board (IRB) and was administered using an IRB acceptable survey site.

Obtaining Consent

The teachers were given a paper copy of the consent form explaining the study. The documents were kept in the Principal's office. The consent form was designed in order to provide a clear explanation of the study and provide the necessary information for the research as required by the Institutional Review Board (IRB) through Virginia Polytechnic Institute (see Appendix A). The IRB application was approved on March 27, 2013. Participants were given the consent form on April 9, 2013 and were to return the form to the researcher anytime during a time period that ended on April 22, 2013. The teachers were offered the opportunity to ask the researcher questions about participating in the survey as a group or individually. Once the signed consent form was returned to the researcher an email with the link to the online survey was sent to the participant (see Appendix B).

Analyzing the Data

The data on the teachers' perceptions obtained from the survey were analyzed based on the three areas of the survey: 1) Demographics of Teachers, 2) Teacher's Perceptions and Instructional Practice, and 3) Influence on Students. Each multiple-choice question was analyzed by determining the percentage of each response for each item in the question from the teachers surveyed. The responses were then compiled by the participant's number of years in the education profession and once again by the participant's number of years teaching at Blacksburg Middle School (BMS). The results for each question were then compared based on the total years of experience and the years of teaching experience at BMS. The comment sections were organized by question and the common themes from each answer were determined using the qualitative analysis methods of coding, descriptive statistics, and content analysis. The final results of the data were reported statistically, graphically, and descriptively.

The analysis of the demographic section allowed for an understanding of the survey participants' teaching background including information on the years taught at Blacksburg Middle School. The background provided contributed to understanding what the faculty may have done differently concerning teaching strategies. The data from the survey could also provide insight into other compensatory actions such as nonacademic after school or lunch time activities by the teachers that could account for the high academic performance on the Standards of Learning in reading and mathematics while housed in the alternate facility compared to teaching in the modern facility the prior two years.

The teacher's perception section of the survey provided data on the teachers' attitudes concerning the decision of moving the Blacksburg Middle School to an alternate facility in order to provide Blacksburg High School with an adequate school facility. The data from the teacher survey provides insight into possible adaptation in the instructional practices the teachers may have instituted while in the alternate facility. The teacher survey also provides detailed information on the differences between the two facilities concerning the instructional space, physical characteristics, lighting, furniture, and technology resources.

A thematic analysis was applied to the data acquired through the teacher survey administered in April, 2013. A qualitative descriptive analysis on the data from the survey responses was examined in order to understand if any instructional strategies were implemented by the teaching staff to compensate for the perceived inadequacy of the alternate facility. Coding and descriptive statistical analysis was applied to the data from teacher survey. Any specific activities the teachers incorporated into their daily routine outside of the classroom while in the alternate facility were sought through the analysis data from the teacher survey. The data gathered on the teachers' perceptions of the influences the facility had on the students was

grouped and themes were extracted. The themes and strategies discovered in the responses of the teachers were combined and prioritized.

Chapter 4: Findings

Introduction

The teachers completed The Teacher's Perception Survey (see Appendix A) through the Virginia Tech online survey website. The data from the completed surveys were analyzed by question. The data from each question were compiled by years of experience in the education profession, years of educational experience at Blacksburg Middle School (BMS), and overall responses to each question. The responses to each question were compared based on the years of experience and overall responses.

Survey Procedures

The subject pool consisted of instructional and administrative staff that was serving the Blacksburg Middle School students at the time of the survey. There was no exclusion of certain individual staff members. Teachers received an invitation to participate in the study in the form of the survey permission document (see Appendix B). Participation was voluntary as explained in the survey permission form. The survey permission form was given to the 58 staff members who were available to participate in the study which included an explanation of the study and details of the process. There were 51 staff members who signed and submitted the survey permission form out of the 58 staff. Once the forms were returned to the researcher an email (see Appendix C) was sent to each individual staff member who returned a signed permission form with the web address of the online survey. Thirty seven staff members out of the 51 completed the survey for a 73% completion rate.

Data were gathered by means of the teacher survey that asked the teachers about their teaching experience, the teacher's perceptions of the facility, the teacher's instructional practices

and any compensation made to instruction due to the relocation, and the influence the facility may have had on students and student achievement. The survey instrument also allowed teachers to provide feedback on any unusual motivational strategies, organizational practices, or instructional techniques that assisted students in maintaining and improving their academic performance while in the alternate facility as compared to the prior school years. The data were gathered through the survey website and results were maintained through the survey website. The responses were downloaded from the Virginia Tech survey website in the form of an excel spreadsheet. Responses were saved onto an external storage device maintained by the researcher. Data were analyzed to determine what, if any, adjustments teachers made to instruction or routine that would account for the high standard of student performance while housed in the alternate facility.

Findings

The findings were a result of the descriptive and thematic analysis of each item in the survey instrument. The first three items on the survey were to determine the demographics of the population participating in the study based on overall educational experience and educational experience specifically at Blacksburg Middle School (BMS). Table 4.1 represents the number of staff members within each range of years of experience in education overall and also in years of educational experience at BMS: questions one and two from the survey. The table also indicates the percentage of staff members in each range of years of experience out of the total number of participants in the survey. Teachers with more than 10 years of educational experience overall made up 73% of the surveyed population. Teachers who taught at Blacksburg Middle School for more than 10 years made up 54% of the surveyed population.

Table 4.1

Participants’ years of educational experience overall and years of experience at BMS

Years of Experience	Number of responses overall years in the education profession	Percentage of overall years in education	Number of responses years on the BMS staff	Percentage of years of educational experience at BMS
20 +	17	46%	7	19%
16 to 20	7	19%	10	27%
11 to 15	3	8%	3	8%
6 to 10	7	19%	11	30%
0 to 5	3	8%	6	16%
Total	37	100%	37	100%

The breakdown of the subjects taught by the participants is detailed in Table 4.2. Multiple teachers taught multiple subject areas: question three from the survey.

Table 4.2

Subject areas taught by the teachers.

Subject Area	Number of Responses	Percentage
Mathematics	11	18%
English	13	21%
Science	12	20%
Social Studies	11	18%
CTE	3	5%
Fine Arts	6	10%
Physical Education	1	2%
Special Education	4	7%

The responses from the teachers on their observations on the change in staff morale after moving to the alternate facility are detailed in Table 4.3 which displays the results as organized by overall years of experience by the participants and Table 4.4, which indicates the results as

sorted by years of education experience at Blacksburg Middle School: question 6 from the survey. The indication was that the teachers' morale did shift negatively once it was determined the relocation would occur with 89% of the surveyed population reporting a negative change and 11% of those surveyed indicating no change in morale. The results indicate very little variance in the responses based on overall years of educational experience compared to years of educational experience at Blacksburg Middle School.

Table 4.3

Staff's change in morale due to the change of facilities as reported by overall years of experience in education.

Overall Years of Experience in Education	Total N	Yes, negatively	Yes, negatively Percentage	No	No Percentage	Yes, positively	Yes, positively Percentage
20+	17	16	94%	1	6%	0	0%
16 to 20	7	6	86%	1	14%	0	0%
11 to 15	3	3	100%	0	0%	0	0%
6 to 10	7	6	86%	1	14%	0	0%
0 to 5	2	1	50%	1	50%	0	0%
Total	36	32	89%	4	11%	0	0%

Table 4.4

Staff's change in morale due to the change of facilities as reported by years of experience in education at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	Yes, negatively	Yes, negatively Percent	No	No Percent	Yes, positively	Yes, positively percentage
20+	7	6	86%	1	14%	0	0%
16 to 20	10	9	90%	1	10%	0	0%
11 to 15	3	3	100%	0	0%	0	0%
6 to 10	11	11	100%	0	0%	0	0%
0 to 5	5	3	60%	2	40%	0	0%
Total	36	32	89%	4	11%	0	0%

Teachers were asked if the working conditions changed as a result of the move to the alternate facility: question seven from the survey. The overall results showed 81% of the teachers felt the working conditions changed negatively with 19% of those surveyed feeling that there was no change in the working conditions of the school facilities. Table 4.5 shows the results broken down by overall years of education experience and Table 4.6 displays the data as years of experience at Blacksburg Middle School (BMS). There was a difference in the responses when comparing the data between the overall years of experience and years of experience at BMS. The largest difference when comparing years of educational experience overall and years of educational experience at BMS was in the 16 to 20 years of experience range with those having 16 to 20 years overall reporting a 67% of the participants feeling the working conditions changed negatively and 33% expressing no change in working condition. Ninety percent of the population with 16 to 20 years of experience at BMS felt the working conditions changed negatively and 10% reporting no change in the working conditions. The comparison between the overall years and the years of experience at BMS for the range zero to five years showed that those who only had five or less years in education felt there was no change in working conditions but 60% of those participants who had been teaching at BMS for five or less years responded that there was a negative change in work conditions with 40% expressing no change in working conditions between the two school facilities.

Table 4.5

Responses to change in working conditions between the two school facilities as reported by overall years of experience in education.

Overall Years of Experience in Education	Total N	Yes, negatively	Yes, negatively Percentage	No	No Percentage	Yes, positively	Yes, positively percentage
20+	17	15	88%	2	12%	0	0%
16 to 20	7	6	67%	1	33%	0	0%
11 to 15	3	2	100%	1	0%	0	0%
6 to 10	7	6	86%	1	14%	0	0%
0 to 5	2	0	0%	2	100%	0	0%
Total	36	29	81%	7	19%	0	0%

Table 4.6

Responses to change in working conditions between the two school facilities as reported by years of experience in education at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	Yes, negatively	Yes, negatively Percentage	No	No Percentage	Yes, positively	Yes, positively Percentage
20+	7	6	86%	1	14%	0	0%
16 to 20	10	9	90%	1	10%	0	0%
11 to 15	3	3	100%	0	0%	0	0%
6 to 10	11	8	73%	3	27%	0	0%
0 to 5	5	3	60%	2	40%	0	0%
Total	36	29	81%	7	19%	0	0%

The staff responses to question eight about how they felt after having taught for the previous two and half years in the alternate facility indicated that 58% of those surveyed adjusted positively. There were no teachers who felt they had a negative adjustment and 22% felt they had adjusted positively initially. There was 20% that believed that after two and half years they had not adjusted and still had the negative feelings as they did when they first moved to the

alternate facility. These results, presented in Table 4.7 reported by overall years of education experience, and Table 4.8 reported by years of experience at Blacksburg Middle School, were similar when viewing the data separated into years of experience overall and years of experience at Blacksburg Middle School.

Table 4.7

Participants' feelings after having taught in the alternate facility for two and half years as reported by overall years of experience in education.

Teacher's Years of Experience at BMS	Total N	Same as before: pos.	Same as before: pos. %	Same as before: neg.	Same as before: neg. %	Adjust pos.	Adjust pos. %	Adjust neg.	Adjust neg. %
20+	16	4	25%	3	19%	9	56%	0	0%
16 to 20	7	1	14%	4	57%	2	29%	0	0%
11 to 15	3	0	0%	0	0%	3	100%	0	0%
6 to 10	7	3	43%	0	0%	4	57%	0	0%
0 to 5	3	0	0%	0	0%	3	100%	0	0%
Total	36	8	22%	7	20%	21	58%	0	0%

Table 4.8

Participants' feelings after having taught in the alternate facility for two and half years as reported by years of experience in education at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	Same as before: pos.	Same as before: pos. %	Same as before: neg.	Same as before: neg. %	Adjust pos.	Adjust pos. %	Adjust neg.	Adjust neg. %
20+	7	2	29%	1	14%	4	57%	0	0%
16 to 20	10	2	20%	5	50%	3	30%	0	0%
11 to 15	3	0	0%	0	0%	3	100%	0	0%
6 to 10	11	1	9%	3	27%	7	64%	0	0%
0 to 5	5	0	0%	1	20%	4	80%	0	0%
Total	36	5	14%	10	29%	21	57%	0	0%

The participants were asked in question 13 from the survey what effect, if any, the change to the alternate facility had on the use of technology in instruction or student access. The

technology was installed and upgraded where necessary in the alternate facility to match and improve on the technology located in the modern facility. The technology in the alternate facility prior to the upgrade was minimal and did not include wireless access in multiple areas, smart boards in classroom rooms, or document cameras in classrooms. There were no significant statistical differences when analyzing the data based on overall years of experience as compared to years of experience at Blacksburg Middle School. The results represented in Table 4.9 and Table 4.10 indicate 63% of the staff felt there was no effect on technology with 11% conveying a positive improvement in technology availability and usage. There was 26% of the staff feeling that the change in facilities had a negative effect on the use of technology in instruction and student access. Based on the comments from the participants on this item the issue was the inconsistency of the wireless connection in some areas of the alternate facility. Those who believed the change to the alternate facility was a negative effect on technology also commented that the number of available computers and computer labs was a problem. The 63% of the participants who felt there were no effects on technology usage and the 11% who believed there was an improvement commented that maintaining the technology had a positive impact on instruction and student achievement.

Table 4.9

Effect on the use of technology in instruction or student access as reported by overall years of experience in education.

Teacher's Years of Experience at BMS	Total N	None	None Percentage	Neg.	Neg. Percentage	Pos.	Pos. %	None or Positive Effect %
20+	16	9	56%	5	31%	2	13%	69%
16 to 20	7	5	71%	2	29%	0	0%	71%
11 to 15	2	1	50%	1	50%	0	0%	50%
6 to 10	7	6	86%	0	0%	1	14%	100%
0 to 5	3	1	33%	1	33%	1	33%	67%
Total	35	22	63%	9	26%	4	11%	74%

Table 4.10

The effect on the use of technology in instruction or student access as reported by years of experience in education at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	None	None Percentage	Neg.	Neg. Percentage	Pos.	Pos. %	None or Positive Effect %
20+	7	4	57%	2	29%	1	14%	71%
16 to 20	10	7	70%	3	30%	0	0%	70%
11 to 15	3	1	33%	1	33%	1	33%	67%
6 to 10	10	7	70%	2	20%	1	10%	80%
0 to 5	5	3	60%	1	20%	1	20%	80%
Total	35	22	63%	9	26%	4	11%	74%

The staff were asked if the furniture in their classroom at the alternate facility was inferior, superior, or the same as the furniture in the classroom on the Price's Fork campus: question 15 from the survey. The classroom furniture that was in the Price's Fork Road facility remained in that facility and classroom furniture that was available in the school division was

utilized in the alternate facility. The furniture in the alternate facility included desks and tables depending on the teacher’s preference. In some teacher’s rooms the in the alternate facility the quality of the furniture was of lesser quality because of the smaller size of desks and tables, the instability of the furniture, and the condition of the surface of the furniture. Overall 60% of the participants felt the furniture was inferior with 37% believing the furniture was the same. There was three percent of the staff that felt they had better classroom furniture in the alternate facility. The findings are represented in Table 4.11 and Table 4.12. The analysis indicated no significant statistical differences between data based on overall years of experience as compared to years of experience at Blacksburg Middle School

Table 4.11

Comparison of the classroom furniture between the original and the alternate facility as reported by overall years of experience in education.

Overall Years of Experience in Education	Total N	Inferior	Inferior Percentage	Superior	Superior Percentage	Same	Same Percentage
20+	16	9	56%	1	6%	6	38%
16 to 20	7	5	71%	0	0%	2	29%
11 to 15	3	2	67%	0	0%	1	33%
6 to 10	6	5	83%	0	0%	1	17%
0 to 5	3	0	0%	0	0%	3	100%
Total	35	21	60%	1	3%	13	37%

Table 4.12

Comparison of the classroom furniture between the original and the alternate facility as reported by years of experience in education at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	Inferior	Inferior Percentage	Superior	Superior Percentage	Same	Same Percentage
20+	7	3	43%	0	0%	4	57%
16 to 20	10	7	70%	1	10%	2	20%
11 to 15	3	3	100%	0	0%	0	0%
6 to 10	10	6	60%	0	0%	4	40%
0 to 5	5	2	40%	0	0%	3	60%
Total	35	21	60%	1	3%	13	37%

The effect of lighting on student achievement was investigated by asking the staff their feelings about the influence lighting had on student achievement: question 19. The lighting used in both facilities was fluorescent bulb fixtures. Seventy four percent of the participants felt that lighting had no influence on student achievement with 20% believing lighting was a negative influence on student achievement. There were six percent of the participants who felt that the lighting had a positive effect on the students. The results are shown in Table 4.13 and Table 4.14. As in the previous question, the analysis indicated no significant statistical differences between data based on overall years of experience as compared to years of experience at Blacksburg Middle School.

Table 4.13

The influence of lighting in the alternate facility on student achievement as reported by overall years of education experience.

Overall Years of Experience in Education	Total N	Positive Positive	Positive Percentage	Negative	Negative Percentage	No Influence	No Influence Percentage
20+	15	1	7%	4	27%	10	67%
16 to 20	7	0	0%	1	14%	6	86%
11 to 15	3	0	0%	0	0%	3	100%
6 to 10	7	0	0%	2	29%	5	71%
0 to 5	3	1	33%	0	0%	2	67%
Total	35	2	6%	7	20%	26	74%

Table 4.14

The influence of lighting in the alternate facility on student achievement as reported by years of education experience at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	Positive Positive	Positive Percentage	Negative	Negative Percentage	No Influence	No Influence Percentage
20+	6	0	0%	1	17%	5	83%
16 to 20	10	1	10%	2	20%	7	70%
11 to 15	3	0	0%	1	33%	2	67%
6 to 10	11	0	0%	3	27%	8	73%
0 to 5	5	1	20%	0	0%	4	80%
Total	35	2	6%	7	20%	26	74%

There was a difference in the campus design between the original school facility on Price's Fork Road and the alternate school facility. The original facility was one building with hallways designated for each grade level. Each hallway consist of four pod areas and within each pod there were five classroom areas. The classroom areas consist of a science lab, a teacher workroom space, and a conference room. There were multiple storage areas in each pod hallway

as well as within each classroom. Another main area of the original facility was the physical education space. This included a full sized gym, an auxiliary gym, an exercise room and two additional classrooms for health classes. The original facility also included classrooms for the career and technical education classes which were technology education, agricultural science, business and keyboarding, and family and consumer science. Three fully equipped art rooms and storage area were designed to be located in a central location of the building. There was also an auditorium, dining area for students and faculty, and band and chorus classrooms with practice rooms, dressing rooms, and large storage areas.

The alternate facility had three separate buildings, a large eight classroom mobile unit housing the eighth grade population, four single mobile units with three containing the eighth grade science classrooms and one housing the eighth grade mathematics, and three other stand-alone mobile units for classes. The core classes for each grade levels were separated with the eighth grade having classes in the mobile units, the sixth grade in the main building, and the seventh grade in the lower building which was originally constructed as an elementary school. The middle building housed art, career and technical education, and fine arts. There was also an exercise area for physical education to utilize as well as one gym in the main building.

Teachers were asked in question 21 if the campus layout of the alternate facility influenced student achievement. The data from the item are shown in Table 4.15, detailing results organized by overall years of experience, and Table 4.16, showing the analysis as sorted by the participant's years of experience at Blacksburg Middle School. There were no significant statistical differences between the two sets of data. The combined results from the participants indicated that 60%, 21 out of the 35 responders, believed the layout of the campus did influence student achievement, with 42% of the total 60%, nine out of the 21 participants, believing it

influenced student achievement negatively. Those participants who felt there was a negative influence of the campus layout commented that they believed the expansive layout of the school and the lack of the pod system for teams made it detrimental for collaboration and team gatherings. Those who viewed the layout as a negative also pointed to the distance some students had to travel from their core classrooms to water fountains, restrooms, and lockers. There were five participants who felt the layout influenced the student positively mainly due to the ability to travel outside between classes. The outside exposure was viewed by two participants as a positive and a negative depending on the weather. There were five survey participants who did not indicate whether the campus layout influence was positive or negative. Forty percent of those surveyed believed there was no influence of the campus layout on student achievement.

Table 4.15

The influence the alternate facility campus layout had on student achievement as reported by overall years of education experience.

Overall Years of Experience in Education	Total N	Yes	Yes Percentage	No	No Percentage	No Influence	No Influence Percentage
20+	16	10	63%	2	13%	4	25%
16 to 20	7	3	43%	2	29%	2	29%
11 to 15	3	2	67%	0	0%	1	33%
6 to 10	6	4	67%	1	17%	1	17%
0 to 5	3	2	67%	0	0%	1	33%
Total	35	21	60%	5	14%	9	26%

Table 4.16

The influence the alternate facility campus layout had on student achievement as reported by years of education experience at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	Yes	Yes Percentage	No	No Percentage	No Influence	No Influence Percentage
20+	7	4	57%	1	14%	2	29%
16 to 20	10	5	50%	3	30%	2	20%
11 to 15	3	2	67%	0	0%	1	33%
6 to 10	11	8	73%	0	0%	3	27%
0 to 5	4	2	50%	1	25%	1	25%
Total	35	21	60%	5	14%	9	26%

The change in the facility may have had an impact on the student morale. Teachers were asked if they believed the alternate facility influenced student morale in any way: question 24 of the survey. The results analyzed by the participants overall years of education experience are reported in Table 4.17 and the data organized by the participants years of experience at Blacksburg Middle School is displayed in Table 4.18. There were no significant statistical differences when the data were sorted between years of educational experience overall and years of experience at Blacksburg Middle School. Forty two percent of the teachers felt the change in facility did not affect student morale with 19% of the faculty believing the change of facility had a positive impact. There were 39% who responded that the change of facility had a negative impact of student morale with the majority of the comments expressing that initially student morale may have been lower but overall the students adjusted and no decrease in morale was noticed.

Table 4.17

The influence of the change of facilities on student morale as reported by overall years of education experience.

Overall Years of Experience in Education	Total N	Yes, Positively	Yes, Positively Percentage	Yes, Negatively	Yes, Negatively Percentage	No	No Percentage
20+	16	4	25%	4	25%	8	50%
16 to 20	7	0	0%	5	71%	2	29%
11 to 15	3	0	0%	1	33%	2	67%
6 to 10	7	2	29%	3	43%	2	29%
0 to 5	3	1	33%	1	33%	1	33%
Total	36	7	19%	14	39%	15	42%

Table 4.18

The influence of the change of facilities on student morale as reported by years of education experience at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	Yes, Positively	Yes, Positively Percentage	Yes, Negatively	Yes, Negatively Percentage	No	No Percentage
20+	7	2	29%	1	14%	4	57%
16 to 20	10	0	0%	6	60%	4	40%
11 to 15	3	1	33%	1	33%	1	33%
6 to 10	11	3	27%	4	36%	4	36%
0 to 5	5	1	20%	2	40%	2	40%
Total	36	7	19%	14	39%	15	42%

The overall condition of the alternate facility was rated by the teachers as below standard, standard, or above standard: question 25. The results showed that 65% thought the alternate facility was below standard, 35% felt the condition of the alternate facility was standard, with no participants rating the facility as above standard. There were no significant statistical differences in responses when broken down between the participants overall years of educational experience,

Table 4.19, as compared to the years of educational experience at Blacksburg Middle School, Table 4.20.

Table 4.19

The conditions of the alternate facility as rated by the teachers as reported by overall years of education experience.

Overall Years of Experience in Education	Total N	Below Standard	Below Standard Percent	Standard	Standard Percent	Above Standard	Above Standard Percentage
20+	17	12	71%	5	29%	0	0%
16 to 20	7	5	71%	2	29%	0	0%
11 to 15	3	2	67%	1	33%	0	0%
6 to 10	7	5	71%	2	29%	0	0%
0 to 5	3	0	0%	3	100%	0	0%
Total	37	24	65%	13	35%	0	0%

Table 4.20

The conditions of the alternate facility as rated by the teachers as reported by years of education experience at Blacksburg Middle School.

Teacher's Years of Experience at BMS	Total N	Below Standard	Below Standard Percent	Standard	Standard Percent	Above Standard	Above Standard Percentage
20+	7	5	71%	2	29%	0	0%
16 to 20	10	7	70%	3	30%	0	0%
11 to 15	3	2	67%	1	33%	0	0%
6 to 10	11	7	64%	4	36%	0	0%
0 to 5	6	3	50%	3	50%	0	0%
Total	37	24	65%	13	35%	0	0%

The participants were asked to reply to certain questions requesting comments with no multiple choice answers from which to select. The teachers were asked in question four about their initial reaction to the decision to move Blacksburg Middle School to the alternate facility.

There were 34 participants who were employed at the time of the decision and responded to the question. Twenty five of those had a negative feeling about the decision. Nine participants were indifferent and not surprised; expressing the dilemma to find facilities for the schools had limited solutions.

Participants were asked in question five about their feelings once they had the opportunity to move into their classroom and begin organizing their instructional areas. There were 33 teachers who responded to the question. Ten of those responded expressed a negative feeling with the common theme in their responses being concerns for the lack of space in instructional areas and the overall age of the buildings. The other 23 responders recognized the challenge and cited the improvements to the buildings and the classrooms as a positive.

The participants were asked in question 10 if the alternate facility prevented them from teaching as they did in the newer school facility. Out of the 29 who responded 13, 45%, believed the alternate facility did not stop them from teaching as they had before in the newer facility. The comments that were given had a main theme centered on the lack of classroom space available in the alternate facility. There were 16 teachers, 55%, who specifically noted that the lack of classroom space and work space in the alternate facility prevented them from teaching as they had before in the newer facility. A similar question, question 12, was asked of the participants by inquiring if they had engaged in any instructional strategy, organizational practice, or teaching method that was different from what they had used in the newer school facility. There were 26 responses with 11 participants expressing that they had not engaged in any other strategies that were different from what they had used previously in the newer facility, which represents 42% of those responding. The response was similar to the question as to whether the alternate facility prevented them from teaching as they had in the newer facility,

which 45% responded that the alternate facility did not prevent them from teaching as before. The theme was also similar between the two questions with the teachers who believed the reasons they had to engage in different instructional practices in the alternate facility were due to less classroom space which prevented group work to be organized and certain assignments to be altered.

Understanding what changes, if any, in the instructional practices of the teachers were necessary due to the change in the school facility was the purpose of this research. The participants were asked in question nine what changes in the instructional practices they used previously in the newer facility were made due to the conditions of the classrooms in the alternate facility. There were 30 participants who responded and for whom the question was applicable. Twenty four of the participants, 80%, who indicated they had to adjust their instructional practices, cited the lack of classroom and facility space in the alternate building as the reason for the adjustment. The common themes stated from those who said they made changes to the instructional practices due to instructional space were the loss of common team areas and team activities due to the alternate facility not having pod areas for single teams or moveable walls between classrooms for classes to easily collaborate in a large instructional space. Teachers responded that due to the lack of space fewer team activities with cross curricular focus as well as classroom activities involving groups were used during instructional time. The lack of space includes smaller classrooms in some situations in the alternate facility as well as other rooms not being available to expand classroom activities as were available in the newer school facility. Teachers believed the classrooms were crowded not allowing for group activities or different stations to be utilized by groups of students. The teachers who felt the classrooms were crowded believed the classrooms they used in the alternate facility were smaller

and had less storage than the classrooms in the original facility. Classroom management as well as instructional practices was cited as being modified by teachers due to space with more individual hands on type activities utilizing technology resources such as smart boards and document cameras in the alternate facility. The responses did include the lack of science lab resources as well as classroom size being a reason to modify certain lab activities to meet the resources available in the science classrooms. Participants noted that science labs were specifically installed and did provide some resources that made it possible to continue with certain activities but the alternate facility did not have all the resources afforded the teachers in the newer facility.

The participants were asked if it was necessary to compensate their teaching practices in the alternate facility and if it was necessary how did they compensate: question 11. The themes that were prevalent in the responses in describing what the teacher did to compensate their teaching practices were redesigning activities to be whole class-based rather than small group-based to compensate for the smaller instructional spaces and decreased instructional time, collaborate more with other teachers gaining ideas for different activities, try different classroom organization arrangements, and condensing assignments and activities. Teachers also felt that remaining focused on the content to maximize instructional time and to compensate for fewer group activities was applied due to limitations presented by the facility.

Teachers were asked in question 14 what equipment or physical characteristics of the facility, if any, were missing from the alternate facility that were available in the previous facility. The common theme was the lack of space in the alternate space including storage areas and areas to conduct large group activities. The specific areas that were mentioned as being missing in the alternate facility were the pod areas which included a conference room, teacher

office, teacher planning room, separate science classrooms that were fully equipped, display cases, storage areas, an auxiliary gym, practice rooms and performing areas for fine arts, separate teacher dining area, conference rooms for guidance and administration, green house facility, fewer designated computer lab rooms, and an auditorium. The characteristics that were detailed by the responses as being missing in the alternate facility were movable walls between classrooms which allowed for the creation of a large space for team and group activities, a reliable wireless signal for the laptops, acoustically efficient classrooms, smaller student locker space, and smaller bathroom areas with bathrooms and water fountains being less convenient to some classroom areas. The common theme in the responses was the lack of classroom and storage space in the alternate facility as compared the previous school facility.

Teachers were asked if they felt the alternate facility influenced student achievement in any way: question 16. There were 32 responses with 19 participants, 59%, who felt the facility did not influence student achievement. The participants who believed the facility did not influence student achievement indicated that staff, students, school personnel, and the community worked together to overcome any limitations that may have been presented because of the alternate facility. There were nine participants, 28%, who felt the alternate facility influenced student achievement in a positive manner by giving students the ability to travel outside between classes due to school campus being in separate buildings. The participants felt students being able to access the outside regularly provided a healthy and productive experience. There were four participants who believed the lack of computer lab rooms and classroom space may have hindered the students' ability to learn as well as the ability to provide effective testing areas.

The participants were asked in question 17 what they felt were the greatest influences the alternate facility had on student achievement and 15 out of 25 responses, 60%, expressed positive influences the facility may have had on achievement. The positive factors included the ability of the students to travel outside for class changes due to the facility layout, bringing the school community closer together to help each other because of limitations of the alternate facility, and the smaller size of the dining area in the alternate facility creating the need to have six lunch periods with smaller groups of students at one time. Teachers felt the negative factors of the alternate facility were smaller instructional areas and decreased opportunity for students to stay after school for instructional assistance because the location of the alternate facility was in the neighboring town.

Participants were asked in question 18 what they thought accounted for the maintaining and increase in some areas in student achievement while in the alternate facility over the prior two years. There were 27 participants who responded to the question and 11 of those believed that the strengthened sense of school community created by coming together to meet a common challenge was the reason for maintaining and increasing student achievement scores.

Participants felt the dedication of the faculty and school community provided the positive support which allowed the school community to come together and be able to work hard to overcome any limitations. There were also 11 participants who indicated that teachers and administration focused and prioritized instruction to maximize the instructional time. Because of the decrease in instructional space and a shorter instructional day the responses identify that the teachers focused on the curriculum with an understanding of the Standards of Learning test content by modifying teaching strategies to maximize the time and space available. There were five participants who thought the ability for students to travel outside during the school day and

the decrease in the student lunch group sizes contributed to the increase in student achievement by providing fresh air, more space than a normal hallway would allow, and less opportunity for student conflicts with smaller groups of students having lunch at the same time.

The participants were asked how they felt classroom furniture influenced student learning in the alternate facility: question 20. Twenty three out of the 30 participants responded to the question by indicating that the furniture had no influence on student learning. The reasons for these responses were either that the furniture was the same as in the prior school facility or the furniture was adequate for their classroom. There were seven responses indicating that the furniture could have influenced student learning negatively because of the loose tables and chairs creating distractions.

Participants were asked in question 22 if they believed there were factors other than the facility conditions of the alternate school building that may have influenced student achievement in the alternate facility. Fourteen out of the 25 participants felt that the factors that influenced student achievement positively were the faculty's commitment to the students and each other, the ability of the teachers to focus on the instructional content necessary and the safety of students, the availability of technology resources was maintained, the opportunity for students to walk outside, and lunch groups being decreased in size by approximately half the number of students as compared to when the school population was housed in the newer facility. There were five participants who believed there were no other factors which influenced student achievement and five participants who believed other factors such as shortened instructional day and longer bus ride for students may have influenced student achievement negatively.

The participants were asked in question 23 if there were scheduling or operational changes made to the school day that may have influenced student achievement. A majority of

the responses, 12 out of 28, indicated that the shortened instructional day may have influenced student achievement negatively. Eight participants believed that the decreased size in lunch groups may have positively influenced student achievement with five participants believing that the overall schedule may have also positively affected student achievement by organizing the school day to allow for the maximum instructional time per class period . There were three participants who believed there were no scheduling or operational changes that influenced student achievement.

Chapter 5: Summary of Findings, Discussion, Conclusion, Implications, Recommendations for Further Study

The purpose of chapter five is to provide a summary of the findings from the research investigating the effect a change in a school facility on a middle school population may have had on teacher instructional practices. The data from the survey were collected and analyzed and a summary from the findings is included in the chapter. Conclusions from the findings as well as discussions on the study, study concerns, and recommendations for further study are presented.

Summary

The purpose of the research was to determine what modifications teachers may have made to instructional practices due to being relocated to an alternate facility that would account for the maintained and in some subject areas increased student achievement levels as determined by the English and mathematics Virginia Standards of Learning assessments scaled scores and pass rate scores. The original facility in which the students were housed was a modern school building specifically designed for middle level education. The alternate facility consisted of three school buildings which were built in the 1930's and 1950's, a mobile campus housing eight classroom units, and four individual mobile units. The improvements to the alternate facility were explained in Chapter One. A descriptive qualitative analysis was employed to determine thematic commonalities throughout the results of the research. A statistical analysis was used to compare the results of the data as the results related to years of educational experience.

The population used for the study consisted of 51 middle school staff members who consented to complete the online survey. There were 37 participants who completed the survey out of the 51 who consented. The survey instrument utilized allowed the participants to provide

input concerning each participant's educational experience, the participant's perception of the alternate facility, and the influence the facility had on instructional practice.

Conclusions

The purpose of the study was to discover whether teachers did anything differently relating to instructional strategies while being housed in the alternate facility compared to the previous school years in the original facility. The findings indicated five areas which accounted for the maintained student achievement:

- instructional content was condensed focusing on the necessary content as determined by the Standards of Learning
- necessary technology resources were provided in the alternate facility and utilized to a greater degree
- an increase in collaboration amongst teachers overall provided additional resources for modifying instructional practices
- the decrease in the size of student groups during lunches and the students exposure to the outdoors due to the necessity to travel outside between classes
- the strengthened sense of community and the increased efforts by teachers, school personnel, students, and community members attributed to maintained student achievement and increased student achievement in some areas while housed in the alternate facility which was substandard compared to the original facility.

The research question examining what activities the teachers did with students outside the regular core class instructional routine that provided supports for students and could account for the sustained student academic performance was investigated through the use of data gathered from the teacher survey. Through the analysis of the data it was determined there were no activities outside the regular class instruction that may have accounted for the sustained student academic performance.

Overall the findings indicate that an increased effort by the teachers to design instructional lessons focusing on necessary content only and modifying activities because of the decreased learning space were the main adjustments to instructional practices. The participants felt that having the technology installed in the alternate facility that was available in the original facility impacted instruction and student achievement in a positive way. Even though the alternate facility was not designed specifically for middle level education the teachers were able to overcome this limitation maintaining and improving on student achievement. The determined attitude of the teachers, staff, school personal, and community members may have mitigated the possible negative effects of the alternate school facility.

Discussions

The research provided insight from the instructional staff in the form of a survey to answer the questions:

1. What did the faculty do to account for the maintained consistency and improvement in student achievement based on the Standards of Learning assessments in reading and mathematics?
 - a. What did the teachers do differently relating to instructional strategies?

- b. What activities did the teachers do with students outside the regular core class instructional routine that provided supports for students that could account for the sustained student academic performance?

The comparison of the conditions between the two facilities was established through the participants' responses to the question concerning the change in working conditions from the original facility to the alternate facility. The results from the questions showed that 81% of the teachers who answered the question felt the conditions in the alternate facility were worse than the conditions in the original facility. The common theme for why the conditions were worse in the alternate facility was the classroom space was smaller as well as the availability of other instructional classroom areas were nonexistent in the alternate facility.

Prior research showed that the condition of school facilities does have a negative influence on student achievement (Cash, 1993; Earthman, 2002). The current study does not disprove those findings but provides data to understand what modification to instructional practices and the overall school environment may be effective in offsetting facility conditions in order to maintain and improve on student achievement. The five areas described above could be utilized by school leaders to ensure continuity in instruction and maintaining a positive school climate when transitioning students to a different facility.

The participants provided feedback as to whether the alternate facility prevented them from teaching as they did in the original facility with 45% stating the alternate facility did not prevent them from teaching as they had before in the original facility. The 55% that did believe the alternate facility made them modify their instructional practice stated the modifications were due to the lack classroom space as well as the lack of the availability of extra classroom space that allowed for group work, individual stations for students, and areas for students to work

independently. The modifications specified by the participants were condensing lessons focusing only on the necessary content as determined by the Standards of Learning for Virginia as well as redesigning instructional approaches to allow for individual practice rather than group work. Another modification was conducting whole class instructional activities rather than stations or group activities. The ability for the teachers to have similar technology to what was present in the original facility allowed for instructional strategies to include the use of the technology. The collaborative efforts of teachers in creating successful instructional lessons benefited the academic achievement of the students. Due to the alternate facility layout and lack of space for large student gatherings, student lunch groups were half the size as when housed in the original facility which was determined through the results of the study to benefit the learning environment. The results of study indicated the necessity for the students to travel outdoors between classes during the school day in the alternate facility may have aided the high level of student achievement that occurred in the alternate facility.

The study provides support that modifying instructional practice to fit the physical learning environment space and maintaining a positive supportive environment for the students will have a positive effect on student achievement. These two modifications assisted in overcoming the difference in the physical characteristics of the alternate facility based on the students' academic achievement on the Virginia mathematics and English Standards of Learning assessments. Despite an initial negative change in teacher morale due to the move to an alternate school facility which a majority of the participants, 65%, felt provided poorer working conditions, teachers expressed a positive adjustment with a common school based focus on giving students the best possible educational experience.

The extensive amount of preparation to prepare the alternate facility for use by over 830 middle school students was noted by the teachers. The task was a joint effort by the entire school division and school community. All departments of the school division worked numerous hours of overtime to prepare the facility in such a short time period. The monumental effort was shared by all in the school division and the community with the common theme of providing a high quality educational experience in a safe environment for students. A common theme in the participants' comments recognized that there was no perfect solution in providing facilities for a high school and a middle school but when everyone shared a common cause of creating the best education possible in a safe environment positive outcomes did occur.

Implications

The conclusions that were reached from the data gathered in this study showed that the common theme presented as to why the instructional practices were altered was because of the lack of instructional space within the classrooms and in the alternate facility space overall. The instructional modifications indicated by the participants were summarized by having to condense lessons focusing the instruction only on the necessary content as determined by the Standards of Learning for Virginia as well as redesigning instructional approaches to allow for individual practice rather than group work using the technology resources to lead the group since the learning space was decreased from the original school facility. An implication of this study may be to form an understanding of each classroom space and the specific instructional practices that are utilized in that space to ensure the appropriate instructional strategies for a discipline are allowed the necessary classroom space in order for the instruction to be effective.

The instructional strategies shared by those surveyed indicated that the individual practice for students used the technology resources, smart boards and document cameras, to lead (teacher led or student led) student discussions and individual activities in the classrooms. The implications from the findings may be that by outfitting a new or alternate facility with similar technology resources or improved technology resources that were available in the original facility will have a positive influence on instruction and student achievement. The reader must understand that the teachers surveyed were skilled in the use of classroom technology and the loss of that instructional tool may have hindered student academic progress. Another implication of the study is the awareness of school leaders to the impact of planned large gathering of students during the school day may have on the school culture and student academic achievement.

Study Concerns

The concerns of the study involve the reliability of the data. The participants' responses may be distorted due to the emotional connection having to go through the process of moving from the original building. There were a small population of the participants who did not answer every question because the question may not have been applicable since the participant did not teach in the original building. Another concern is the data used to compare the student academic achievement in each facility was for a two year period in each facility. The cohorts of students were different for each year researched in the study. The size of the population used in the research is also a study concern due to the fact that out of the 51 staff members who had the opportunity to complete the survey a total of 37 did participate which is approximately 73% participation rate. The participants were staff members with educational experience in a variety of disciplines.

A concern of the study is the deficiency of precise wording of certain questions. The questions addressing the possible modifications of instructional practices due to the alternate facility were a concern. The answers given may not be as specific as if the questions were worded so to inquire about particular instructional techniques. There were follow up questions which allowed participants to expound on the difference of the equipment and physical characteristics between the two facilities.

Recommendations for Further Study

The results of the research have led to the following recommendations for further study. The recommendations for further study include situational events that may make it necessary for schools to suddenly transition to alternate facilities or to review current instructional strategies to ensure the strategies are adequately supported by the physical environment and available instructional resources .

1. Determining a finite list of essentials for a school facility to be equipped in order to provide a safe learning environment would be valuable information when a school population is moving into an alternate school facility for any reason.
2. Investigating the instructional practices utilized by teachers in mathematics and/or English classrooms that have the highest success rate on the Virginia Standards of Learning compared to instructional practices by teachers in poor performing classrooms while controlling for student and facility factors.
3. Determining the effect of overcrowded classrooms on student achievement by understanding the necessary space needed for specific pupil numbers and instructional

strategies as well as determining the specific resources necessary to maximize student achievement.

4. Understanding the influence student exposure to the outdoors on a daily basis would have on student academic achievement would provide further insight into the finding of this study.
5. A study of similar populations of students in similar school facilities using different scheduling models may provide information in determining best scheduling models when circumstances prevent a school population from experiencing a normal school year.
6. Conducting a similar study including data collected from students to investigate the effect of facility conditions have on teacher and student attitude as well as on student achievement.

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Appendix A

Teacher Perception Survey

(The page numbers at the end of each question indicates where the question is analyzed in this document.)

Demographics of Teachers

1. How many years have you been in the education profession? (p. 48)
0-5 ____ 6-10 ____ 11-15 ____ 16-20 ____ 20+ ____
2. How many years have you been on the BMS staff? (add choices in 5 year increments on survey monkey? (p. 48)
0-5 ____ 6-10 ____ 11-15 ____ 16-20 ____ 20+ ____
3. What subject areas do (did) you teach and what grade level(s)? (list the subjects and grade levels on survey monkey? (p. 49)

Teacher Perceptions

4. What was your initial reaction to the school board's decision to move Blacksburg Middle School to the alternate facility at the Old Christiansburg Middle School (OCMS) facility? (p. 63)
5. What were your feelings once you moved and organized your classroom (instructional area) but before the students arrived in the OCMS facility? (p. 64)
6. Based on your observations did the faculty morale change in any way after moving to a different building? (p. 50)
 - a. Yes, positively
 - b. Yes, negatively
 - c. NoComments
7. Do you feel your working conditions changed as a result of the move to OCMS? (p. 51)
 - a. Yes, positively
 - b. Yes, negatively
 - c. No change
8. What are your feelings now after having taught for the previous two and half years in the alternate facility? (p. 52)
 - a. Same as before: positive
 - b. Same as before: negative
 - c. Adjusted positively
 - d. Adjusted negativelyComments:
9. What changes in the instructional practices you used previously were made due to the conditions of your classroom in the OCMS facility? (p. 65)
Comments:

Appendix A

10. Did the facility prevent you from teaching as you did in the Price's Fork facility? (p. 64)

- a. Yes, please comment
- b. No

Comments:

11. If you had to compensate your teaching practices how did you overcome the limitations? (p. 66)

Comments:

12. Did you engage in any instructional strategy, organizational practice, or teaching method that was different from what you had used in the Prices Fork Building? (p. 64)

Yes _____

No. _____

Comment:

13. What effect, if any, on the use of technology in your instruction or student access did the move to the OCMS facility have? (p. 53)

- a. None
- b. Negative effect
- c. Positive effect

Comment:

14. What equipment or physical characteristics of the facility, if any, were missing from the OCMS facility that were available in the previous facility on the Price's Fork campus? (p. 66)

Comments:

15. Was the furniture in your classroom at the OCMS facility inferior or superior to the furniture in the classroom on the Price's Fork campus? (p. 55)

- a. Inferior
- b. Superior
- c. Same

Comments:

Influence on Students

16. Do you believe the OCMS facility influenced student achievement? (p. 67)

- a. Yes
- b. No

If yes please comment:

17. What were the greatest influences OCMS had on student achievement? (p. 68)

Comments:

Appendix A

18. What do you think accounted for the increase in student achievement over the past two years? (p. 68)

Comments:

19. Did lighting in OCMS influence student achievement in a positive or negative manner? (p. 57)

- a. Positive
- b. Negative
- c. No influence

Comments:

20. Did the furniture in any way influence how students learned? (p. 69)

Yes____ No____ If yes, please comment:

21. Did the campus layout of the OCMS facility influence student achievement? (p. 59)

- a. Yes
- b. No
- c. No influence If yes, please comment on how.

22. What factors other than facility conditions at OCMS or the change in facility conditions from the Price's Fork campus do you believe influenced student achievement in the alternative facility either positively or negatively? (p. 69)

- a. Positively
- b. Negatively

Comments:

23. Were there scheduling or operational changes made to the school day that may have influenced student achievement? (p. 69)

- a. Yes, negatively
- b. Yes, positively
- c. No If so please comment:

24. Was student morale influenced in any way by changing buildings and how was it influenced? (p. 61)

- a. Yes, negatively
- b. Yes, positively
- c. No If yes, please comment:

25. How would you rate the condition of the OCMS? (p. 62)

- a. Below Standard
- b. Standard
- c. Above Standard Comments:

Appendix B

Teacher Perception Survey Permission Form

Teacher Permission Information: My signed name below indicates that I have read the information provided and have decided to participate in the teacher survey. I understand the purpose of the research project will be to examine the perceptions teachers have about their learning environment and the influence the move to OCMS had on them and the students. The teacher will respond to an inventory assessing their perceptions about their learning environment while at home after school. It will take about 15 minutes to respond. I agree to the following conditions with the understanding that I do not have to complete the survey: a) the identity of participants will be protected; b) no teachers will be identified in the final report; c) original data will be destroyed after research; c) information gathered during the course of the project will be analyzed and the findings may contribute to published research reports and presentations; d) there are no foreseeable inconveniences or risks involved to participate in the study; e) participation in the study is voluntary; f) there will be no compensation for participants in this study. If further information is needed regarding the research study, I can contact: John F. Wheeler at 540-951-5800 or e-mail: johnfw64@vt.edu. Procedures: You will be asked to answer 25 questions in a survey about your perception of the move to the OCMS facility and the influence the facility has on students and yourself. No one will see your answers to the BMS Teacher Survey and all answers will be reported as groups and no individual answers will be identifiable. Privacy of responses will be maintained during the analysis of the responses. All responses will be destroyed at the conclusion of the study.

Freedom to Withdraw: If any anytime you do not want to participate, you may stop at any time without any consequences.

Please complete by April 22, 2013.

Please sign your name below to indicate your assent to participate:

Sign _____ Date _____

Please print your name: _____

Once you sign the form and present it to John Wheeler, the link to the survey will be provided.

Appendix C

Email Sent to Participants of Survey

Email sent to teachers who returned a signed consent form to participate in the survey:

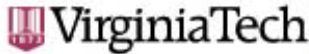
Thank you for signing the consent form.

Access the survey at: <://survey.vt.edu/survey/entry.jsp?id=>

John Wheeler

Appendix D

Institution Review Board (IRB) Approval Letter



Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (497)
Blacksburg, VA 24060
540/231-4606 Fax 540/231-0969
email irb@ut.edu
website <http://www.irb.ut.edu>

MEMORANDUM

DATE: March 28, 2013
TO: Glen I Earhman, John Francis Wheeler
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)
PROTOCOL TITLE: An Investigation into Successful Teacher Practices in the Middle School
IRB NUMBER: 13-254

Effective March 27, 2013, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

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

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Exempt, under 45 CFR 46.110 category(ies) 2,4**
Protocol Approval Date: **March 27, 2013**
Protocol Expiration Date: **N/A**
Continuing Review Due Date*: **N/A**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

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

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

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