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The Relationship Between Rural Middle School Student Mathematics Achievement and Classroom Sense of Community

John E. Donlan
Old Dominion University

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THE RELATIONSHIP BETWEEN RURAL MIDDLE SCHOOL STUDENT MATHEMATICS
ACHIEVEMENT AND CLASSROOM SENSE OF COMMUNITY

by

John E. Donlan
Bachelor of Science, December 1979, Old Dominion University
Master of Science, May 1990, Old Dominion University

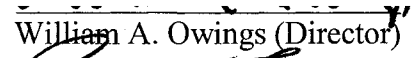
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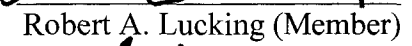
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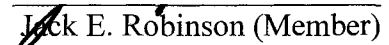
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 Approved by:


William A. Owings (Director)


Robert A. Lucking (Member)


Jack E. Robinson (Member)

ABSTRACT

THE RELATIONSHIP BETWEEN RURAL MIDDLE SCHOOL STUDENT MATHEMATICS
ACHIEVEMENT AND CLASSROOM SENSE OF COMMUNITY

John E. Donlan
Old Dominion University, 2008
Director: Dr. William A. Owings
Co-Directors of Advisory Committee: Dr. Robert A. Lucking
Dr. Jack E. Robinson

This study addressed the need for more information about academic growth and achievement in mathematics, and how it relates to sense of community in middle school settings. This was accomplished by applying the Classroom and School Community Inventory (CSCI) construct (Rovai, Wighting, & Lucking, 2004) to all three middle schools in one rural county. The CSCI was utilized to measure sense of community in mathematics classes to determine if differences existed between grades six, seven, and eight, including gender subgroups, among the three middle schools in the same rural county. This study examined academic growth in the subject of mathematics for middle school students in the participating schools as measured using the North Carolina End-of-Grade Tests (EOGs) in Mathematics as the comparison instrument for mathematics achievement.

Students' classroom sense of community levels and mathematics growth scores on the EOG'S were examined for correlations among the schools and grade levels. Results revealed differences in classroom sense of community between the participating schools and between some grade levels. The study found no relationship between sense of community and academic growth in mathematics at the school level. However, the data for the largest school ($N = 350$) showed a trend toward positive correlation. There was a significant correlation ($p = .05$) between

sense of community and mathematics achievement for grade levels seven and eight at the largest of the three middle schools, and for grade six at the second largest school ($N = 167$).

Another issue examined in this study was to determine if differences existed between genders when compared to academic growth in mathematics and classroom sense of community. The results of the analyses indicated that there was a relationship in three out of the 54 total mathematics classes in the three schools, but the individual classroom sample sizes in those instances were problematically small. Therefore, no conclusive findings were noted regarding gender.

This study included an additional investigation into student motivation, student engagement, and classroom disruption. All three factors were found to be predictors of classroom sense of community and each had a significant correlation ($p < .001$) with classroom sense of community. Motivation and engagement were positively correlated with classroom sense of community and disruption had a significant negative correlation with classroom sense of community. The study concludes with recommendations for future research focusing on middle school learning communities, in particular, more diverse student populations in urban and suburban settings. Most importantly, this researcher's findings that student motivation, student engagement, and classroom disruption were found to be significant predictors of sense of community can have an impact on future research in education. These significant findings are generalizable to other educational environments and should be explored further.

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Dedication

I would not have been able to complete this dissertation without the help of many people. First and foremost, I would like to thank my wife, Lori. She never gave up on my educational journey, and is my true inspiration. Second, I would like to thank my son, Martin, for his patience. I hope I have served as a good role model for the value of education and perseverance. My dissertation chairman, Dr. William Owings, and committee members, Dr. Robert Lucking and Dr. Jack Robinson, deserve special acknowledgement for their guidance, encouragement, and challenges that they presented me throughout this study. I would like to thank Anastasia Booth for her intellectual perspective and input. A special thanks to Dr. Sue Burgess, Superintendent of Dare County Schools, for allowing me to conduct this research and keeping me focused on the end result.

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CHAPTER I

Introduction

Background

Since the mid-1900s, a number of researchers have endeavored to expand the body of knowledge related to a sense of community in the learning environment. In 1955, sociologist George Hillary published *Definitions of community: Areas of agreement*. In his published work surveying academic literature on community, Hillary identified 94 different definitions related to sense of community. From these, he extracted a classification that distinguished 16 different and characteristic elements, including “geographical area, common life-styles, and various intensive types of social interaction” (p. 115). The one concept that was common among the 94 definitions was that they all dealt with people. A recent search conducted by this author in the Educational Resources Information Center (ERIC) yielded 142,528 citations to Hillary. Obviously there has been considerable growth in the amount of literature and research in the field. The interest in community can be viewed as a natural and needed development in the greater conversation about public education in America. However, the entire educational movement related to sense of community grew out of the sociology definition of community. Community was described as the “most fundamental and far-reaching social variable” by sociologist Robert Nisbet (1966, p. 47). A sociological community was defined as a group of people who shared social interaction, with common ties between themselves and the other members of the group, and who also shared a geographical area for at least some of the time.

Sense of community eventually evolved from notions of similar location and common interest of group members (Hillary, 1955) to the concept of emotional connections fostered via

social relationships between group members (Sarason, 1974). Sarason's (1974) research outlined psychological sense of community as "the perception of similarity to others, an acknowledged interdependence with others, a willingness to maintain this interdependence by giving to or doing for others what one expects from them, and the feeling that one is part of a larger dependable and stable structure" (p. 157). McMillan and Chavis (1986) expanded upon Sarason's view by adding a sense of belonging to group members and outlining the fact that individual needs are met by being together. Their theory of psychological sense of community was by far the most influential, and was the starting point for most of the recent research on sense of community conducted in the late twentieth century and early twenty-first century. The single sentence definition developed by McMillan and Chavis (1986) succinctly stated that "Sense of Community is a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p. 6). They proposed that sense of community included feelings of membership among individuals, influence over one another and the community as a whole, integration and fulfillment of needs between individuals in the group, and a shared emotional connection among all members of the community.

The definition was further refined by Furman (1998) to include belonging, trust, and safety. Also in the 1990s, J.L. Hill researched psychological sense of community. In a thorough review of research on psychological sense of community, Hill (1996) found that the results of the writings over the preceding twenty-five years revealed a "paucity of standardized research findings regarding this construct" (p. 431). She found that there was little trouble getting people to agree on a general definition of psychological sense of community. However, there was no development of a standardized, operational definition of the construct. Hill concluded that the

level of sense of community relied heavily upon context for its description. Furthermore, the appropriate operational definition of psychological sense of community and its determinants differed greatly from setting to setting. Hill stated that “psychological sense of community is an extra-individual, aggregate variable and we need to put much more effort into measuring it at that level” (p. 437). Therefore, sense of community can only be accurately measured in a school setting by studying the members of that particular school community. Hill’s suggestion for future research was as follows:

If psychological sense of community is setting specific, then the most effective way to study it would be to combine the expertise of a researcher familiar with the construct along with the expertise of a researcher familiar with the setting. (p. 435)

This recommendation for a researcher to be familiar with the setting in which research is conducted dictates having someone such as a school administrator or teacher study the sense of classroom community for a particular school. Members of a classroom community include, first and foremost, the students. Those students come in contact with and are actively involved with a limited number of school staff on a daily basis. Evans (2007) noted that “Adelson and O’Neil (1966) were the first researchers to use the ‘Sense of Community’ description with adolescents and they did so years before Sarason (1974, 1986) described Psychological Sense of Community (PSOC) as the feeling that one is part of a readily available, supportive, and dependable structure” (p. 695). Evans’ research measured adolescent sense of community in the three contexts of school, neighborhood, and city. Adolescent sense of community was measured by analysis of student writings in response to the following three questions:

1. Think of something that you have recently been involved in that made you feel what you believe is a “sense of community.”

2. How would you describe that feeling of a sense of community?
3. This experience of sense of community came about because . . . [complete this sentence] (p. 698)

The context of the school or classroom as a separate community was not addressed.

School climate was researched by Phillips in 1997 utilizing students ($N > 5,600$) from 23 middle schools. Phillips sought to determine whether or not student engagement or academic achievement was related to school climate. According to Phillips, the *communitarian* approach had just emerged as one of the “two competing theories about which intraschool processes matter most for student outcomes, the other theory being *academic press*” (p. 634). Climate was defined as communitarian or academic. Measures of communitarian climate included feedback from teachers such as quality of relationships with students, feedback from students related to quality of relationships with teachers, and teacher responses regarding relationships with the school administration and its school governance. Measures of academic climate included teachers’ expectations of the percentage of students graduating and their continuing on to college, students’ responses on time spent on homework weekly, and student enrollment in a specific class. A limitation of the study noted by the researcher included the fact that the sample was largely working-class or middle-class. Phillips stated, “The analytic sample in this article is not even generalizable to the school district from which it was drawn. The students in the analytic sample are more advantaged than the average student in the school district” (p. 656). The researcher noted skepticism about the communitarian approach being a “solution to school ineffectiveness” (p. 633). Regarding students’ views about sense of community, more emphasis was placed on school-wide teacher relationships and input from the teachers regarding their

perceptions about students, than on actual feedback from each student. The individual classroom as a 'community' in and of itself was not investigated.

Measuring sense of community in the school setting has proven to be challenging thus far, particularly at the state level. In a progress report by the North Carolina Education Research Council, Cunningham and Thompson (2002) reported that "how well students are known and cared for is difficult to measure, but we can look at the size of classes, the rates of chronic absenteeism, and parents' perceptions of their child's relationship with school staff as indicators" (p. 39). This has been a common practice, mainly through ease of measurement. States have traditionally looked at this type of data when trying to ascertain sense of community. When the report by Cunningham and Thompson was completed prior to its publication in January 2002, the Classroom and School Community Inventory (CSCI) construct (Rovai, Wighting, & Lucking, 2004) designed to measure sense of community in the classroom and school, had not yet been developed. More recent research assessing sense of community at the middle school level was conducted by surveying parents and teachers at nine middle schools (Belenardo, 2001). Belenardo's study, as with Cunningham and Thompson's report, did not utilize input data from students. Since students are ultimately the key stakeholders in an educational setting, their insights are vital to the overall determination of the level of sense of community within the school. Schools must utilize student input in order to reliably measure sense of community in any school environment. The CSCI was utilized as the construct for this study.

Need for the Study

During the 20th century and continuing into the 21st century, public schools have been typically characterized as bureaucratic organizations with the values of individualism and

competition. Centralization and standardization in the form of national standards, goals prescribed by the state to be implemented at the local level, and high stakes accountability tests have continued to be the dominant model of public school accountability. The general assumptions for American public schools have focused on schools being instrumental in preparing students for the workforce, and for students to compete with other students on individual academic measurements to secure future financial prosperity. School success is determined through standardizing the measurement of student achievement, and both teachers and schools are held accountable for measurable student achievement (Furman, 2002). This research utilized a standardized assessment to determine academic growth in the area of mathematics. It also utilized a validated survey construct to measure student sense of classroom community. The Classroom and School Community Inventory (CSCI) construct (Rovai, Wighting, & Lucking, 2004) was designed to measure students' sense of community. The usefulness of this instrument is particularly important for research in K-12 education programs where student persistence and learning are lingering issues. Rovai, Wighting, and Lucking (2004) provided the following evidence of validity and reliability of the constructs: Internal consistency estimates of reliabilities for the classroom scale and school scale using Cronbach's coefficient alpha were .84 and .83 respectively, and stability estimates for each scale using Pearson *r* correlation coefficients and a two-week interval between pre-test and post-test measurements was .91. This study utilized the classroom construct to measure students' sense of community in the classroom. The study investigated an important area of overall student success, which is the relationship between academic growth and students' sense of classroom community. Furthermore, the subgroup of gender was investigated to ascertain if there were differences between males and females with respect to academic growth and classroom sense of community.

Students' mathematics achievement in the state of North Carolina is measured utilizing the *North Carolina End of Grade Tests* (EOGs) in Mathematics for grades six, seven, and eight. The Assessment Brief (2007) published by the North Carolina Department of Public Instruction Testing Program describes the EOGs as curriculum-based multiple-choice achievement tests in the areas of mathematics for grades three through eight. The tests are specifically aligned to the *North Carolina Mathematics Standard Course of Study* (Assessment, 2007) and include a variety of strategies designed to measure the academic growth and achievement of students in the North Carolina public school system. The mathematics tests for grades six and seven are administered in two sessions which can be completed in one or two days. The tests contain a calculator active section lasting 135 minutes and a calculator inactive section lasting 60 minutes. This differs from the format for administration of tests at the eighth grade level. For grade eight, the entire test is calculator active, lasting a total of 150 minutes and must be administered in its entirety in only one day (Assessment, 2007).

In addition to the EOGs, accountability is tracked through the ABCs of Public Education (ABCs, 2007). The program, which began in 1996, has three primary goals: strengthen local school accountability, emphasize mastery of basic subjects, and provide for as much local decision-making as possible. This model is centered on North Carolina's state initiative to improve its school system. It provides for school accountability and produces information used to enhance school improvement efforts. The ABCs of Public Education model was one of the first in the nation to track academic growth of students from year to year. The ABCs Accountability Report is used by the state of North Carolina to measure *Adequate Yearly Progress* (AYP) for the No Child Left Behind (NCLB) Act since 2002 when that law was enacted. That law holds schools across the state accountable for the achievement for all groups of

students in each school, with a goal of closing any achievement gaps between the groups and bringing proficiency rates to 100% for every student by the 2013-14 academic year (ABCs, 2007). These student groups are identified as belonging to the following categories: 1) the School, as a whole; 2) Whites; 3) Blacks; 4) Hispanics; 5) Native Americans; 6) Asians; 7) Multi-Racial Students; 8) Economically Disadvantaged Students; 9) Limited English Proficiency Students; and 10) Students With Disabilities.

With the level of accountability and emphasis on student proficiency increasing, it is necessary for educators to provide optimal instructional practices and environments to allow for student success. Phillips (1997) suggested that communally organized schools could lead to teachers and students having stronger affective ties to both places and people. Beck (2002) noted that “some thinkers see the creation of strong communities in schools as an antidote to the loneliness and alienation that has become so characteristic of modern life” (p. 25). In their research study regarding the classroom as a social environment, Ryan and Patrick (2001) noted the following:

Research in a variety of areas has documented that characteristics of classroom environments have an impact on student motivation and engagement. In particular, this research has focused on teachers’ practices around academic activities, and students’ perceptions of these practices. However, classrooms are inherently social places; students do not learn alone but rather in the presence of many peers. (p. 438)

A community exists when its members experience a sense of belonging or a personal relationship within a group. The members feel they are important to the group and the group is important to them. Members feel that the group will satisfy their needs and that they will be cared for within the group. Finally, the members feel there is an emotional sense of connection

within the group (McMillan & Chavis, 1986). A growing number of research studies outlining the positive effects of developing a strong sense of community in the classroom were reported by Schaps (2003) as follows:

Students in schools with a strong sense of community are more likely to be academically motivated (Solomon, Battistich, Watson, Schaps, & Lewis, 2000); to act ethically and altruistically (Schaps, Battistich, & Solomon, 1997); to develop social and emotional competencies (Solomon et al., 2000); and to avoid a number of problem behaviors, including drug use and violence (Resnick et al., 1997). (p. 31)

Battistich, Solomon, Kim, Watson, and Schaps (1995) noted in the general discussion of their study that “students who experience the school as a caring and supportive environment . . . will feel attached to the school community” (p. 649). Furman (2002) backed this viewpoint in her “Lessons for the practice of community” (p. 278).

Shields (2002) addressed this concept of knowing others well in a research study, placing great emphasis on a “need to pay careful attention to the perspectives of students” (p. 201). In order for educational practitioners to understand students’ perspectives, the need exists to measure sense of community among students. It is also important to ascertain if a relationship exists between sense of community and academic growth due to an increased emphasis on academic achievement under the NCLB, as well as a decrease in academic motivation among early adolescent students. K. M. Brown (2004) surveyed middle level principals in New Jersey, North Carolina, and Pennsylvania, who reported that “efforts to create a caring community within each school and each classroom are linked to students’ social and academic development” (p. 32).

Regarding research among middle school students, links between academic achievement and classroom social environment have been investigated (Ryan & Patrick, 2001). Ryan and Patrick concluded, “We need to know more about how the social aspects of the classroom environment can support or undermine students’ motivation, engagement, and learning” (p. 448). Reyes and Fuller (1995) conducted research in middle and senior high schools ($N = 101$) to determine if achievement in mathematics was related to selected elements of communal schools (shared norms and values, teacher collaboration, and focus on student learning), and whether or not sense of community, as indicated by those elements differed between middle schools ($n = 50$) and senior high schools ($n = 51$). No significant difference was found to exist between the middle schools and high schools on the communal variables. However, their findings showed that “gender, socioeconomic status, and parent expectations exert a significant effect on seventh-to-eight-grade achievement growth in mathematics” (p. 21).

Anderman and Maehr (1994) noted, “...during the middle grades, students often exhibit a disturbing downturn in motivation” (p. 288). Huang and Waxman (1994) conducted a study in one school district’s five middle schools in a major metropolitan city in Texas. Students participated in research about the effects of ethnicity, gender, and grade on students’ motivation and perceptions of learning environment in mathematics. The researchers found that “middle school girls had higher motivation and more positive perceptions of their learning environment in mathematics than boys” (p. 15). Regarding the grade level of the students, “in general, the lower the grade level, the more involved and satisfied they were” (p. 16).

The need for this research was based on the types and breadth of previous research in this area. As research has been described in this section, topics ranged from math achievement and middle school achievement, to sense of community, climate and social interactions. Various

ethnicities, socioeconomic backgrounds, and community sizes have been investigated with respect to achievement and motivation of adolescents. It has been argued that sense of community is imperative to successful learning. However, the investigation of sense of classroom community and its relationship to mathematics achievement has not been adequately explored and documented. The most effective construct for measuring sense of community at the classroom level for middle school students was recently developed and refined to ascertain students' perceptions related to sense of community (Rovai, Wighting, & Lucking, 2004). Having this instrument available enables researchers to further investigate relationships between sense of community and the academic achievement of middle school students. The usefulness of this instrument is particularly important for research in K-12 education programs where student persistence and learning are lingering issues. Mathematics was selected for this study because it is tested as an End-of-Grade subject in the state of North Carolina as part of a Standard Course of Study required to meet the state Board of Education accountability program (ABCs, 2007). Each student receives a predicted growth score based on their performance in previous years, and actual growth based on the current academic year. It allows for comparison of individual students, classes, grades, and schools. Pre-test and post-test scores are compared to determine academic change as defined by the North Carolina Department of Public Instruction. Therefore, this study adds to the current body of research related to sense of community in the educational setting, by determining the possible relationship between middle school students' sense of classroom community and academic growth in the area of mathematics. The research investigates an important area of student learning which is in the assessment and relationship of sense of community to mathematics achievement among middle school students.

Purpose of the Study

The purpose of this study was to measure classroom sense of community among middle school students and to investigate whether correlations existed among the various subgroups, as defined by NCLB, between classroom sense of community and performance on standardized state assessments in the subject of mathematics. This research utilized a standardized assessment to determine academic growth in the area of mathematics. It also utilized a validated survey construct to measure students' classroom sense of community. This study investigated an important area of overall student success, which is the relationship between academic growth and achievement in mathematics with students' classroom sense of community. Furthermore, the subgroup of gender was investigated to ascertain if there were differences between males and females with respect to academic growth and achievement in mathematics and classroom sense of community.

Measurement of classroom sense of community has evolved from the first widely-accepted instrument used to evaluate sense of community, the sense of community index (SCI) developed by Chavis, Hogge, McMillan, and Wandersman (1986). This instrument was not specific to the educational environment. The Classroom Community Scale (CCS) was developed by Rovai (2002a), and was specifically designed to measure sense of community within an educational environment. The instrument was validated and utilized in university settings. This evaluation instrument has since been adapted for use in addressing the sense of community for middle school, high school, and university students (Rovai, Wighting, & Lucking, 2004). This new instrument, the Classroom and School Community Inventory (CSCI), has been utilized in research involving high school students (Wighting, 2006). It has been validated for but not applied to middle school settings, until this study. The CSCI was used to measure the students'

sense of community. Rovai, Wighting, and Lucking (2004) reported the following as evidence of the validity and reliability of the CSCI: A factor analysis offers empirical support for the notion that students have multiple psychological senses of community in reference to classroom communities and the presence of two subscales of social community and learning community as dimensions of the classroom community construct. Internal consistency estimate of reliability for the classroom scale using Cronbach's coefficient alpha was .84. Internal consistency coefficients for the social community and learning community subscales of the classroom form were .90 and .87 respectively. Stability estimates for each scale using Pearson r correlation coefficients and a two-week interval between pre-test and post-test measurements were .91. Wording of the survey questions, according to the Flesch Reading Ease scale, scored 81.1 out of a possible 100 points, where 100 points equates to having the greatest ease of understanding on this scale. Therefore, wording was suitable for use with the middle school student target population of this study. The usefulness of this instrument is particularly important for research in K-12 education programs where student persistence and learning are lingering issues. This was the most current and appropriate construct for measuring students' sense of classroom community for this study.

This study addresses the need for more information about academic growth and achievement in mathematics and how it relates to sense of community in middle school settings by applying the CSCI at all three of the middle schools in one rural county. The aspect of this research utilizing the CSCI determines if there is a difference in sense of community within individual math classrooms, between grade levels, and among the three middle schools in the same county, as well as between gender subgroups. Another aspect of this study utilizes the academic growth in the subject of mathematics for middle school students in the participating schools, as measured using the North Carolina End-of-Grade Tests in mathematics as the

comparison instrument. These tests were developed to address the need to measure student performance in accordance with the guideline that *expected* student performance would be based on *past* student performance (ABCs, 2007). Therefore, growth expectations according to the ABCs 2007 accountability program are measured as follows:

- A standard setting year is labeled as year one.
- Student scores are standardized and placed on a change scale labeled as the *c-scale*.
- The individual student is expected to perform as well, or better, on the end-of-grade (EOG) assessment for the current year as she or he did, on average, during the previous two years when the student's scores are placed on the *c-scale*. (p. 3)

As an indicator of growth, according to the ABCs 2007 accountability program, academic change is defined as follows:

Academic change is expressed as the difference between a student's actual c-scale score for the current year and the student's average of two (in most cases) previous assessments (EOGs) with a correction for regression toward the mean. The *academic change* is based on an average of the previous two years' assessments. If there is only one year's EOG test data available, the expectation for change will be based on one previous assessment. A positive academic change indicates a gain in academic achievement, while a negative academic change indicates a loss in academic achievement from the previous two years. (p. 4)

This study attempts to provide a more in-depth understanding of how middle school students relate to their learning environment and whether there is a correlation between classroom sense of community and academic growth in mathematics. It further investigates the

possibility of a relationship between each of the following three factors – motivation, engagement, and disruption – in determining the ability to predict sense of community in the classroom. Although, they were not the main focus of this study, all three topics appeared numerous times in the review of the literature.

Research Questions

The following research questions were addressed in this study:

1. Does a difference in classroom sense of community, as measured by the CSCI, exist among mathematics classes across the three middle schools in the same rural county?
2. Does a difference in classroom sense of community, as measured by the CSCI, exist among sixth, seventh, and eighth grade mathematics classes at each of the three middle schools in the same rural county?
3. Does a relationship exist between academic growth in mathematics classes and classroom sense of community in each of the three middle schools in the same rural county?
4. Does a relationship exist between academic growth in mathematics and classroom sense of community across grade levels six, seven, and eight at the three middle schools in the same rural county?
5. Does a difference exist between genders when compared to academic growth in mathematics and classroom sense of community in grades six, seven, and eight at and among each of the three middle schools in the same rural county?

Definition of Terms

The following terms are defined operationally. They are provided to clarify words, terms, and phrases used in this study.

ABCs of Public Education Model (ABCs). This is a school-based management and accountability program developed by the North Carolina State Board of Education as a restructuring plan for public education. The framework for the program was outlined in May 1995 and 180 schools in 10 districts piloted the program for the 1995-96 school year. After the General Assembly approved the State Board's plan and put into law the ABCs, implementation began for schools with grades K-8 during the 1996-97 school year. Validity of this accountability system was evaluated by the NC State Board of Education during the 2004-05 school year, with state law requiring re-evaluation and any necessary modifications to be made every 5 years. The following modifications were required to be in place by the 2005-06 school year:

Under the new formulas, student scores were standardized and a student's performance was considered as a point on the *c-scale* (change scale) relative to standard performance for that grade level in a standard setting year. The individual student is expected to perform as well, or better, on the end-of-grade (EOG) assessment for the current year as she or he did, on average, during the previous two years when the student's scores are placed on the *c-scale*. As an indicator of growth, the new model is based on *academic change*. (p. 3)

Academic Change (ABCs, 2007). Academic change, as defined by the ABCs of Public Education Model as an indicator of academic growth, is based on an average of the previous two years' End-of-Grade (EOG) assessments. If there is only one year's EOG test data available, the expectation for change is based on that one previous assessment. Therefore, *expected* student

performance is based on *past* student performance. The formulas factor in an adjustment for regression to the mean (a student who performs above or below the mean score on one EOG will likely score closer to the mean on a subsequent EOG). Academic change is expressed as the difference between a student's actual *c-scale* score for the current year and the student's average of two (in most cases) previous assessments (EOGs) with a correction for regression toward the mean. A positive academic change indicates a gain in academic achievement, while a negative academic change indicates a loss in academic achievement from the previous two years. (p. 4)

Adequate Yearly Progress (AYP). All public schools, in North Carolina and throughout the country, must measure and report AYP as outlined in the No Child Left Behind Act of 2001. AYP measures the yearly progress of different groups of students at the school, district, and state levels against a yearly target in reading and mathematics. There are both proficiency and participation targets. Proficiency target goals are set increasingly higher in three-year increments until the 2013-14 school year. Target goals increase in 2007-08, 2010-11, and finally in 2013-14 when 100% proficiency is expected. AYP measures the yearly progress toward achieving grade level performance for each student group in reading and mathematics. Student groups are specified as follows: 1) the School, as a whole; 2) Whites; 3) Blacks; 4) Hispanics; 5) Native Americans; 6) Asians; 7) Multi-Racial Students; 8) Economically Disadvantaged Students; 9) Limited English Proficiency Students; and 10) Students With Disabilities.

Classroom and School Community Inventory (CSCI) (Rovai, Wighting, & Lucking, 2004). Classroom community may be referred to as the sense of trust and interaction between groups of learners and it has been argued that sense of community is imperative to successful learning. The CSCI is the instrument developed to measure students' sense of community. The CSCI consists of a subscale for each of two forms: a classroom form and a school form. The

researchers provide evidence of both CSCI validity and reliability. The usefulness of this instrument is particularly important for research in K-12 education programs where student persistence and learning are lingering issues. This is the most current and appropriate construct for measuring students' sense of classroom community for this study.

End-of-Grade Tests (EOGs). The North Carolina End-of-Grade Tests are designed to measure student performance on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study. The end-of-grade tests in mathematics are administered to students in grades six, seven, and eight as part of the statewide assessment program. EOG assessments are given during the last three weeks of the school year. All students at the same grade level within a school are administered the appropriate EOG test at the same time on the same day. Afternoon administrations of the EOG tests are prohibited except for students who receive certain testing accommodations. Students at different grade levels cannot be administered EOG tests in the same classroom. Testing grade levels in two subjects on one day is also prohibited. The mathematics tests are not timed. Academic growth is defined as *academic change*. *Academic change* is based on an average of the previous two years' assessments in relation to the current year's assessment. If there is only one year's EOG test data available, the expectation for change will be based on one previous assessment. An adjustment for regression to the mean is factored in. *Academic change* is expressed as the difference between a student's actual *c-scale* (change scale) score for the current year and the student's average of two previous assessments (or one when two are not available) with a correction for regression toward the mean. A positive change indicates academic growth, while a negative change indicates the opposite.

No Child Left Behind Act of 2001 (NCLB). The NCLB Act was first implemented during the 2002-03 school year by the United States government. It requires schools to have 100% proficiency among students in mathematics, reading and language arts by the year 2014. Schools must also meet graduation and attendance standards.

North Carolina Mathematics Standard Course of Study (NCMSCS). The NCMSCS provides a set of mathematical competencies for each grade level and each high school course to ensure rigorous student academic performance standards that are uniform across the state. It describes the mathematical concepts, skills, operations, and relationships that all NC students should learn and understand. It is based on a philosophy of teaching and learning mathematics that is consistent with the current research, exemplary practices, and national standards. It is also a guide for textbook selections and the foundation of the NC academic performance testing program.

Psychological Sense of Community (PSOC). PSOC is defined as a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together. PSOC includes feelings of membership among individuals, influence over one another and the community as a whole, integration and fulfillment of needs between individuals in the group, and a shared emotional connection among all members of the community.

Sociological Sense of Community (SSOC). From the sociological viewpoint, the term community includes (1) a group of people (2) who share social interaction (3) and some common ties between themselves and the other members of the group (4) and who share an area for at least some of the time.

Assumptions

Assumptions had to be made in the course of this study. One assumption was the existence of fair and consistent administration of the CSCI to the participants. This was addressed through the administration of the survey by the researcher only, in order to minimize errors and enhance consistency. The researcher provided directions for participation in the study and administered the survey to students in each classroom, followed by collection of the surveys after their completion.

Another assumption was that all participants would cooperate fully and honestly in completing demographic information and the CSCI instrument. This was addressed through the presence of the researcher, rather than the classroom teacher, during the administration of the survey.

Limitations

There were several limitations in effect when conducting this research. One limitation of the research was the age and maturity level of the students taking the survey. It was possible, if not likely, that this was their first exposure to participation in academic research. The researcher, prior to administering the survey, provided a brief overview of this type of research in order to minimize this threat.

Another potential threat to validity, inherent to any self-report questionnaire, was for bias on the part of the participants taking the survey. The researcher minimized this threat by maintaining anonymity of the students in the handling of the questionnaires throughout the administration and collection of the surveys. Additionally, the researcher took responsibility for administering the questionnaires rather than utilizing the classroom teachers or electronic means. Participants were reassured that their responses would be completely anonymous.

The primary threat to the external validity of this research was that it was confined to an intact population. The results should be capable of being generalized to similar educational settings comprised of middle school students in grades six, seven, and eight.

Summary

The concept of “sense of community” has been the subject of a growing body of educational research in recent years. This area has become increasingly important as educators strive to address the academic and social needs of students at all levels. This study aimed to increase our understanding about classroom sense of community and its relationship to academic growth in mathematics achievement for middle school students. This quantitative research examined middle school students’ perceived sense of classroom community and its relationship among mathematics classes. The researcher compared each student’s classroom sense of community to the overall achievement level of the class based on academic growth scores from a standardized mathematics end-of-grade test administered at the end of the academic year, as compared to a pre-test score that was based on the average EOG scores from the previous two years. Each class was compared with the other participating schools as well as with the same grade level in the other participating schools and with different grade levels within the same school. Additionally, the researcher examined gender to ascertain if there were differences in classroom sense of community and mathematics achievement between those two subgroups. Although not the main focus of this study, the following three factors were also examined to determine each one’s possible ability to predict sense of community in the classroom: student motivation, student engagement, and classroom disruption.

CHAPTER II

Literature Review

Introduction

The purpose of this chapter is to provide a path beginning with research through the twentieth century on psychological sense of community. This path leads to the current status of the body of research encompassing sense of classroom community. It ends with a description of measurement constructs for sense of classroom community as well as standardized student performance measures.

Sense of Community: Collaboration and Cooperation

In 1955, sociologist George Hillary published *Definitions of Community: Areas of Agreement*, which contained 94 different definitions of community and few areas of agreement between those definitions. Although Dewey (1938) argued that the school community happens to be a place where children gain authentic experiences by doing projects rather than solving isolated problems, the school community under discussion was simply defined as a geographic location. Dewey (1940) later wrote about democracy in the classroom and how children relate within the school setting. Dewey promoted students functioning within social groups and argued that quality of education “is realized in the degree in which individuals form a group” (1958, p. 65). All of the initial background on schools, community, and group dynamics did not develop into an interest in studying the concept of psychological sense of community until psychologist Seymour Sarason (1974) wrote that psychological sense of community “is one of the major bases for self-definition” (p. 157).

As studies followed, McMillan (1976) proposed a definition of psychological sense of community that included feelings about fellow group members within the defined community and the members' commitment to the group. It was in a later collaborative effort that McMillan and Chavis (1986) removed the word psychological from the term, and defined 'sense of community' as comprising the following four elements: membership, influence, integration and fulfillment of needs, and shared emotional connection. Membership included boundaries of behavior, dress, communication and the like, as well as a sense of belonging or acceptance, the ability to convey one's feelings with security, and personal investment or contribution to the group. Influence included feelings of empowerment as well as individual influence over group actions or activities. Integration and fulfillment of needs included an individual's perceived rewards for participation in the group. Shared emotional connection was asserted "to be the definitive element for true community" (p. 14) and included group cohesiveness and bonding. McMillan and Chavis (1986) also discussed the dynamics, interrelatedness, and interdependence between the elements in their theory on sense of community. A valid and reliable instrument measuring psychological sense of community, the Sense of Community Index (SCI), designed by Chavis, Hogge, McMillan, and Wandersman (1986), was developed concurrently with the theory and published at the same time. One decade later, Jean Hill (1996) noted that there had been, up to that point, less than 30 published research studies directly measuring sense of community. Furthermore, findings from those studies were varied; thus, Hill wrote that "there is still a lack of agreement as to what specific dimensions make up psychological sense of community" (p. 431).

Sense of community regarding social networks and overall adolescent well-being was researched by Compas, Wagner, Slavin, and Vannatta (1986), as well as Vaux (1988). Aspects regarding the importance of having group members acquire interdependency by communicating

with and depending upon each other was researched by Cohen (1986). A number of studies investigated shared responsibility for learning and teaching, collaborative interactions in the classroom, and cooperative learning where students focused on sharing ideas and goals in a help-centered, caring environment (Johnson & Johnson, 1991; Newman, Griffin, & Cole, 1989; Rogoff, 1994; Slavin, 1981, 1991, 1995; Solomon, Battistich, Kim, & Watson, 1996). It was in 1994 that Battistich, Solomon, Watson, and Schaps attempted to measure students' sense of the classroom as a community. Fourth, fifth, and sixth grade students were included in that study. The researchers examined students' perceptions of whether or not they and their classmates cared about and were supportive of one another. Also examined were students' feelings that they had an active and important role in classroom norm setting, as well as decision making. In their discussion, the researchers stated "we strongly believe that the concept of school as community has great potential for improving educational practice" and noted "the concept of school community seems to be particularly powerful" (Battistich et al., 1994, p. 11).

Pretty, Andrewes, and Collett (1994) conducted research suggesting that sense of community was relevant to the well-being of both adolescents as well as adults. Two years later, Pretty, Conroy, Dugay, Fowler, and Williams (1996) reported in their discussion section of a study ($N = 234$) of adolescents ranging in age from 13 to 18, as follows:

Many of the findings in this study concur with those reported by Pretty, Andrewes, and Collett (1994). The utility of the psychological sense of community construct for assessing social environments of adolescents and the reliability and validity of the SCI as a measure was supported for adolescents of all ages. (p. 375)

It was around this same period of time when McMillan (1996) revisited the four elements comprising sense of community (McMillan & Chavis, 1986) and renamed them spirit, trust,

trade, and art. Spirit included not only a sense of belonging, confidence, and acceptance, but also friendship. Truth was considered by McMillan (1996) to be the “primary unit of analysis for the spirit element” (p. 316). The spirit element was centered on empathy, understanding, caring, and a sense of intimacy based on truthfulness. Trust required members of the community to know what to expect from each other, as well as an outline of community norms, rules, laws, and a sense of order. McMillan noted that trust “evolves into justice” (p. 320). The third principle, trade, was the community’s integration of each of the members’ needs and resources, and the subsequent bonding that begins with the discovery of similarities. This element required self-disclosure, sharing of feelings, and social exchange based on fairness in making trades with one another. The final principle, art, consisted of the events that eventually become part of a community’s collective heritage and commitment to honor the community’s values and ideals. These collective experiences comprised shared symbolic expressions that had an impact on the community because they represented values such as courage, wisdom, compassion, and integrity. The definition was further refined by Furman (1998) to include belonging, trust, and safety.

Hill (1996) researched existing measurements of sense of community and noted that the SCI (Chavis, Hogge, McMillan, & Wandersman, 1986) was useful in several different investigations and different referents of community, concluding that more work needed to be done in a variety of settings. Hill concluded the following:

The research strongly suggests that psychological sense of community is, to a significant extent, setting specific. In other words, the reason for the lack of consistent findings regarding dimensions and correlates is that some significant percentage of these aspects of psychological sense of community differ from setting to setting. (p. 433)

Classroom Sense of Community

By the end of the 20th century, the concept of school as community was being studied by some researchers interested in discovering possible frameworks for guiding educational reform efforts (Battistich, Solomon, & Watson, 1998; Battistich, Solomon, Watson, & Schaps, 1997; Garcia, Giuliani, & Wiesenfeld, 1999; Hargreaves, A., Earl, L., & Ryan, J., 1996). The SCI (Chavis, Hogge et al., 1986) was being reported as the most used and broadly validated measure of sense of community (Chavis & Pretty, 1999; Chipuer & Pretty, 1999). Yet, Chavis and Pretty noted that “there continues to be a search for additional measures” (p. 635) and stressed that “much can be gained from persisting in a collaborative scale development effort” (p. 637). Chavis and Pretty cited the following studies utilizing other measures of sense of community which were developed by combining the SCI with other items or instruments: Allen and Allen, 1987; Berger, 1997; Davidson and Cotter, 1993; Glynn, 1981; and Royal and Rossi, 1996. Berger (1997) researched sense of community for college students. Royal and Rossi (1996) conducted a research study involving employed adults and students in a research firm and in three high schools, in order to understand sense of community within different contexts. Kingston, Mitchell, Florin, and Stevenson (1999) researched neighborhood sense of community. Obst and White (2004) examined sense of community by revising the SCI and producing a new four-factor structure based on the same items. Psychological sense of community (PSOC) was examined for three different types of community members: neighborhood groups, college student groups, and interest groups. Obst and White (2004) concluded as follows:

In summary, this study has given a strong indication that continuing to examine the SCI in terms of the theory of McMillan and Chavis (1996) can add to our theoretical

understanding of PSOC and the refinement of a valid, theoretically based measure of PSOC. (p. 704)

Over the last two decades, group cohesion has been studied by many different researchers since it was found to promote cooperation and togetherness of group members. According to Schmuck and Schmuck (1997), group cohesion forms from strong interpersonal relationships between class members and a sharing of individual ideas, whether similar or different. A sense of belonging and a feeling of good morale were reported by Chin, Salisbury, and Gopal (1996) to be the two most important components of cohesiveness in small groups. Cooperation, as opposed to competition, leads to many positive emotional effects (Anderman & Maehr, 1994; Covington, 1992). Cooperative learning enhances students' personal sense of belongingness and leads to a feeling of acceptance by the group (Osterman, 2002). In a study by Johnson, Lutzow, Strothoff, and Zannis (1995), cooperative learning and bonding activities fostered peer support and led to a 71% drop in classroom referrals for misbehavior. Student participants also reported higher levels of comfort within the group and a greater ability to make friends, express opinions openly without fear of retribution, and an increased level of satisfaction with the group.

Students' sense of the classroom as a community affects students' classroom behavior. Teachers' encouragement of cooperative activities has been found to be important in influencing engagement of students, as well as positive student behaviors (Solomon, Battistich, Watson et al., 2000). Royal and Rossi (1996) also found sense of community to be related to students' engagement in school activities. The higher the sense of community, the less likely were students to participate in negative behaviors, such as behaving disruptively in class, cutting classes, or even considering dropping out of school. Pretty, Conroy et al. (1996) noted that getting adolescents actively involved with others develops a sense of well-being which prevents

loneliness and can actually increase coping skills. As Battistich, Solomon, Watson, and Schaps (1994) noted, “school community is significantly related to a large number of desirable outcomes for both students and teachers” (p. 9). In a report for the North Carolina Education Research Council, Cunningham and Thompson (2002) stated that “there must be a constant focus on enhancing a supportive and caring context for learning in ways that contribute to a psychological sense of community” (p. 25). The authors noted that the degree to which a school can create an atmosphere which encourages mutual support, caring, and a sense of community seems highly related to the prevention of learning, behavior, and emotional problems.

Studies have linked an increased sense of community in school with lower rates of negative behaviors (Hawkins, Catalano, Kosterman, Abbot, & Hill, 1999), higher degrees of ethical and altruistic actions (Schaps, Battistich, & Solomon, 1997), and higher academic motivation (Hawkins et al., 1999; Solomon, Battistich, Watson et al., 2000). In a paper presented at the annual meeting of the American Educational Research Association, Battistich, Solomon, and Watson (1998) noted that “when a sense of school community is established, students are likely to become affectively bonded with and committed to the school, and therefore inclined to identify with and behave in accordance with its expressed goals and values” (p. 9).

Solomon, Battistich, Watson, Schaps, and Lewis (2000) gathered data from twelve schools that instituted the Child Development Project—a program designed to create caring school and classroom communities. The program focused on cooperative learning, where students worked together, collaboratively, in small groups. Students in these program schools were reported as seeing their classrooms and schools as caring communities. The researchers concluded that their findings were “consistent with the hypothesis that the sense of community reflects a commitment to school and the values promoted therein . . . and that this commitment

translates into various positive student outcomes” (p. 39). Schaps, Battistich, and Solomon (1997) found that a strong sense of community encouraged ethical and altruistic behavior among students. Battistich, Solomon, Kim, Watson, and Schaps (1995) gathered data from a geographically diverse sample of 24 elementary schools with ethnically diverse student populations. Their research revealed “that individual students’ sense of school community is positively related to a wide range of attitudinal, motivational, and behavioral variables” (p. 648). The authors noted in the general discussion of their study that “students who experience the school as a caring and supportive environment . . . will feel attached to the school community” (p. 649). Furman (2002) supported this view. In “Lessons for the practice of community” (p. 278), Furman made the following conclusions:

Community is ultimately about how people feel and experience their daily lives in schools—the psychological dimension noted by Beck. The practice of community, then, involves continual attention and sensitivity to this psychological/affective dimension of community, as noted in the abundant literature on ‘caring’ in schools. This implies that the practice of community involves opportunities to know each other well, high levels of continual communication, and the valuing and training of empathy as an important ‘skill’ for educators. (p. 279)

Shields (2002) addressed this concept of knowing others well by making the observation that “knowing the students who make up a school community is, in fact, a particularly complex undertaking, requiring that teachers challenge and continually re-examine . . . students’ home lives, their academic abilities, cultures, and values” (p. 204). Shields placed great emphasis on a “need to pay careful attention to the perspectives of students” (p. 201) and stressed the importance of not assuming that teachers or administrators would automatically know what

every student might need in order to meet with success. Shields concluded, “Students can teach us a great deal about how to create more welcoming, respectful, and inclusive communities of difference in schools—we need to listen to them respectfully and carefully” (p. 214).

Consideration and usage of student input is the way for educators to provide an environment which allows for student success. Schaps (2003) concluded that “community building should become, at a minimum, a strong complement to the prevailing focus on academic achievement” (p. 33). Therefore, the challenge for educational practitioners is to develop and measure sense of community among students to ascertain if a relationship exists between sense of community and academic growth.

In current research by K. M. Brown (2004), caring schools were found to foster a sense of belonging and provide the foundation for intellectual growth. Brown stated, “Such a caring, supportive atmosphere, with its stress on nurturing positive interpersonal relationships, is linked to teacher commitment and student achievement” (p. 30). In her study, Brown sent surveys to 175 middle level principals in New Jersey, North Carolina, and Pennsylvania. Out of the 56% of surveys that were returned and suitable for data analysis, 44 principals indicated that they were willing to be interviewed. The 44 practicing middle school principals who were interviewed felt that “creating safe and supportive school environments is not an easy task, but it is doable” and that “efforts to create a caring community within each school and each classroom are linked to students’ social and academic development” (p. 32). In a study which examined sense of community and small class sizes in rural schools, researchers Nelson and Drake (1997) noted the following:

Numerous middle level reform efforts have been initiated in the last two decades in recognition of adolescent needs. As a representative of these middle school reform

efforts, the Carnegie Council on Adolescent Development (Hornbeck, 1989) describes a good middle school in the following terms: A small community where close, stable relationships are developed between adults and students. . . (p. 49)

Nelson and Drake's study found that rural teachers have a unique advantage in that "they have a sense of community as they guide their students and involve adults in school activities" (p. 51).

One of the few studies utilizing adolescents with regard to studying sense of community (Bateman, 1998) involved exploring students' psychological sense of community within the classroom setting. The population was sixth grade students who were divided between traditional classrooms and classrooms following the Schools for Thought (SFT) project, which focused on a team-based learning concept. Results from the study showed that the SFT students had significantly higher levels of psychological sense of community than did students in the traditional classrooms. Also, the SFT students had significantly higher levels of cooperative skills than the students in the traditional classrooms. Bateman found that psychological sense of community was positively correlated with students' academic achievement and other affective elements such as social skills, task-mastery, academic self-efficacy, goal-learning, and an interest in complex problem-solving. Bateman concluded that more research was needed to examine students' psychological sense of community in different environments. Noting that the sense of community was an important factor in understanding student behavior and performance, Osterman (2000) concluded that "students who experience acceptance are more highly motivated and engaged in learning and more committed to school. These concepts of commitment and engagement are closely linked to student performance and, more importantly, to the quality of student learning" (p. 359).

Ryan and Patrick (2001) conducted a study which found that “for many children early adolescence marks the beginning of a downward trend in academics” (p. 438). Their research on early adolescence and the classroom environment pointed out that the social environment of a classroom was important to motivation and engagement, particularly for young adolescent students. During this developmental stage, students are especially sensitive regarding changes in their beliefs related to academic achievement. Their study examined students ($N = 233$) who were in the process of transitioning from the seventh to the eighth grade within the same middle school. Three ethnically diverse middle schools within two school districts were utilized for the study. The sample was 45% European American and 55% African American. Forty percent of the students received free or reduced fee lunch. Fifty-seven percent of the sample was female and 43% male. The surveys were administered in two ‘waves’: in the spring of seventh grade and in the fall of eighth grade. The focus of the study was on mathematics classes, so as not to confound aspects of the classroom context with subject area. Math as the subject was chosen due to the following reason:

When students believe that difficulties reflect a lack of ability, they are likely to experience anxiety or nervousness that may undermine motivation and engagement.

Accordingly, a social environment in math class that is perceived as supportive . . . is expected to be facilitative of adaptive patterns of motivation and engagement. (p. 441)

The researchers investigated how students’ perceptions of various facets of the social environment of their eighth-grade math classroom related to changes in motivation and engagement when students moved from seventh to eighth grade. They controlled for students’ prior (seventh grade) motivation and engagement, as well as for students’ gender, race, and prior achievement. Their research found that, “in general, prior motivation and engagement were

strong predictors of subsequent motivation and engagement, whereas gender, race, and prior achievement were not related to changes in motivation or engagement” (p. 437). Although race was not a predictor of changes in motivation or engagement, as they were investigating, they did discover that African American students’ “judgments of their capability to complete their work successfully” (p. 442) increased from seventh to eighth grade at a higher rate than it did for the European American students in the study. This was ascertained from students’ responses to statements such as the following:

1. I’m certain I can figure out how to do even the most difficult math work.
2. I can do even the hardest work in math class if I try. (p. 442)

Ryan and Patrick concluded, “We need to know more about how the social aspects of the classroom environment can support or undermine students’ motivation, engagement, and learning” (p. 448).

A study by Reyes and Fuller (1995) utilizing middle and senior high schools ($N = 101$) was conducted to determine if achievement in mathematics was related to selected elements of communal schools (shared norms and values, teacher collaboration, and focus on student learning), and whether or not sense of community, as indicated by those elements, differed between the middle schools ($n = 50$) and senior high schools ($n = 51$). The following sums up their research findings:

Our hypothesis that both types of schools differed on the communal variables is not supported. No significant difference exist [*sic*] between the middle schools and high schools on the communal variables. Further analyses of the data indicate that within school variation was larger than between schools. This shows that middle schools differ more among the middle school sampling units than between middle and high schools.

Despite this outcome, the trend in the mean scores show that middle schools have higher means than high schools on the variables measured in this study. Furthermore, gender, socioeconomic status, and parent expectations exert a significant effect on seventh-to-eighth-grade [*sic*] achievement growth in mathematics. (p. 31)

The communal variables of collaboration and commitment to shared goals yielded the greatest positive effects on student achievement gain in math. Teachers' absence from the classroom was found to be negatively related with student math achievement gain. Their findings showed that the most significant effects on seventh-to-eighth-grade achievement growth in mathematics were due to parental expectations, socioeconomic status, and gender.

In a study conducted in one school district's five middle schools in a major metropolitan city in Texas, students ($N = 2,400$) were selected to participate in research about the effects of ethnicity, gender, and grade on students' motivation and perceptions of learning environment in mathematics (Huang & Waxman, 1994). Half of the students selected were Asian-American ($n = 1,200$) and half were Anglo-American ($n = 1,200$). Huang and Waxman gathered data by questionnaires. Student *Involvement* through active participation in math class was examined. Student *Affiliation* regarding the extent to which students knew, helped, and were friendly toward one another was examined. Student *Satisfaction* determined by enjoyment of math class work was examined. *Parent Involvement* through interest in the child's mathematics education was examined. *Academic Self-Concept* regarding the extent to which students expected to do well in mathematics was examined. Asian-American students reported less *Affiliation* than Anglo-American students, but more *Involvement*, *Satisfaction*, and *Parent Involvement*. There were no significant differences in *Parent Involvement* regarding gender. Additionally, the researchers found "girls scored almost equally high on *Academic Self-Concept* as boys" (p. 13).

Regarding the grade level of the students, “in general, the lower the grade level, the more involved and satisfied they were” (p. 16). Sixth grade students reported significantly more *Involvement, Affiliation, Satisfaction, and Parent Involvement* than students in the higher grades. Seventh grade students had significantly higher perceptions of *Involvement, Satisfaction, and Parent Involvement* than eighth grade students.

Development of Sense of Community Measurement Constructs

Up until the beginning of the twenty-first century, measuring sense of community in the school setting proved to be challenging because of the lack of a single valid and reliable construct that would measure both classroom and school-wide sense of community. Historically, the state of North Carolina has examined class size, absenteeism, and parental perceptions as indicators of whether or not students felt cared for in school (Cunningham & Thompson, 2002). However, feedback in schools with respect to the student’s sense of community was not ascertained. Recent research assessing sense of community at the middle school level surveyed parents and teachers at nine middle schools (Belenardo, 2001). Again, input data from students was not collected. Since students are ultimately the key stakeholders in an educational setting, their insights provide valuable information to the school community as a whole. Schools must utilize student input to reliably measure sense of community within the school environment. One current study (Wood, Lawrenz, Huffman, & Schultz, 2006) examined a variety of middle school community members ($N = 2,698$) in an attempt to “provide a broad and contextualized picture of the school environment from which to elucidate relationships to school-level student achievement” (p. 238). The study consisted of eighth grade students ($n = 2,465$) as well as eighth grade science teachers ($n = 165$) and middle school principals ($n = 68$). The student survey utilized in the study was “essentially a subset of the teacher survey” (p. 239). Findings were that

“students, teachers, and principals perceive the school environment in significantly different ways” (p. 249). The researchers (Wood et al., 2006) concluded, therefore, that “further investigation of student culture is needed to determine appropriate changes that might lead to real improvements in achievement” (p. 251).

Schaps (2003) outlined a growing number of research studies which reported the positive effects of developing a strong sense of community in the classroom. There is a correlation between a student’s strong sense of community and his or her academic motivation, as well as social and emotional competence (Solomon et al., 2000). As previously noted, Schaps et al. (1997) also discovered that a strong sense of community encouraged ethical and altruistic behavior among students. These positive benefits indicate the need to further study sense of community at the classroom level. Regarding more recent studies conducted using groups of students, most have dealt with adult learners rather than adolescents (Cadieux, 2002; Obst & White, 2007; Rovai, 2001a; Rovai, 2002a; Rovai, 2002b; Rovai & Lucking, 2001). Cadieux (2002) worked with community college students, Obst and White (2007) utilized university freshmen ($N = 219$), Rovai (2001a, 2002a, 2002b) worked with graduate-level college students, and Rovai and Lucking (2001) conducted their research using undergraduate student populations.

The previous instrument used to evaluate sense of community, Sense of Community Index (SCI), developed by Chavis, Hogge, McMillan, and Wandersman (1986), was not specific to the educational environment. Therefore, in 2001, Rovai, Lucking, and Cristol developed a Sense of Classroom Community Index based on the earlier research by McMillan (1996) as well as McMillan and Chavis (1986). The McMillan and Chavis instrument measured general sense of community, but was not setting-specific to the classroom. The Sense of Classroom Community Index (SCCI) was designed specifically for use in the classroom to measure sense of

classroom community. The SCCI consists of a self-report questionnaire of 40 items. The 40 items are divided equally among the following four components of classroom sense of community: spirit, trust, interaction, and learning. Following is an overview of each of these four domains.

Spirit encompasses the recognition of membership in a community in which friendships develop, members bond with one another, and the sense of belonging that members possess fosters a nurturing environment, leading to a more cohesive group. Inclusion leads to involvement and a greater feeling of connectedness as McMillan (1996) states in the following:

Each of us needs connections to others so that we have a setting and an audience to express unique aspects of our personality. We need a setting where we can be ourselves and see ourselves mirrored in the eyes and responses of others. (p. 315)

Rovai (2001b) notes that “a lack of connectedness may affect the learner’s ability to cope” (p. 107).

Trust involves a willingness of community members to rely on one another. Honesty and truthfulness lead to credibility and increased candor among members. This helps to increase members’ feelings of confidence within the community. When individual members possess a genuine interest in the welfare of other group members, a feeling of supportiveness is fostered. This supportiveness is not just for fellow members, but also for the community as a whole.

Interaction comes from community members searching for similarities and shared traits with other members. The search for and appreciation of differences between community members also comprises interaction. When members share positive feelings about one another, as well as suggestions and differences of opinion, community cohesiveness increases as the

members grow closer to each other. As Rovai (2001b) states, “thus, increased disclosure of personal information strengthens classroom community” (p. 108).

Learning involves a commitment by community members to grow intellectually and increase the overall knowledge base of the community. Cooperation and collaboration between members serves to foster greater learning. Rovai (2001b) states that “learning thus represents the common purpose of the community and members of the community grow to feel that their educational needs are being satisfied through active participation in the community” (p. 108).

The Classroom Community Scale (CCS) was the next development in measurement constructs by Rovai (2002a). The 20-item CCS was designed to specifically measure the sense of community within a classroom. It was validated and utilized at a single institution of university students ($N = 375$) pursuing graduate studies in 28 different courses using the Blackboard.com e-learning system. The next major development of an instrument measuring sense of classroom community took place when researchers Rovai, Wighting, and Lucking (2004) developed the Classroom and School Community Inventory (CSCI). Rovai, Wighting, and Lucking conducted this study in response to the need for an instrument measuring psychological sense of community in the educational environment, therefore developing a construct that could discriminate between classroom and school communities. The development and implementation of the CSCI was an important step forward in educational research because it allowed for investigation and differentiation of sense of community at the classroom as well as school-wide levels by utilizing one single instrument. Student feelings of social community and learning community for both classroom and school learning environments may be extracted from the CSCI. The CSCI consists of a subscale for each of two forms: a classroom form (see Appendix A) and a school form. There are 10 self-report items for the classroom scale, such as “I trust others in this course,” and

“I feel that students in this course care about each other,” which specifically measure sense of community within the classroom setting. Following each item is a five-point Likert-scale of potential responses: strongly agree, agree, neutral, disagree, and strongly disagree. The total possible score ranges from 0 to 40 for the classroom community scale, with higher scores reflecting a higher sense of community. Rovai, Wighting, and Lucking (2004) provide evidence of both CSCI validity and reliability. The internal consistency estimate of reliability for the classroom scale using Cronbach’s coefficient alpha was .84. Reliability for the classroom scale and consistency coefficients for the social community and learning community subscales of the classroom form were .90 and .87, respectively. Stability estimates were calculated using Pearson r correlation coefficients and a two-week interval between pre-test and post-test measurements. Stability for the CSCI classroom form was .91. The stability estimate for the classroom scale using Pearson r correlation coefficients and a two-week interval between pre-test and post-test measurements was .91. The usefulness of this instrument is particularly important for research in K-12 education programs where student persistence and learning are lingering issues. This is the most current and appropriate construct for measuring students’ sense of classroom community for this study. This broadens the scope and flexibility needed by researchers to pursue various aspects of sense of community and their relationship to instructional methods, student behavior, and achievement. In conclusion of the study, Rovai, Wighting, and Lucking state the following with regard to the CSCI:

Given the ability of the instrument to evaluate both social community and learning community, researchers will be able to obtain insights into the specific areas where a school may need to focus its efforts in building a strong sense of community. (p. 277)

In his most recent research, Wighting (2006) investigated the relationship between sense of community and use of technology. He noted that “the literature does not address sense of classroom community among K-12 students or whether their sense of learning in a classroom community is affected by the use of technology in instruction” (p. 372). His study of ninth and eleventh grade students ($N = 181$) found that technology did, in fact, augment the sense of classroom community for the participants. Wighting noted that the implications of this study were twofold. In addition to the fact that the use of computers may add to students’ motivation and enjoyment of working within a community of learners, he also stated that “classroom community is important and could be linked to academic success” (p. 378). It was this connection with academic success that was the focus of this study.

The instrument selected to be utilized in this research provides an evaluation of student achievement in the area of mathematics. The evaluation instrument is the North Carolina End-of-Grade Tests (EOGs) in Mathematics. These are curriculum-based multiple choice tests administered in grades three through eight. Additionally, the EOGs are the North Carolina assessments utilized to determine proficiency under the Federal No Child Left Behind Act of 2001 (NCLB) by determining whether the state’s schools and local educational agencies are making adequate yearly progress. The tests are specifically aligned to the North Carolina Standard Course of Study (Assessment, 2007) and include a variety of strategies to measure the academic achievement of North Carolina students.

Among the measurements of achievement is a measurement of Adequate Yearly Progress (AYP). AYP is an individual state’s measure of progress toward the goal of 100% of students achieving to state academic standards in at least reading/language arts and mathematics. It sets the minimum level of proficiency that the state, its school districts, and schools must achieve

each year on annual tests and related academic indicators. AYP is specified by a predetermined percentage change in EOG test scores for all students in an entire school, as well as for each racial group specified under the federal program. Each student receives a predicted growth score based on their performance in previous years, and actual growth based on the current academic year. It allows for comparison of individual students, classes, grades, and schools. Pre-test and post-test scores are compared to determine *academic change* as defined by the North Carolina Department of Public Instruction (Assessment, 2007).

According to the ABCs 2007 accountability program, *academic change* is defined as follows: *Academic change* is expressed as the difference between a student's actual *c-scale* score for the current year and the student's average of two (in most cases) previous assessments (EOGs, 2007) with a correction for regression toward the mean. The *academic change* is based on an average of the previous two years' assessments. If there is only one year's EOG test data available, the expectation for change will be based on one previous assessment. A positive academic change indicates a gain in academic achievement, while a negative academic change indicates a loss in academic achievement from the previous two years (p. 4).

Summary

The literature provides details into the evolution of the concept of sense of community and the development of a tool for measuring sense of community in various educational settings. Research into students' sense of community in the classroom has become a high-interest area of sociological research, as America's educational systems come under increased levels of accountability to produce a more educated population. Studies have shown that schools with a high sense of community have positive influences on student behavior, attitudes, and motivation. However, little research has been conducted to ascertain if there is a relationship between

academic achievement and sense of classroom community. This research study attempts to add to the body of research on this topic, as well as explore other avenues to research based on the results obtained in this study.

CHAPTER III

Methodology

Introduction

This chapter will describe the setting for this study along with the quantitative procedures utilized in preparation of data analysis. The community and research participants will be described accordingly. The quantitative instrument and its reliability and validity for use with middle school students, the standardized test used as a comparison, and the methods for analyzing and comparing the data are discussed.

Setting and Research Participants

The Dare County Public School system is located on the Northeastern coast of North Carolina. These barrier islands have a total of 384 square miles of land. The year-round population is approximately 30,000 residents. During the 2007-08 school year, there were 5,145 students enrolled in the K-12 school system, with three middle schools in the district serving grades six, seven, and eight. Cape Hatteras Secondary School, located in Buxton, had approximately 147 students enrolled in grades six, seven, and eight. There were three classes of sixth grade students, two classes of seventh grade students, and two classes of eighth grade students at Cape Hatteras Secondary School. First Flight Middle School, located in Kill Devil Hills, had 605 students enrolled in grades six, seven, and eight. There were ten classes of sixth grade students, twelve classes of seventh grade students, and nine classes of eighth grade students at First Flight Middle School. Manteo Middle School, located on Roanoke Island, had 337 students enrolled in grades six, seven, and eight. There were five classes of sixth grade students, five classes of seventh grade students, and six classes of eighth grade students at

Manteo Middle School. The average class size across the district was 19 students for sixth grade, 21 for seventh grade, and 18 for eighth grade. District-wide in the three middle schools, the total number of mathematics classes for each grade was 18 sixth grade classes, 19 seventh grade classes, and 17 eighth grade classes.

The Dare County School system was selected for this research because of its uniqueness in geographical setting and size of schools, its similarities in demographic information related to the school communities, the consistency in performance of students as measured by the State of North Carolina's accountability system, high student attendance rates, as well as the high percentage of qualified and fully licensed teachers. All three schools have achieved the state's designation of School of Distinction for the last academic year, which requires 80-89% of students to be at grade level and to make expected growth, according to the state growth formula for students. In analyzing each school's profile, noting similarities in student populations and communities, as well as consistent high performance, one would expect the schools to have similarities in sense of classroom community at each campus.

Instrumentation

The North Carolina End-of-Grade Tests:

The North Carolina End-of-Grade Tests (EOGs) are designed to measure student performance on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study. The End-of-Grade Tests in Mathematics are administered to students in grades six through eight as part of the NC statewide assessment program. EOG assessments are given during the last three weeks of each academic school year. Pre-test and post-test scores are compared to determine academic change as defined by the North Carolina Department of Public Instruction. Pre-test scores are determined by averaging the previous two

years' assessments. If there is only one year's EOG test data available, the pre-test score is based on the one previous assessment. North Carolina End-of-Grade Mathematics Tests measure the goals and objectives as specified in the 2003 North Carolina Mathematics Standard Course of Study. Utilization of this mathematics achievement assessment instrument has been in effect since the 2005-06 school year.

Adequate Yearly Progress:

All public schools, in North Carolina and throughout the country, must measure and report Adequate Yearly Progress (AYP) as outlined in the Federal No Child Left Behind Act of 2001. AYP measures the yearly progress of different groups of students at the school, district, and state levels against a yearly target in reading and mathematics. There are both proficiency and participation targets. Proficiency target goals are set increasingly higher in three-year increments until the 2013-14 school year. Target goals increase in 2007-08, 2010-11, and finally in 2013-14 when 100% proficiency is expected. AYP measures the yearly progress toward achieving grade level performance for each student group in reading and mathematics. Student ethnic groups include the following: Whites, Blacks, Hispanics, Native Americans, Asians, and Multi-Racial.

The Classroom and School Community Inventory:

The Classroom and School Community Inventory (CSCI), developed by Rovai, Wighting, and Lucking (2004), consists of 10 self-report items for the classroom scale, such as "I trust others in this course," and "I feel that students in this course care about each other," which specifically measure sense of community within the classroom setting. Following each item is a five-point Likert-scale of potential responses: strongly agree, agree, neutral, disagree, and strongly disagree. The total possible score ranges from 0 to 40 for the classroom community

scale, with higher scores reflecting a higher sense of community. Rovai, Wighting, and Lucking (2004) provided the following evidence of both CSCI validity and reliability. The internal consistency estimate of reliability for the classroom scale using Cronbach's coefficient alpha was .84. Internal consistency coefficients for the social community and learning community subscales of the classroom form were .90 and .87, respectively. Stability estimates were calculated using Pearson r correlation coefficients and a two-week interval between pre-test and post-test measurements. Stability estimates for each scale were .91. Wording of the survey questions, according to the Flesch Reading Ease scale, scored 81.1 out of a possible 100 points, where 100 points equates to having the greatest ease of understanding on this scale. Therefore, wording was suitable for use with the middle school student target population of this study. This was the most current and appropriate construct for measuring students' sense of classroom community for this study.

Study Procedures

Selection:

Students in three middle schools, grades six through eight, were asked to participate in the classroom form of the CSCI. This self-selection within intact schools included mathematics classes in all three middle schools in the school district. The researcher obtained permission from the human subjects review board prior to collecting the data. The superintendent of the school system reviewed the research proposal to determine school board goal alignment and to grant permission to proceed with the research. The researcher also obtained permission to conduct the research in each school from the principals and mathematics teachers. Parents of the student participants were contacted and provided with an overview of the CSCI and the purpose of the study. Their permission was obtained prior to the administration of the survey. Documentation of

the permission was maintained. The researcher guaranteed that anonymity for all students would be maintained by assigning a unique code to each participant's survey instrument. This code was not released to any other person. The researcher personally collected all data and analyzed it away from the school campuses to ensure confidentiality and security.

Administration of Measures:

After following the appropriate protocol to obtain permission to proceed with the assessment, the researcher scheduled and then administered the classroom form of the CSCI at the selected schools in Dare County, North Carolina. The CSCI was administered during the spring semester of the 2007-08 school year. Permission was obtained in April 2008 from the Superintendent of Dare County Schools, adhering to the Dare County School Board policy for conducting educational research and surveying students within the school system. After permission was granted from the Superintendent, the researcher formally discussed the study, as well as data collection with all of the participating school principals and mathematics teachers. Students were informed about the research and about their voluntary participation when they received the permission slips for parental approval. After parental approval, potential participants were also presented with informed consent forms to ensure that they fully understood that participation in the study was voluntary. The researcher was the only survey administrator collecting the data in the mathematics classes. This ensured control over the confidentiality and security of survey codes for each student in order to guarantee anonymity of participants in the study. The directions were read after the survey was passed out. Following completion, the surveys were collected, organized, and secured to maintain confidentiality. The data input into the SPSS statistical computer program for subsequent quantitative analysis took place in a secure, off-campus location.

Analysis

Quantitative Analysis:

The data obtained from the CSCI was analyzed using descriptive statistics in order to reveal information relating to the subscales within the instrument, as well as to provide descriptive analysis of the scores for the various schools, grade levels, classes, and students that completed the questionnaire. Inferential statistical analyses were conducted to assess the relationship between classroom sense of community (dependent variable) and one or more independent variables (IVs), including student growth in mathematics achievement by school, grade level, classroom, and gender. An additional analysis was conducted to explore the possible relationship between sense of classroom community and each of the following topics: student motivation, student engagement, and class disruptiveness (see Appendix B).

Summary

This study was designed to quantitatively examine sense of community in the middle school classroom environment and compare students' sense of classroom community to academic achievement in mathematics. The classroom form of the CSCI was administered to 589 students in grades six, seven, and eight in three middle schools. The data was analyzed to ascertain students' sense of community at the classroom level. This study also utilized standardized mathematics achievement data for individual students to examine the possible relationship between students' sense of community and academic growth in mathematics. After the data was examined, the researcher sought information regarding differences in classroom sense of community among the three participating schools, between the grade levels, and among mathematics classes. The focus of the study was to examine the data to determine if there was a relationship between mathematics achievement and classroom sense of community.

Gender was also analyzed to ascertain if there were differences in classroom sense of community and mathematics achievement between those two subgroups. In addition to the main research questions, this study collected information from students related to the following three topics: student motivation in each mathematics class, student engagement in each mathematics class, and disruptive student behavior in each mathematics class.

CHAPTER IV

Results

Introduction

The purposes of this study were to examine and measure sense of community in the middle school classroom environment by utilizing the CSCI, and to determine if there was a relationship between sense of classroom community and mathematics achievement as measured by growth scores of EOG tests (EOGs, 2007). Rovai, Wighting, and Lucking (2004) provided the following evidence of both CSCI validity and reliability: A factor analysis offers empirical support for the notion that students have multiple psychological senses of community in reference to classroom communities and the presence of two subscales of social community and learning community as dimensions of the classroom community construct. Internal consistency estimate of reliability for the classroom scale using Cronbach's coefficient alpha was .84. Internal consistency coefficients for the social community and learning community subscales of the classroom form were .90 and .87, respectively. Stability estimates were calculated using Pearson r correlation coefficients and a two-week interval between pre-test and post-test measurements. Stability estimates for each scale were .91. The classroom form of the CSCI was administered to students in grades six, seven, and eight.

First, the researcher examined middle school students in all three of the middle schools in one rural county to determine individual students' perceptions of classroom sense of community. Second, the researcher collected individual students' mathematics EOG test score information from the North Carolina Department of Public Instruction (Assessment, 2007) to compare with individual students' perceptions of classroom sense of community in the participating middle

schools. Third, the researcher examined the possible relationships between individual students' sense of community and mathematics achievement, as measured by mathematics growth scores (ABCs, 2007). Results of data analyses are included in this chapter, as well as reports on the following: (a) the results of the measurements taken to ascertain individual middle school students' perceived sense of community at the classroom level and (b) the results of measurements to determine the relationship between each middle school student's mathematics achievement, as measured by growth scores, to each student's perception of sense of community in the mathematics classrooms.

Threats and Limitations

Internal and external threats to this study were considered prior to site selection, administration of the survey, and data analysis. Internal threats for selection and instrumentation bias were acknowledged and addressed by the researcher. The three middle schools selected to participate in the study comprised all of the middle schools in the school system; therefore, every student was provided the opportunity to participate. Fifty-four percent of the students that were invited actually participated in the study. The process for participation required the approval of the university Human Subjects Review Board, the Dare County School System's Superintendent, and the Principal at each of the three middle schools. Consent from both parents and students, in accordance with county school board policy, was obtained prior to survey administration. The three middle schools selected for the study possessed common characteristics related to geographic location, population diversity, and performance levels of the students in the schools.

The selection process reduced the potential threat of subject characteristics. All students in the three schools were invited to participate in the study. Their participation in the study was voluntary and required permission from the participants' parents due to their age (see Appendix

C). Participants also signed an informed consent form prior to participation (see Appendix D). The researcher acknowledged the participant selection process as a threat to the study, in that there was a potential for students with low sense of community to opt out of the study either by not getting parental permission, or by not following through by signing the informed consent form after receiving parental permission. However, regarding the second concern, 100% of the participants that received parental permission did follow through by signing the informed consent forms. The researcher encouraged and reminded the teachers to monitor the permission slip return rates for their classes. The return rates varied from school to school. Table 1 lists survey participation rates for the three schools, as well as total county-wide participation.

Table 1

Subject Participation Rates by School

School	Number of Participants	Students Enrolled	Participation %
1	72	147	49.0%
2	350	605	57.9%
3	167	337	49.6%
Total	589	1,089	54.1%

The potential for instrumentation bias existed in administering the survey to participants. This threat was addressed by the researcher by controlling administration of the survey in its entirety. Continuity of measurement was achieved due to the researcher being the only administrator of the survey. The researcher was also the only survey administrator collecting the data in the mathematics classes. This ensured consistency in administration of the survey and control over the confidentiality and security of survey codes for each student.

Limitations in this study were related to the use of standardized questions in a survey format administered to a middle school-aged population. It was likely that this was the first opportunity that students had to participate in educational research of this nature and the responses could have been artificial. The use of the standardized survey was also advantageous in data collection. The same questions were asked of each respondent, enabling the researcher to describe and compare characteristics of the population.

Overview

The following research questions were addressed:

1. Does a difference in classroom sense of community, as measured by the CSCI, exist among mathematics classes across the three middle schools in the same rural county?
2. Does a difference in classroom sense of community, as measured by the CSCI, exist among sixth, seventh, and eighth grade mathematics classes at each of the three middle schools in the same rural county?
3. Does a relationship exist between academic growth in mathematics classes and classroom sense of community in each of the three middle schools in the same rural county?
4. Does a relationship exist between academic growth in mathematics and classroom sense of community across grade levels six, seven, and eight at the three middle schools in the same rural county?
5. Does a difference exist between genders when compared to academic growth in mathematics and classroom sense of community in grades six, seven, and eight at and among each of the three middle schools in the same rural county?

This study was conducted during the 2007-08 school year. There were 5,145 students enrolled in the K-12 public school system of Dare County, North Carolina, in five elementary, three middle, and three high schools. Enrollment in grades six, seven, and eight in the three middle schools totaled 1,089 students or 21.2% of the total number of students enrolled in the school system. Cape Hatteras Secondary School (school 1), located in Buxton, had 147 students enrolled in grades six, seven, and eight comprising three classes of sixth graders, two classes of seventh graders, and two classes of eighth graders. First Flight Middle School (school 2), located in Kill Devil Hills, had 605 students enrolled in grades six, seven, and eight comprising ten classes of sixth graders, twelve classes of seventh graders, and nine classes of eighth graders. Manteo Middle School (school 3), located on Roanoke Island, had 349 students enrolled in grades six, seven, and eight comprising five classes of sixth graders, five classes of seventh graders, and six classes of eighth graders. The average class size across the district was 19 for sixth grade, 21 for seventh grade, and 18 for eighth grade.

All students in each of the three middle schools in the county were invited to participate in this study (see Table 1). This invitation was preceded by an informative letter to the teachers and accompanied by a brief explanation about data collection for the purpose of this educational research (see Appendix E). Written parental permission (see Appendix C) followed by written student informed consent (see Appendix D) forms were obtained for all participants. Table 2 shows the total participation rates for the three schools by grade level. The lowest participation rate (17.9%) came from school 1, grade seven. This low rate was due to the fact that only seven students participated in the survey at that grade level, out of a total population of 39 students in seventh grade at that school.

Table 2

Subject Participation Rates by Grade Level

School	Grade	Participants	Total Students	Participation %
1	6	50	59	84.7%
1	7	7	39	17.9%
1	8	15	48	31.3%
2	6	99	198	50.0%
2	7	145	223	65.0%
2	8	106	184	57.6%
3	6	60	115	52.2%
3	7	48	114	42.1%
3	8	59	109	54.1%

Of the total participants ($N = 589$), 265 students or 45% were male, and 324 students or 55% were female. One hundred percent of the participants revealed their gender. The ages of students ranged from 10 to 16 years old. One hundred percent of the participants revealed their ages.

The researcher personally administered the classroom form of the CSCI survey to each mathematics class. The researcher then collected the surveys, and secured them in the researcher's private office. The surveys were hand-scored solely by the researcher. This data was maintained on file for a predetermined amount of time. Figure 1 is a histogram illustrating the dependent variable (Sense of Classroom Community) distribution for all three middle schools combined.

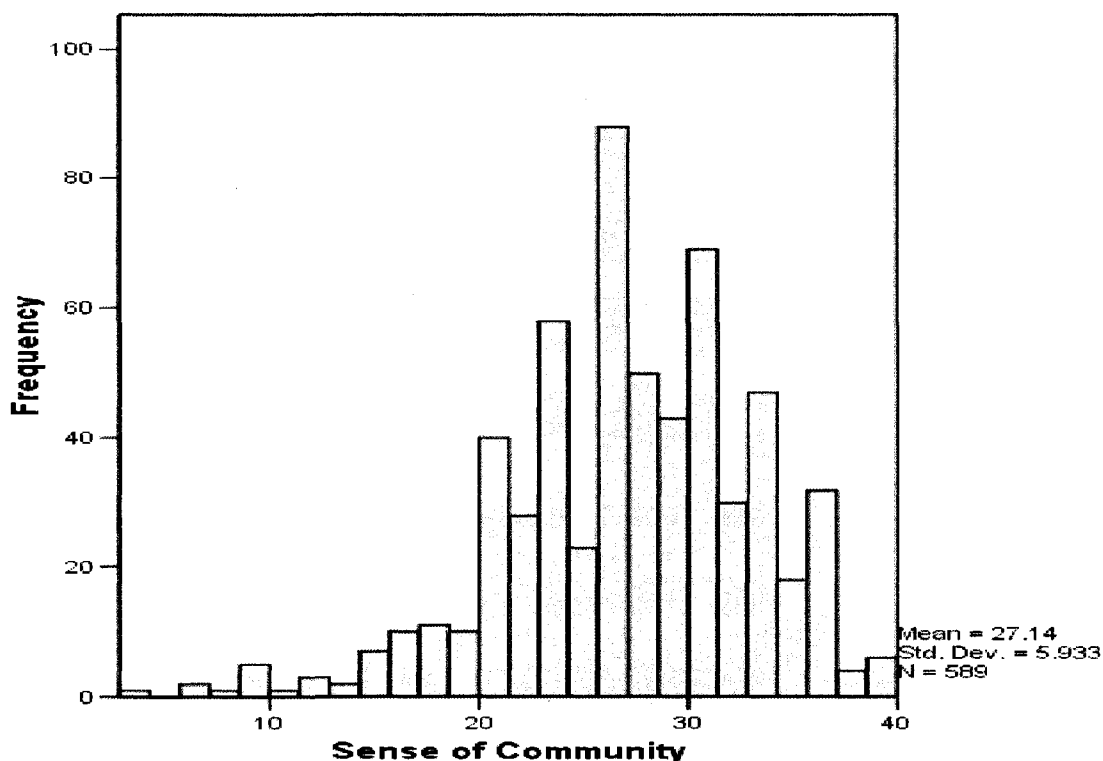


Figure 1. Dependent Variable, Sense of Classroom Community Distribution

Results of Statistical Analyses

The first issue addressed in this study was to determine if a difference existed in classroom sense of community, as measured by the CSCI administered to individual students, among mathematics classes across the three middle schools of the same rural county participating in the study. Inferential statistics were used to determine if any differences existed among the mathematics classes across the three middle schools. Differences in sense of community total score measured among schools were analyzed using a one-way between subjects ANOVA. Levene's test showed that the assumption of homogeneity of variance ($p = .122$) was tenable.

The Kolmogorov-Smirnov tests of normality indicated that the data from school 1 were normally distributed ($p > .20$); however, data from schools 2 and 3 were significantly non-normal ($p \leq .001$ in both cases). Table 3 provides the results of the tests of normality for each school.

Table 3

Tests of Normality Results for Classroom Sense of Community by School

Sense of Community	<u>Kolmogorov-Smirnov^a</u>				
	School	N	Statistic	df	Significance
	1	72	.087	72	>.200
	2	350	.073	350	.000
	3	167	.094	167	.001

Note. ^aLilliefors Significance Correction.

Because the ANOVA was robust (Glass & Hopkins, 1984) in the face of some departure from normality, further analysis was conducted. The histograms and Q-Q plots suggested normality; median and mean were within one standard error of each other in every case and sample sizes were large. The assumption was therefore tenable. The ANOVA would have been more robust if the three schools had been more similar in size.

Following is the sense of classroom community distribution mean for each of the three schools: school 1 ($N = 72$) had a mean of 25.43; school 2 ($N = 350$) had a mean of 27.00; and school 3 ($N = 167$) had a mean of 28.17. Table 4 shows the results of the one-way analysis of variance between schools relating to classroom sense of community as measured by the CSCI instrument administered to individual students. Results of the one-way analysis of variance showed significance, $F(2, 586) = 5.71, p = .004$, with post hoc Tukey's Honestly Significant Difference test indicating that sense of community in school 3 was significantly higher than school 1 (mean difference was 2.74, $p = .003$). Differences between schools 1 and 2, and differences between schools 2 and 3, were not significant.

Table 4

Comparisons Between Schools of Sense of Community Mean Scores

Pair-wise school comparison	Mean difference	Standard error	Significance
1 ($N = 72$) × 2 ($N = 350$)	-1.57	.76	.098
1 ($N = 72$) × 3 ($N = 167$)	-2.74**	.83	.003
2 ($N = 350$) × 3 ($N = 167$)	-1.17	.55	.088

Note. ** The mean difference is significant at $p = .01$.

After examining and interpreting these results, the researcher reviewed school sizes and study participation rates at each school to determine any possible influence on the results. The sample size for school 1 ($N = 72$) and the participation rate for school 1 (49.0%) could have affected the results for this comparison. School 1 had the lowest sample size and participation rate compared to the other two schools.

The second issue addressed in this study was to determine if a difference existed in classroom sense of community, as measured by the CSCI administered to individual students, among sixth, seventh, and eighth grade mathematics classes at each of the three middle schools in the same rural county. Students' individual sense of community scores were used to calculate mean sense of community scores by grade level for each school. The researcher then utilized the grade level mean scores to compare sense of community for grades six, seven, and eight at each of the three middle schools. Differences in sense of community measured among grade levels for the three schools were analyzed using a two-way analysis of variance between subjects. There were two independent variables (IV's) with three levels each (schools: 1, 2, and 3; grades: six, seven, and eight). Data were normally distributed across all sub-populations. Distributions of total sixth, seventh, and eighth grade students' sense of community scores were examined for

normality. Kolmogorov-Smirnov tests indicated $p < .001$ for all three levels, but histograms and Q-Q plots showed normality was acceptable for an analysis of variance. Table 5 provides the results of the tests of normality for classroom sense of community at each of the three grade levels for all three schools combined.

Table 5

Tests of Normality Results for Classroom Sense of Community by Grade

Sense of Community	<u>Kolmogorov-Smirnov^a</u>				
	Grade	<i>n</i>	Statistic	<i>df</i>	Significance
	6	209	.092	209	.000
	7	200	.091	200	.000
	8	180	.095	180	.000

Note. ^aLilliefors Significance Correction.

When examined for both grade level and school, normality was indicated for all grades in school 1, for grade eight in school 2, and for grades six and seven in school 3. Although grades six and seven in school 2, as well as grade eight in school 3, were significantly different from normal, the assumption was tenable because of the robustness of the test. Departure from normality in school 2, grade six was offset by sample size. In school 2, grade seven, there were three mild outliers; and in school 3, grade eight, there were four mild outliers and one extreme outlier. Departure from normality in school 2, grade seven and in school 3, grade eight was likely caused by these outliers. The data variances were homogeneous across cells. Levene's test was used to test the null hypothesis that the error variance of the dependent variable was equal across groups. The test was non-significant ($p = .085$), therefore the assumption was tenable. Table 6 shows the descriptive statistics relating to classroom sense of community for each grade level at each of the three middle schools.

Table 6

*Descriptive Statistics for Classroom Sense of Community for Each Grade and School
(Grand mean = 26.964)*

School	<i>N</i>	<i>M</i>	<i>SD</i>	outliers
1	72	25.43	5.39	2 mild, 0 extreme
2	350	27.00	6.16	6 mild, 0 extreme
3	167	28.17	5.48	5 mild, 0 extreme
Grade	<i>n</i>	<i>M</i>	<i>SD</i>	outliers
6	209	28.35	5.487	1 mild, 0 extreme
7	200	22.91	5.956	7 mild, 1 extreme
8	180	27.11	6.151	6 mild, 0 extreme
School × Grade	<i>n</i>	<i>M</i>	<i>SD</i>	outliers
1,6	50	24.86	5.257	1 mild, 0 extreme
1,7	7	23.00	7.188	1 mild, 0 extreme
1,8	15	28.47	3.815	0 mild, 0 extreme
2,6	99	29.09	5.309	0 mild, 0 extreme
2,7	145	25.21	5.743	3 mild, 0 extreme
2,8	106	27.51	6.771	0 mild, 0 extreme
3,6	60	30.03	4.716	1 mild, 0 extreme
3,7	48	28.46	5.754	0 mild, 0 extreme
3,8	59	26.05	5.322	4 mild, 1 extreme

Note. The two extreme outliers are not the same case. These cases skewed the data lower.

A survey instrument review of each case did not indicate any other discrepancies;

therefore, the data were not removed and re-analyzed.

The results of a two-way ANOVA showed that the main effects of school and grade were significant, $F(2, 580) = 3.98, p = .019$ and $F(2, 580) = 3.84, p = .022$, respectively. In addition, the interaction effect was significant, $F(4, 580) = 6.05, p < .001$. The adjusted $R^2 = .08$. The post hoc tests (Tukey HSD) indicated that school 3 had overall higher sense of community scores than school 1. The post hoc tests (Tukey HSD) also indicated that grade six had overall higher scores than grade seven. The simple main effects for each grade within each school were evaluated. For school 1, grade eight had a significantly higher sense of community than grades six and seven. For school 2, grades six, seven, and eight were significantly different than each other, with grade seven lowest and grade six highest. For school 3, grade eight was significantly lower than grades six and seven. Table 7 provides the results of the two-way ANOVA that show the main effect of each school and each grade level.

Table 7

Analysis of Variance for Sense of Community

Source	<i>df</i>	<i>F</i>	<i>p</i>
School (S)	2	3.98*	.001
Grade (G)	2	3.84*	.02
S × G	4	6.05*	.001
Error	580	(32.25)	

Note. Value enclosed in parentheses represents mean square error.

* $p < .05$. Adjusted $R^2 = .08$.

The sequential Bonferroni approach was applied to account for type I error rate .05/3 ($p \leq .017$). The results showed the differences in school 2 between grades six and seven, and between grades seven and eight, were significant. The results showed the differences in school 3 between

grades six and eight were significant. The results of these analyses were reviewed by the researcher to ascertain any trends, regarding students' classroom sense of community in grades six, seven, and eight between the three participating middle schools, which would warrant further investigation. School 1 had the lowest overall student participation rate of the three schools, with grade seven having the lowest participation among the three grade levels that school. Grade seven in school 1 also had the lowest classroom sense of community of any grade level in the three participating schools. The low rate of participation in school 1, grade seven, in particular may indicate issues related to sense of community at the classroom level, such as teacher commitment, and focus on student learning as indicated by teacher expectations.

The third research question in this study examined the possible relationship between academic growth in mathematics classes and classroom sense of community in each of the three middle schools in the same rural county. Students' individual classroom sense of community scores (see Appendix F) were used to calculate mean classroom sense of community scores for each of the three middle schools. Students' individual mathematics growth scores (see Appendix F) were used to calculate the mean mathematics growth scores for each of the three middle schools. Mean classroom sense of community scores and mean mathematics growth scores for each of the middle schools were analyzed to determine if a relationship existed between the two continuous variables, academic growth in mathematics and classroom sense of community. The Pearson product-moment correlation coefficients were examined to determine if these relationships existed. In order to assess the assumptions for correlation analysis, tests were performed to determine if there were extreme outliers. There were no extreme outliers for sense of community or for mathematics growth. The data were normally distributed for both of the

variables. All three schools showed normal distribution for growth, based on Kolmogorov-Smirnov tests ($p > .20$).

The analysis of the correlation utilizing mean mathematics growth scores and mean sense of community scores for individual students at each school indicated that there was no significant relationship ($p = .05$) between sense of classroom community and mathematics achievement (growth) among schools. However, the data for the largest school in this research showed a trend toward a positive correlation. Table 8 shows the results of these correlations between sense of community and growth in mathematics achievement by school.

Table 8

Pearson Correlations Between Sense of Community and Growth in Mathematics Achievement by School

School	<i>N</i>	Correlation	Significance
1	72	-.047	.708
2	350	.106	.053
3	167	.075	.344

Note. Correlation is not significant at $p = .05$ for any combination.

Further consideration of these correlations was given by the researcher with regard to school populations and student participation rates. The largest school, school 2, had the highest participation rate in the study and trended toward significance ($p = .053$) at the alpha level of .05 when correlating classroom sense of community and mathematics achievement as measured by growth scores. Reasons for the wide variations in participation rates among grade levels at each school (see Table 2) were not revealed to the researcher during the administration of the CSCI

construct. Factors related to individual teachers within each school may have impacted the participation rates at each grade level.

The fourth research question in this study examined the possible relationship between academic growth in mathematics and classroom sense of community across grade levels six, seven, and eight at the three middle schools in the same rural county. Individual mathematics achievement scores and classroom sense of community scores for individual students at each school were grouped according to grade level. Students' individual classroom sense of community scores were used to calculate mean classroom sense of community scores at each grade level for each of the three middle schools. Students' individual mathematics growth scores were used to calculate the mean mathematics growth scores at each grade level for each of the three middle schools.

Mean classroom sense of community scores and mean mathematics growth scores at each grade level for each of the middle schools were analyzed to determine if a relationship existed between the two continuous variables, academic growth in mathematics and classroom sense of community. The Pearson product-moment correlation coefficients were examined to determine if these relationships existed. An assessment of the assumptions for a correlation analysis was conducted to determine if there were extreme outliers. There was a single extreme outlier in eighth grade for mathematics growth. A review of the survey and mathematics growth score for the participant was conducted and the researcher determined that the datum point in question, an extreme outlier, would not be removed due to the consistency of the student's other responses on the survey and historical performance on mathematics achievement measures. Table 9 shows the results of these correlations between sense of community and growth in mathematics achievement by grade level at each of the three schools.

Table 9

Pearson Correlations Between Sense of Community and Growth in Mathematics Achievement by Grade Level at Each School

School	Grade	<i>n</i>	Correlation	Significance
1	6	50	.044	.769
1	7	7	-.494	.319
1	8	15	-.176	.566
2	6	99	.054	.605
2	7	145	.190	.024*
2	8	106	.206	.039*
3	6	60	.396	.002**
3	7	48	.044	.769
3	8	59	-.072	.596

Note. * Correlation is significant at $p = .05$.

** Correlation is significant at $p = .01$.

The sample size was large enough that linearity and homoscedasticity variations were unlikely to affect the robustness of the analysis. The data were normally distributed for both variables. All three schools showed normal distribution for growth, based on Kolmogorov-Smirnov tests ($p > .20$). There was a significant correlation ($p = .05$) between sense of community and mathematics growth for school 2, grade seven, $r(138) = .190$, $p = .024$; and for school 2, grade eight, $r(99) = .206$, $p = .039$. There was a significant correlation ($p = .01$) between sense of community and mathematics growth for school 3, grade six, $r(56) = .396$, $p = .002$. School 1, grade seven, $r(4) = -.494$, $p = .319$, appeared to have a significant correlation; however, due to the small sample size ($n = 7$), the correlation was not significant. The number of

participants for this grade level was too small for the correlation analysis. There was no significant correlation for any other school \times grade combinations.

Since three out of nine correlations were significant, the researcher examined school populations, student participation rates, and demographic information for all grade levels at all three schools to possibly account for these results. An initial investigation was conducted into the three grade levels that showed a significant correlation ($p = .05$) between classroom sense of community and growth in mathematics achievement. Participation rates were then examined by grade level for all three schools to determine if the grade levels that showed significant correlation ($p = .05$) in Table 8 also had higher rates of student participation than the grade levels that showed no significant correlation.

While school 1 had the smallest population ($N = 72$) of the three participating schools and the smallest participation rate (49.0%), results showed no significant correlation ($p = .05$) for any of the grade levels. School 2, with the largest population ($N = 350$) of the three participating schools, as well as the highest overall participation rate (57.9%), showed a significant correlation ($p = .05$) between classroom sense of community and mathematics growth scores for grades seven and eight. However, results showed no significant correlation for grade six in that school. Student participation rates by grade level at school 2 were highest for grade seven and lowest for grade six. School 3, with the second largest population ($N = 167$) and overall participation rate (49.6%), showed a significant correlation ($p = .01$) between classroom sense of community and mathematics growth scores for grade six. However, results showed no significant correlation ($p = .05$) for grades seven or eight in that school. Student participation rates by grade level at school 3 were highest for grade eight and lowest for grade seven. This revealed that participation rates

were higher in only one out of the three grade levels identified as showing a significant correlation ($p = .05$) between classroom sense of community and mathematics growth scores.

Further consideration of these correlations was given by the researcher with regard to the following grades showing significance: school 2, grade seven; school 2, grade eight; and school 3, grade six. The researcher examined classroom level correlations for each of the three grade levels showing significant correlation. None of the classes that were examined showed significant correlation ($p = .05$) on their own. Participation rates at the classroom level were calculated for all grade levels in all three schools to determine whether or not the highest participation rates were among classes with the highest classroom sense of community. Participation rates by class varied from 0% to 100%, but were not highest in classes with the greatest CSCI scores.

Socioeconomic status of participants was not made available to the researcher and therefore was not considered. Ethnic diversity among participants was examined across grade levels at each school to explore any ethnicity variations that could account for these results. School 3, grade six had a 30.0% participant minority population, which was the second highest grade-level minority population among all survey participants. School 2, grades seven and eight participant minority populations were 8.3% and 5.7% respectively. Among all grade levels in all three schools, the range of minority participants was 0.0%—33.9% out of the total number of survey participants. Table 10 shows the minority student participation numbers and rates among each of the grade levels at each of the three schools. Ethnicity did not appear to be connected to the varied grade level correlations in the study.

Table 10

Minority Participation by School and Grade Level

School	Grade	Minority Participants	Total Participants	Minority Participation
1	6	1	50	2.0%
1	7	0	7	0.0%
1	8	3	15	20.0%
2	6	7	99	7.1%
2	7	12	145	8.3%
2	8	6	106	5.7%
3	6	18	60	30.0%
3	7	7	48	14.6%
3	8	20	59	33.9%

The final issue was to determine if a difference existed between genders when compared to academic growth in mathematics, and classroom sense of community in grades six, seven, and eight at and among each of the three middle schools of the same rural county. Analyses were conducted on the demographic information collected. Although gender information was collected, gender was not intended as a major predictor, and the research design resulted in wide variations in sample cell sizes when split by school, grade, and gender. In order to determine the possible effects of gender within sense of community and mathematics growth scores, gender was controlled during a partial correlation of the two variables. One t-test comparing sense of community between genders and another t-test comparing mathematics growth between genders were conducted. Neither of these tests yielded significant numbers. Using the Bonferroni adjustment for controlling Type I error showed correlation was not significant ($p = .05$). The

results of the analyses indicated that there was a relationship in 3 out of the 54 total mathematics classes in the three schools, but the individual classroom sample sizes in those three instances were problematically small.

In addition to the five research questions, the researcher included questions at the end of the student survey to investigate whether there was a relationship between sense of classroom community and student motivation, student engagement, and class disruptiveness (see Appendix B). The researcher's goal was to ascertain how these three topics might produce an interesting link for future studies. The additional questions appearing on the CSCI construct administered in this study were not part of the original construct. The questions had not been analyzed for validity or reliability to measure motivation, engagement, or disruptiveness before addition to the survey. The purpose was to determine if sense of community scores could be predicted by a linear combination of scores on measures of motivation, engagement, and disruption. Regression analysis was utilized. The assumption of normal distribution of residual error was reviewed through a histogram of residual error plotted against a normal curve, and determined to be tenable. Table 11 includes zero-order correlations and descriptive statistics for all variables.

Table 11

Zero-Order Correlations, Means and Variance of Motivation, Engagement, Disruption, and Sense of Community (SOC)

	Motivat ion	Engageme nt	Disrupti on	SO C	<i>M</i>	<i>SD</i>
Motivation					2.85	.92

Engagement	.61			2.79	.90
Disruption	-.32	-.29		1.88	1.16
SOC	.49	.49	-.32	27.14	5.93

Note. All correlations are significant at $p = .001$.

Collinearity diagnostics were reviewed by the researcher to evaluate the assumption of low multicollinearity. Tolerance was high, and VIF was low, indicating there was little collinearity in the model. Regression analysis showed that the model significantly predicted sense of classroom community scores, $F(3, 585) = 89.65, p < .001, R^2 = .32$, adjusted $R^2 = .31$. The prediction equation for sense of classroom community (SOCC) follows:

$$\text{Predicted SOCC} = (.28)\text{Motivation} + (.27)\text{Engagement} - (.16)\text{Disruption} + 18.71$$

All three predictors had a significant correlation with classroom sense of community. Motivation and engagement were positively correlated with classroom sense of community and disruption had a significant negative correlation with classroom sense of community. Table 12 shows the multiple regression analysis used to predict classroom sense of community with motivation, engagement, and disruption.

Table 12

Multiple Regression Analysis Predicting Sense of Community Scores

Predictor Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	Significance
Motivation	1.80	.28	.28	6.29	<.001

Engagement	1.75	.29	.27	6.12	<.001
Disruption	-.81	.19	-.16	-4.35	<.001

Note. $R^2 = .31$.

The statistical tests performed to analyze the relationship between sense of classroom community and student motivation, engagement, and disruption were not the focus of this study. However, these tests did produce significant results, and is an area to be considered for future studies.

CHAPTER V

Conclusions and Recommendations

Introduction

The purpose of this study was to examine sense of community in the middle school classroom environment. First, the study examined middle school students in the three middle schools of the same rural county to determine their perception of sense of classroom community. Second, the study examined the possible relationships between students' sense of community in the classroom and mathematics achievement as measured by students' growth scores. Third, the study utilized the classroom construct of the Classroom and School Community Inventory (CSCI) developed by Rovai, Wighting, and Lucking (2004). The CSCI was designed to measure students' sense of community from middle school through the college level, but had not been utilized in the middle school setting prior to this study.

As an addition to the classroom form of the CSCI survey, three questions related to motivation, engagement, and disruption in the classroom were added to the instrument. The three additional questions were added by the researcher to the CSCI construct due to each topic's frequent occurrence in the review of the literature. Phillips (1997) sought to determine whether

or not student engagement or academic achievement was related to school climate. Phillips stated that findings were inconclusive due in part to the lack of generalizability of the results. Schaps (2003) reported positive effects of a strong sense of community in the classroom. Solomon, Battistich, Watson, Schaps, and Lewis (2000) reported increased motivation as being tied to a strong sense of community. Resnick et al. (1997) reported the avoidance of problem behaviors as linked to a strong sense of community. Ryan and Patrick (2001) conducted a study investigating the classroom as a social environment and the characteristics of classroom environments that impacted student motivation and engagement. Royal and Rossi (1996) found that sense of community was related to students' engagement in school activities. They also found that the higher the sense of community, the less likely were students to participate in negative behaviors, such as behaving disruptively in class. Hawkins, Catalano, Kosterman, Abbot, and Hill (1999) linked increases in sense of community in the classroom to lower rates of negative behaviors as well as higher academic motivation.

The purpose of adding the three questions was to ascertain how they might produce an interesting link for future studies. The three additional questions, appearing on the CSCI construct that was administered to the participants in the study, were not part of the original construct to measure students' classroom sense of community. The three questions had not been analyzed for their validity or reliability to measure student motivation, engagement, or classroom disruptiveness before addition to the survey. This research collected data on these three topics to further explore any possible relationship to sense of community in the classroom by determining their ability to predict sense of community in the classroom.

The discussion focuses on how this study supported or did not support findings from past investigations and calls for the need to further investigate various aspects of sense of community

in middle schools, as well as how that sense of community relates to academic achievement in various educational settings. Recommendations for future research are also discussed.

Conclusions of Study

With regard to classroom sense of community, as measured by the classroom form of the CSCI (Rovai, Wighting, and Lucking, 2004), among mathematics classes across the three middle schools of the same rural county, the analyses showed each school exhibited a normal distribution of classroom sense of community scores. The implication of having a normal distribution when administered to three different middle schools is that the CSCI construct has consistency in that it measures what it is supposed to measure. The school system in this study was selected because of the shared commonalities among the three middle schools. The schools were located in the same school district. Each received the same level of funding for students based on a per pupil funding formula. The teaching staffs were on the same pay scale at each school. Students had similar opportunities within the community to participate in extracurricular activities both in the school setting and with the Parks and Recreation Department programs. All of the schools in this study have historically performed well on state-mandated accountability measures.

This was the first time the CSCI had been utilized in the middle school setting to measure students' sense of community in the classroom. The results, when compiled for each class, grade, or school, provide a baseline for future research. Reliable measurement of sense of community at the classroom level for middle school students in this study was important, just as Wighting's application was, measuring sense of community at the high school level in his 2006 research study, thus establishing a baseline for grades nine and eleven. Having the CSCI available to the

educational community now enables researchers to continue further investigations into sense of community in the classroom.

The results of the sense of community assessment showed that the participating schools' sense of community scores were unique to each individual school and revealed some significant differences. The difference between classroom sense of community in school 1 ($N = 72$) and school 3 ($N = 167$) was significant. Of the three middle schools in the study, school 1 had the lowest mean classroom sense of community score (25.43), and school 3 had the highest (28.17). Differences between schools 1 ($N = 72$) and 2 ($N = 350$), and between schools 2 ($N = 350$) and 3 ($N = 167$), were not significant. Differences in sample size within each school could have affected the results. These results partially support a study conducted by Reyes and Fuller (1995) that utilized middle and senior high schools investigating whether or not sense of community differed between the middle schools and senior high schools. Their study utilized information collected through an exploratory data analysis in a national survey of middle and high school students and their mathematics teachers. This study was a nation-wide longitudinal study ($N = 101$) involving middle ($n = 50$) and high ($n = 51$) schools. The schools in the longitudinal study had similar organizational structures, as did the schools in this current study. Reyes and Fuller found that no significant difference existed between the middle schools and high schools. However, their data indicated that middle schools differed more among the middle school sampling units than between middle and high schools.

After analyzing the data from the three middle schools in this study, the researcher noted that the differences between the middle schools were significant in only one of the three comparisons. Regarding middle school climate and culture, Maehr and Anderman (1993) stated that, "in spite of what an individual teacher might do..., these efforts may be undermined if the

school as a whole emphasizes grades, competition, and rewards” (p. 598). School leadership was not investigated in the three middle schools in this study. However, school leadership may have been a factor in sense of community at the classroom level. Regarding the effects of school climate, Riehl and Sipple (1996) made the following conclusions based on their longitudinal, nationally representative study of public and private schools, administrators, and teachers ($N = 14,844$): Teachers who receive administrative support from their principals and instructional support from peers and other persons are also more likely to be committed to teaching in general and to the goals and values of their schools (p. 892).

With regard to classroom sense of community, as measured by the classroom form of the CSCI, among sixth, seventh, and eighth grade mathematics classes at each of the three middle schools in the same rural county, the analyses provided evidence that there were some significant differences in classroom sense of community according to grade level in each school. These differences in classroom sense of community among the grade levels may indicate that sense of community is unique at the classroom level. The results showed that the differences in classroom sense of community at each school were unique to each school in the study. After analyzing the data from all grade levels at each of the three middle schools, the researcher noted differences in sense of community between schools and between grades within each school, as well as certain grade levels among all three schools. This finding supports Hill’s (1996) conclusion that psychological sense of community is, to a significant extent, setting-specific. In other words, the reason for the lack of consistent findings regarding dimensions and correlates is that some significant percentages of these aspects of psychological sense of community differ from setting to setting (p. 433).

There was a trend in all three schools showing sixth grade classroom sense of community being higher than seventh grade. Regarding transitioning of students from elementary to middle school, the school district in this study has a systematic method for helping ensure a smooth transition for sixth grade students into middle schools. This includes administrative visits to each school during the spring semester, student visits to the middle schools, parent meet-and-greets, and summertime jump-start programs for selected students. Additionally, teacher certification may have played a role in classroom sense of community scores for grade six. One area of licensure for North Carolina teachers is K-6. This license allows teachers to teach anywhere from kindergarten through fifth grade at the elementary school level, up to sixth grade at the middle school level. Because of this, the possibility of having teachers with prior elementary school experience teaching at the sixth grade level, may result in having a positive effect on classroom sense of community by providing a more nurturing environment at this grade level. Brown (2004) stated that, "... stress on nurturing positive interpersonal relationships, is linked to teacher commitment..." (p. 30). The researcher reviewed the North Carolina teaching license status for each of the six middle school sixth grade teachers whose students participated in this study. This review revealed that 100% of the sixth grade teachers at the three middle schools held K-6 licensure to teach in North Carolina. Of these, five of the six had prior experience teaching at the elementary school level. The sixth teacher was a first-year teacher in the middle school setting with no prior teaching experience.

In two of the three schools, eighth grade classes had a higher sense of classroom community than the seventh grade. However, the third school's eighth grade classes had significantly lower classroom sense of community than grades six and seven at the same school. Several aspects of the eighth grade classes at school 3 were further examined to provide possible

information for the lower classroom sense of community in that grade level. Ethnicity was investigated and the researcher found that the percentage of minority students for this grade was similar to grades six and seven, with six being the highest and seven the lowest. Ethnicity did not appear to be connected to the differences in sense of community scores for school 3. There were two teachers on this grade level teaching mathematics. Teacher A taught four math classes and Teacher B taught two math classes. The mean sense of community scores at the grade level for each teacher were 23.80 for Teacher A and 26.85 for Teacher B. Teacher A had an extremely low survey return rate ($n = 2$) along with a very low sense of community mean score in one class that may have skewed the results lower for the entire grade level in that school.

Overall, the findings at the grade level for the three middle schools in this study partially support a study by Huang & Waxman (1994) in which the researchers found that, regarding the grade level of students, in general, the lower the grade level the higher the level of satisfaction and involvement. They also found in their study that sixth grade students had significantly higher achievement motivation than seventh and eighth grade students. Huang and Waxman noted, “These findings were in agreement with other observational studies which found that sixth grade students were more on task and less disruptive in the mathematics classroom than seventh and eighth grade students (Huang & Waxman, 1993a, 1993b)” (p. 16).

Regarding the relationship between academic growth in mathematics and classroom sense of community, as measured by the classroom form of the CSCI, in each of the three participating middle schools, the researcher found no evidence of a significant relationship at the school level. There was no significant correlation ($p = .05$) between sense of community and academic growth in mathematics among schools. However, the data for the largest school showed a trend toward positive correlation. The largest school, school 2, had the highest

participation rate in the study and trended toward significance ($p = .053$) at the alpha level of .05 when correlating mean classroom sense of community scores and mean mathematics growth scores.

Brown (2004) suggested a link between caring communities in school classrooms and student achievement. This study attempted to provide that link. It is possible that the nature of a mathematics classroom is structured around individual, independent learning rather than group projects and cooperative learning activities. It is possible mathematics classrooms provide less student-to-student interaction than other content areas such as language arts, science, or social studies. Solomon, Battistich, Watson, Schaps, and Lewis (2000) studied twelve schools that utilized a program focused on cooperative learning, where students worked together, collaboratively, in small groups. Students in these program schools were reported as seeing their classrooms and schools as caring communities. This leads to the potential for additional research to link classroom sense of community to academic achievement in subject areas with more communal learning environments.

The relationship between academic growth in mathematics, and classroom sense of community as measured by the classroom form of the CSCI, was further examined across each of the grade levels—six, seven, and eight—at all three middle schools in the same rural county. In three out of the nine correlations, there was a significant relationship ($p = .05$) between classroom sense of community scores and academic growth in mathematics classes within the participating schools and in different grade levels. There was a significant correlation between classroom sense of community and mathematics growth for grade levels seven and eight at one of the middle schools, and for grade six at another. Two of the three grade levels showing significant correlations were in school 2, the largest school ($N = 350$) in the study. School 3, the

second largest school ($N = 167$) in the study, had one grade level showing significant correlation. School 1, the smallest school ($N = 72$) in the study, had no grade levels showing significant correlation. Classroom level correlations for each of the three grade levels showing significant correlation were examined. None of the classes showed significant correlation ($p = .05$) on their own. Therefore, other demographic aspects were examined.

Each middle school varied in the number of elementary schools from which its student population was drawn. School 1 drew from one elementary school. School 2 drew from three elementary schools. School 3 drew from two elementary schools. Additionally, schools 2 and 3 had one elementary school in common. Socioeconomic status of participants was not made available to the researcher and therefore was not considered. An examination of participant ethnicity among all grade levels at each school was conducted. No trends were apparent to the researcher.

In a study investigating students' psychological sense of community in the classroom as compared to social and academic skills and social behavior, Bateman (1998) found a positive correlation between psychological sense of community in the classroom and academic achievement. The population consisted of sixth grade students who were divided between traditional classrooms and classrooms following the Schools for Thought project, which focused on a team-based learning concept across disciplines. Results from Bateman's research showed that the Schools for Thought project students had significantly higher levels of psychological sense of community than did students in the traditional classrooms. This current study differed from Bateman's study in that Bateman examined various content areas rather than mathematics only. The current study was designed to examine only mathematics students in traditional

classrooms. Therefore, the results for this study did not align with the findings of the Bateman study.

The final research question in this study was to determine if a difference existed between genders when compared to academic growth in mathematics, and classroom sense of community in grades six, seven, and eight at and among each of the three middle schools in the same rural county. Gender was not intended as a major predictor, and resulted in wide variations when split by school, grade, and class. The results of the analyses indicated that there was a relationship in 3 out of the 54 total mathematics classes in the three schools, but the individual classroom sample sizes in those instances were problematically small. The first class had 4 out of 12 students participate, with 3 of the 4 participants being female. The second class had 6 out of 23 students participate, with 4 of the 6 participants being male. The third class had 12 out of 20 students participate, with 9 of the 12 participants being female. Thus, results revealed no gender differences when comparing academic growth in mathematics and classroom sense of community.

These results support research conducted by Ryan and Patrick (2001) which found that gender was not a strong predictor of student motivation and engagement in a study of middle school students. Huang and Waxman (1994) found that no significant gender differences existed with regard to academic self-concept, or the extent to which students expected to do well in mathematics classes. Whereas neither of these previous studies benefited from utilization of the CSCI construct, further research into the area of gender would be beneficial.

This study included an additional investigation regarding motivation, engagement, and disruption. The researcher included questions at the end of the CSCI survey for the purpose of determining whether a relationship existed between sense of classroom community and student

motivation, student engagement, and class disruptiveness. More specifically, the three factors were examined to determine if each of them had the potential to be a predictor of classroom sense of community. The three additional questions, appearing on the CSCI construct administered to the participants in the study, were not part of the original construct to measure students' classroom sense of community. The three questions had not been analyzed for their validity or reliability to measure student motivation, engagement, or classroom disruptiveness before addition to the survey. The purpose was to determine if sense of community scores could be predicted by a linear combination of scores on the measures of motivation, engagement, and disruption.

All three factors were found to be predictors of classroom sense of community in this study. Student motivation and student engagement were positively correlated with classroom sense of community. Regarding engagement, these findings support a Royal and Rossi (1996) study finding sense of community to be related to students' engagement in school activities. Osterman (2000) conducted a study which found that student acceptance led to higher motivation and engagement. Regarding motivation, Battistich, Solomon, Kim, Watson, and Schaps (1995) found a positive relationship between individual students' sense of community and their motivation. Schaps (2003) also found a correlation between a student's strong sense of community and his or her academic motivation. Regarding classroom disruption in this study, disruption was found to have a significant negative correlation with classroom sense of community. These findings support a Royal and Rossi (1996) study which found that the higher the sense of community, the less likely students were to participate in negative behaviors such as behaving disruptively in class. Resnick et al. (1997) conducted a research study which found that development of a strong sense of community in the classroom led to students' avoidance of a

number of problem behaviors including violence. These findings were supported by further research when Hawkins, Catalano, Kosterman, Abbot, and Hill (1999) linked increases in sense of community within the classroom to lower rates of negative behaviors.

Examination of motivation, engagement, and disruption as predictors of classroom sense of community in this study produced significant results, supporting several previous research study findings. The current study found student motivation, student engagement, and classroom disruption to be significant predictors of classroom sense of community. All three had a significant correlation ($p < .001$) with classroom sense of community. Student motivation and student engagement were positively correlated with classroom sense of community and classroom disruption was negatively correlated with classroom sense of community. These significant results are an area to be considered for future studies.

Recommendations for Further Research

Rovai, Wighting, and Lucking (2004) set the modern stage for measuring sense of community in a variety of educational settings through development of the CSCI. This study was the first to use the CSCI construct in the middle school setting to measure students' perceived sense of classroom community. The results, when compiled for each class, grade, or school, now provide a baseline for future research at the middle school level. This study attempted to answer important questions related to classroom sense of community and achievement in mathematics classes. Since no relationship was found between growth in mathematics achievement and classroom sense of community in this study, research in different content areas should be further explored to determine if a relationship exists between classroom sense of community and other subject areas. Future research can investigate whether there is a link between classroom sense of community and reading achievement, written language, science, or social studies.

Since the nature of the mathematics classroom is typically structured around individual, independent learning rather than group projects and cooperative learning activities, different learning environments with more communal learning opportunities for students should be explored. For example, classes that emphasize hands-on, activity based learning in science, involving student-centered learning, may create a classroom environment in which students have a higher sense of community and greater student understanding.

In this study, the trend toward positive correlation between classroom sense of community and mathematics growth scores in the largest of the three middle schools strongly suggests that further research conducted in schools with larger populations may reveal more significant results. Conducting future studies that would include schools with more uniform sample sizes, particularly larger sample sizes, rather than the widely-varied sample sizes in this rural community setting would be beneficial and may yield different results.

Demographics should be considered and planned for in future studies. Gender can be analyzed on a much larger scale with larger sample sizes than occurred in this study. Diversity is of vital importance in the advancement of educational research. Utilizing the CSCI construct in measuring sense of community to include geographical variations of schools may reveal more significant findings. For instance, other rural settings which vary from the one used in this study, and more importantly, urban and suburban school districts with different student populations may produce significant findings when measuring sense of community and making any comparisons to academic achievement. Conducting a larger-scale study using the CSCI construct in an urban setting with much greater diversity than in this study's rural setting would provide valuable baseline research results for students with various ethnic backgrounds.

Another direction to take for future research would be a longitudinal study that seeks to measure students' classroom sense of community over time in a school setting. This could provide a clearer picture of cohort groups of students' perceptions of sense of community in order to ascertain if a student's sense of community decreases or increases as groups move through the grades in middle schools. These measurements could be compared to academic achievement over time in selected content areas. The value of this type of study would be to benefit educational administrators in assessing both personnel and instructional programs within the school setting. This would allow teachers and administrators to focus on areas where sense of community is low and needs to improve in order to benefit students.

Personnel issues are important in schools and must be addressed if educational administrators are concerned about classroom and school sense of community. If school leadership both values and emphasizes a positive sense of community within a school, the CSCI construct provides the most current and useful tool to accomplish this. For example, school improvement plans can include assessments on classroom and school sense of community by utilization of the CSCI to better develop a positive school environment for students and teachers alike. This could lead to increased teacher satisfaction ratings and lower teacher turnover, which ultimately benefits the student.

At the classroom level, teachers would be able to improve individual classroom management by using the CSCI construct to help assess the classroom sense of community that exists among their students. The information obtained from the CSCI survey could enable teachers to have a better understanding of the social dynamics of their classrooms and increase their knowledge of individual students within that class. It could provide teachers with information to identify individual students who might not feel a part of the class and have

difficulty interacting with their peers. This knowledge could help facilitate interventions for students in need.

Further research into classroom sense of community and different subject content areas should be explored, in part, because of the diverse methods used to teach mathematics, language arts, science, and social studies. Instructional approaches and teaching methodologies can vary across districts, schools, and classrooms. At a specific grade level, teachers who teach the same content can assess sense of community within each classroom to analyze varying teaching methodologies in their respective classes. This information can be compared to student learning using formative assessments during a given unit of study. Teachers can then collaborate on development of the most effective methods for delivering content objectives. The more effective teaching methods are, the more students learn.

Understanding students' own perceptions of their sense of community is important in educating the whole child. Furman (2002) noted that sense of community is how people feel about and experience their daily lives. It involves continuous attention and sensitivity to this psychological domain. The implication for educators is to continually communicate with and value students as they meet the academic rigors of furthering their education. Now that the CSCI has been utilized in the middle school setting, it opens up vast potential for further research in this area.

Educators need to know how students perceive sense of community in their schools and in their classrooms in order to better engage and motivate students. This information could be valuable to building level administrators seeking to increase student involvement in schools as students mature, rather than having them become disengaged from the school culture. Past studies have shown links between motivation and engagement of students with sense of

community in the classroom environment. This study found both motivation and engagement to be significant predictors of classroom sense of community. Student motivation and student engagement were positively correlated ($p < .001$) with classroom sense of community. This study's findings produce an interesting link for future studies. Additional research to further explore and determine the ability of student motivation and student engagement to predict sense of community in the classroom is necessary to move school cultures from top-down bureaucratic organizations to ones that are more student-centered and focused on engaging students in their own learning community.

The ability to predict sense of community based on student motivation and student engagement will enable teachers to keep students on task and ready to learn. Engaged and motivated students who are comfortable and satisfied within their learning communities may be more persistent in achieving academic success. Successful students cause less classroom disruptions, resulting in fewer disciplinary referrals to the office as well as fewer interruptions to the teaching and learning process within the classroom. Past studies have linked higher sense of community with decreases in the negative behaviors that result in classroom disruptions. This study found classroom disruption to be a significant predictor of classroom sense of community. Classroom disruption had a significant negative correlation ($p < .001$) with classroom sense of community. This finding means that schools could experience fewer office referrals from unengaged, disruptive students, and possibly fewer students being retained at the middle school grade levels. This would increase educational successes for students as they move on to high school, resulting in student's ability to graduate on time, possibly resulting in fewer high school dropouts. Thus, additional research to further explore classroom disruption as a significant

predictor of classroom sense of community could have implications at the middle school level that could subsequently affect these same students as they move to the high school level.

The ability to generalize the research findings of this study is limited for the following reasons: non-uniform size of school populations, lack of ethnic diversity, and wide variations in participation rates at the classroom level. Therefore, it would be beneficial to conduct more studies utilizing the CSCI with more diverse student populations in urban and suburban settings. Most importantly, this researcher's findings that student motivation, student engagement, and classroom disruption were found to be significant predictors of sense of community can have an impact on future research in education. These significant findings are generalizable to other educational environments and should be explored further.

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Appendix A

Classroom and School Community Inventory

Self-report questionnaire – classroom form

DIRECTIONS: Below you will see a series of statements concerning a specific course you are presently taking or recently completed. Read each statement carefully. Place an X in the parentheses to the right of the statement that comes closest to indicating how you feel about the course. You may use a pencil or pen. There are no correct or incorrect responses. If you neither agree nor disagree with a statement or are uncertain, place an X in the neutral (N) area. Do not spend too much time on any one statement, but give the response that seems to describe how you feel.

Answer Key: Strongly Agree(SA), Agree(A), Neutral(N), Disagree(D), Strongly Disagree(SD)

Please respond to all items.

1. I feel that students in this course care about each other.....(SA) (A) (N) (D) (SD)
2. I feel that I receive timely feedback in this course.....(SA) (A) (N) (D) (SD)
3. I feel connected to others in this course.....(SA) (A) (N) (D) (SD)
4. I feel that this course results in only modest learning.....(SA) (A) (N) (D) (SD)
5. I trust others in this course.....(SA) (A) (N) (D) (SD)
6. I feel that I am given ample opportunities to learn in this course.....(SA) (A) (N) (D) (SD)
7. I feel that I can rely on others in this course.....(SA) (A) (N) (D) (SD)
8. I feel that my educational needs are not being met in this course.....(SA) (A) (N) (D) (SD)
9. I feel confident that others in this course will support me.....(SA) (A) (N) (D) (SD)
10. I feel that this course does not promote a desire to learn.....(SA) (A) (N) (D) (SD)

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Internet and Higher Education, 7(4), 263-280.

Appendix B

Classroom and School Community Inventory

Administered to Dare County Public Schools Middle School Students

STUDENT # _____

Below is a short survey that you are respectfully requested to complete. All questions on this survey are multiple-choice. Your participation in this educational research study is highly valued and the results of this study have the potential to improve educational practice.

Your participation is voluntary. You will receive no extra credit if you elect to participate and you will not be penalized if you choose not to participate. Additionally, participation is both anonymous and confidential; completed surveys will only be seen by the researcher.

Please respond to all items.

DIRECTIONS: Please respond to each of the following items by **drawing a circle** around the best response or most accurate response.

1. Gender: Female Male
2. Ethnicity: White Black Hispanic American Indian Asian Multi-racial
3. Age: 9 10 11 12 13 14 15
4. Grade: 6 7 8
5. On a scale of 0 to 9, how much did you learn in this course, with **0** meaning you learned nothing, and **9** meaning you learned more than in any other course you've had?
0 1 2 3 4 5 6 7 8 9

DIRECTIONS: Below you will see a series of statements concerning a specific course you are presently taking. Read each statement carefully. Place an X in the parentheses to the right of the statement that comes closest to indicating how you feel about the course. You may use a pencil or pen. There are no correct or incorrect responses. If you neither agree nor disagree with a statement or are uncertain, place an X in the neutral (N) area. Do not spend too much time on any one statement, but give the response that seems to describe how you feel.

Answer Key: Strongly Agree(SA), Agree(A), Neutral(N), Disagree(D), Strongly Disagree(SD)

Please respond to all items.

1. I feel that students in this course care about each other.....(SA) (A) (N) (D) (SD)
2. I feel that I receive timely feedback in this course.....(SA) (A) (N) (D) (SD)
3. I feel connected to others in this course.....(SA) (A) (N) (D) (SD)
4. I feel that this course results in only modest learning.....(SA) (A) (N) (D) (SD)
5. I trust others in this course.....(SA) (A) (N) (D) (SD)
6. I feel that I am given ample opportunities to learn in this course.....(SA) (A) (N) (D) (SD)
7. I feel that I can rely on others in this course.....(SA) (A) (N) (D) (SD)
8. I feel that my educational needs are not being met in this course.....(SA) (A) (N) (D) (SD)
9. I feel confident that others in this course will support me.....(SA) (A) (N) (D) (SD)
10. I feel that this course does not promote a desire to learn.....(SA) (A) (N) (D) (SD)

*Please respond to these three additional questions:

1. Compared to other classes, this class has been motivating.....(SA) (A) (N) (D) (SD)
2. Compared to other classes, this class has been engaging.....(SA) (A) (N) (D) (SD)
3. Compared to other classes, students have been more disruptive.....(SA) (A) (N) (D) (SD)

Appendix C

Parent Permission Form for Student Survey Participation

June __, 2008

Dear Parent or Guardian:

During the last weeks of school, a PhD candidate from Dare County Schools will conduct a study on the sense of community of our students in grades six through eight. This survey supports one of the Dare County School Board goals, which is to engender community support for our schools.

The survey is titled *Classroom and School Community Inventory*. It will provide our school system with information related to students' perceptions about their learning community. The information only relates to the students' experiences in the classroom and there are no highly-personal questions asked. The results will assist our middle schools in addressing the developmental needs of our youth during this pivotal stage of their lives.

Additional Information:

- The survey takes approximately 12 minutes to administer.
- **The surveys are completed anonymously.** All students in each classroom will place their surveys in one envelope. The envelope is then sealed. All envelopes will be handled only by the researcher for processing.
- The final report will present findings to the school system by total group, grade, and gender.

No individual student data is reported.

- Students will be told that their participation is **voluntary** and they may skip items if they so choose.
- The survey is not a test that students take for school grades and their **grades will not be affected** if they choose not to participate.
- The survey is available for your review prior to the administration date through the school counselors at your child's school.
- A survey of this kind is most valuable when every student participates. If you want your child to participate, you **must** return the form at the bottom of this letter to your child's school **prior to the survey date**. If no form is received, your child will not participate in the survey. If you have any questions please contact John E. Donlan, Principal, Nags Head Elementary School, at 252-480-8880.

Thank you,

John E. Donlan, Principal, Nags Head Elementary School

My child is permitted to participate in the *Classroom and School Community Inventory* survey.

Child's name (please print) _____ Grade level _____

School _____

Parent Signature _____ Date _____

Appendix D
Informed Consent Document
Old Dominion University

Project Title: The Relationship Between Rural Middle School Student Mathematics Achievements and Classroom Sense of Community

Introduction

The purposes of this form are to give you information that may affect your decision whether to say YES or NO to participation in this research, and to record the consent of those who say YES. This research on the relationship between rural middle school student mathematics achievement and classroom sense of community will be conducted in the student's regular classroom for mathematics.

Description of Research Study

Several studies have been conducted looking into the subject of sense of classroom community. None of the previous studies have investigated middle school students' perception of sense of classroom community and the possible relationship with academic achievement in mathematics. The purpose of this research is to measure students' perception of classroom sense of community and compare it to their mathematics achievement as measured by a standardized assessment.

If you decide to participate, then you will join a study involving research of sense of classroom community by completing a brief survey. The mathematics achievement will be ascertained utilizing the state mandated End-of-Grade test scores. A trained test administrator will visit the classroom, provide a brief overview of the study, pass out the survey, read the directions, and allow ample time to complete the survey which is approximately five minutes. The administrator will collect the surveys, secure them in an envelope, and remove the surveys to a secure off campus location for analysis. There will be approximately 600 other middle school students participating in the survey.

Exclusionary Criteria

If you do not give written permission and receive written parental/guardian permission, you will not participate in the research.

Risks and Benefits

Risks: If you decide to participate in this study, you will face no risks.

Benefits: The main benefit to you for participating in this study is to provide the opportunity for you to reflect on your sense of classroom community. It also provides you with an opportunity to participate in educational research that will be utilized to gain further insight into student's perceptions of sense of classroom community and its possible relationship to academic achievement in mathematics.

Costs and Payments

The researcher wants your decision about participating in this study to be absolutely voluntary. The researcher is unable to give you any payment for participating in this study.

New Information

If the researcher finds new information during this study that would reasonably change your decision about participating, it will be given to you.

Confidentiality

All information obtained about you in this study is strictly confidential. The results of this study may be used in reports, presentations, and publications, but the researcher will not identify you.

Withdrawal Privilege

It is okay for you to say NO. Even if you say yes now, you are free to say NO later, and withdraw from the study – at any time.

Compensation for Illness and Injury

If you say YES, then your consent in this document does not waive any of your legal rights. If you have any concerns at all about this study, you may contact the principle investigator, Dr. William Owings at 757-683-4954.

Voluntary Consent

By signing this form, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand this form, the research study, and the risks and benefits. The researcher should have answered any questions you may have had about the research. If you have any questions later on, then the researcher should be able to answer them. You may call Dr. William Owings at 757-683-4954, or Mr. John Donlan at 252-480-8880.

If at any time you feel pressured to participate, or have any questions about your rights on this form, then you should call Dr. David Swain, the current IRB chair, at 757-683-6028, or the Old Dominion University Office of Research at 757-683-3460.

By signing below, you are telling the researcher YES, that you agree to participate in this study and the researcher will give you a copy of this form for your records.

Subject's Printed Name and Signature	Date
Parent / Legally Authorized Representative's Printed Name & Signature	Date

Appendix E

Teacher Information Letter

Dear Dare County Middle School Math Teacher,

I am currently designing and working to collect data for my dissertation. The broad topic deals with the sense of community within the classroom setting. The focus will be on assessing the sense of community in middle schools and comparing students' sense of community to their mathematics achievement as reported by their Mathematics End-of-Grade test growth scores.

I feel this particular topic supports the very essence of our School Board's goal which is to engender community support for our schools. The concept of community has received considerable interest in recent years and I feel that Dare County has a strong sense of community which is reflected in the successes of our schools. My research plan is to measure and compare students' sense of community. If we are to advocate and promote community involvement in our schools, there is a need to measure how our stakeholders feel as a part of the school's community.

With this in mind, the study is designed to compare the sense of community within different middle schools at the classroom level. I plan to use all three middle schools in Dare County. There have been some very recent studies comparing sense of community on the high school and college levels. The instrument to measure sense of community has been developed and analyzed for validity and reliability. This is encouraging for me, as I would prefer to use a measurement instrument that is already developed. However, this survey instrument, *Classroom and School Community*

Inventory (Rovai, Wighting, & Lucking, 2004), has never been utilized in a middle school setting. In particular, the instrument is quantitative in nature and has ten items for student responses at the classroom level. It takes approximately fifteen minutes to administer the survey.

Prior to administering the survey, I will receive appropriate permission from all stakeholders including the Dare County Board of Education, the Superintendent, principals, parents, and students. Once the data has been collected and tabulated, I will share this information with you, so that you can use it to continue your pursuit of excellence, along with supporting our School Board's goal.

I plan on distributing the parental permission forms and student informed consent forms to all students in each participating school. I am sending a copy of the parental permission and student informed consent forms for your review. If it is satisfactory to you, I will send enough copies to distribute. I will also send you a copy of the actual survey. Please treat the survey instrument confidentially, prior to its administration. I plan to administer the survey after the End-of-Grade tests in your Mathematics classes. Please call me if you have any questions.

Thanks,

John

Appendix F
Individual Student Data

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
1	2	F	5	10	6	34	4	4	1	-0.49
2	2	M	5	11	6	38	3	4	2	-0.06
3	2	M	5	11	6	28	3	3	2	-0.11
4	2	M	5	11	6	21	4	4	0	.
5	2	M	5	11	6	24	3	2	2	0.07
6	2	M	6	11	6	28	3	3	2	0.41
7	2	M	5	11	6	29	3	3	0	-0.41
8	2	M	5	11	6	31	2	3	2	-0.13
9	2	M	5	11	6	33	2	2	2	0.13
10	2	M	5	11	6	22	4	4	2	-0.66
11	2	M	5	11	6	34	3	3	1	-0.75
12	2	M	5	11	6	26	2	2	2	0.21
13	2	M	5	11	6	28	4	4	4	0.67
14	1	M	5	11	6	28	3	3	1	0.37
15	1	M	5	11	6	35	4	4	1	.
16	1	M	5	11	6	27	4	3	2	0.2
17	1	M	5	11	6	32	3	3	2	0.56
18	1	M	5	11	6	30	3	3	1	0.23

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
19	1	M	5	11	6	21	0	3	4	0.66
20	3	M	4	11	6	35	4	4	1	0.99
21	3	M	5	11	6	31	4	4	2	0.24
22	3	M	5	11	6	26	2	4	2	.
23	3	M	5	11	6	30	4	3	1	0.8
24	3	M	5	11	6	36	3	3	4	0.22
25	2	F	5	11	6	24	3	2	1	0.48
26	2	F	5	11	6	32	3	3	1	-0.11
27	2	F	5	11	6	34	3	3	2	0.36
28	2	F	5	11	6	38	4	3	2	0.99
29	2	F	5	11	6	26	3	3	3	0.47
30	2	F	5	11	6	29	3	4	3	0.53
31	2	F	5	11	6	25	4	2	3	-0.07
32	2	F	5	11	6	27	4	4	1	0.45
33	2	F	5	11	6	35	4	3	4	-0.27
34	2	F	6	11	6	30	4	4	0	-0.17
35	2	F	5	11	6	30	4	4	1	-0.06
36	2	F	5	11	6	29	2	2	0	-1.2
37	2	F	3	11	6	36	4	4	0	-0.12
38	2	F	5	11	6	32	3	3	3	0.69
39	2	F	5	11	6	26	3	3	2	-0.28

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
40	2	F	5	11	6	24	3	0	1	-0.39
41	2	F	3	11	6	24	2	3	0	0.34
42	2	F	5	11	6	28	4	3	2	-0.26
43	2	F	5	11	6	28	2	2	1	0.34
44	2	F	5	11	6	27	3	3	0	-0.02
45	1	F	5	11	6	21	1	2	2	0.43
46	1	F	5	11	6	22	2	2	1	-0.15
47	1	F	5	11	6	28	3	2	2	-0.01
48	3	F	5	11	6	32	4	4	2	0.37
49	3	F	5	11	6	37	3	4	0	0.39
50	3	F	5	11	6	37	1	2	0	0.64
51	3	F	4	11	6	28	4	4	3	0.14
52	3	F	5	11	6	34	3	3	1	0.57
53	3	F	4	11	6	34	3	3	2	0.46
54	3	F	5	11	6	36	4	4	3	1.23
55	3	F	6	11	6	32	3	3	3	0.16
56	3	F	6	11	6	32	4	4	2	0.94
57	3	F	5	11	6	25	4	4	0	0.09
58	3	F	5	11	6	32	3	4	1	-0.09
59	3	F	5	11	6	26	3	3	2	-0.13
60	2	M	5	12	6	20	3	2	3	-0.02

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
61	2	M	5	12	6	32	4	3	2	-0.24
62	2	M	5	12	6	22	2	2	2	-0.08
63	2	M	5	12	6	36	4	4	1	-0.27
64	2	M	5	12	6	30	3	4	1	-0.01
65	2	M	5	12	6	32	2	2	0	0.41
66	2	M	6	12	6	30	4	4	2	-0.53
67	2	M	5	12	6	36	4	4	0	0.27
68	2	M	5	12	6	32	3	3	1	0.42
69	2	M	5	12	6	17	1	2	4	.
70	2	M	5	12	6	29	4	3	2	-0.01
71	2	M	5	12	6	29	4	3	2	-1.32
72	2	M	5	12	6	21	2	2	3	-0.11
73	2	M	5	12	6	32	4	4	1	0.27
74	2	M	5	12	6	31	2	1	2	-0.32
75	2	M	5	12	6	24	2	3	3	-0.22
76	2	M	5	12	6	33	2	2	1	-0.04
77	2	M	5	12	6	23	3	4	3	0.48
78	2	M	5	12	6	25	2	2	2	0.2
79	2	M	5	12	6	32	4	2	2	0.23
80	2	M	5	12	6	34	4	2	3	-0.52
81	2	M	5	12	6	26	4	3	2	0.23

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
82	2	M	5	12	6	21	3	3	3	0.17
83	2	M	5	12	6	31	2	3	0	-0.38
84	2	M	5	12	6	21	3	3	0	0.27
85	1	M	3	12	6	23	3	3	0	-0.05
86	1	M	5	12	6	28	2	2	2	0.97
87	1	M	5	12	6	27	4	3	0	0.01
88	1	M	5	12	6	22	3	3	3	0.85
89	1	M	5	12	6	27	2	3	3	.
90	1	M	5	12	6	21	4	3	2	-0.6
91	1	M	5	12	6	29	4	3	4	-0.13
92	1	M	5	12	6	18	3	3	2	-0.1
93	1	M	5	12	6	32	4	4	4	0.23
94	1	M	5	12	6	15	1	1	4	0.43
95	1	M	5	12	6	9	1	1	4	-0.06
96	1	M	5	12	6	24	1	4	4	0.02
97	1	M	5	12	6	30	4	3	2	-0.27
98	1	M	5	12	6	26	2	2	4	-0.06
99	1	M	5	12	6	28	2	2	1	0.83
100	1	M	3	12	6	25	3	3	3	0.28
101	1	M	5	12	6	15	1	1	0	-0.25
102	1	M	5	12	6	28	1	3	1	0.53

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
103	1	M	5	12	6	24	3	3	0	-0.04
104	1	M	5	12	6	20	1	2	3	0.58
105	1	M	5	12	6	28	3	3	4	-0.41
106	3	M	4	12	6	33	4	4	1	0.48
107	3	M	5	12	6	30	4	4	1	0.38
108	3	M	5	12	6	30	2	2	1	-0.18
109	3	M	6	12	6	23	4	2	2	0.21
110	3	M	4	12	6	31	4	3	4	0.1
111	3	M	3	12	6	24	4	4	2	0.05
112	3	M	5	12	6	35	3	4	1	0.57
113	3	M	5	12	6	28	4	4	0	0.17
114	3	M	5	12	6	37	4	4	2	-0.09
115	3	M	3	12	6	26	4	4	0	-0.28
116	3	M	5	12	6	27	3	3	1	0.81
117	3	M	5	12	6	34	4	3	1	1
118	3	M	5	12	6	33	3	3	2	-0.03
119	3	M	5	12	6	20	4	4	2	-0.02
120	3	M	5	12	6	27	4	4	4	.
121	3	M	5	12	6	28	4	4	0	-0.03
122	3	M	5	12	6	31	3	4	2	-0.47
123	3	M	3	12	6	34	3	4	2	-0.01

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
124	3	M	5	12	6	27	3	3	2	0.12
125	3	M	5	12	6	22	1	1	3	-0.34
126	3	M	5	12	6	34	4	4	1	0.5
127	3	M	5	12	6	35	2	3	3	0.8
128	3	M	5	12	6	28	0	2	4	0.06
129	2	F	5	12	6	30	3	3	2	-0.5
130	2	F	2	12	6	30	2	3	1	0.05
131	2	F	3	12	6	33	4	2	3	-0.73
132	2	F	5	12	6	23	4	3	1	0.32
133	2	F	5	12	6	31	4	4	1	0.18
134	2	F	5	12	6	35	3	3	1	-0.19
135	2	F	5	12	6	23	4	3	1	-0.23
136	2	F	5	12	6	32	4	4	3	.
137	2	F	5	12	6	23	2	1	2	0.08
138	2	F	5	12	6	35	4	4	1	0.13
139	2	F	5	12	6	31	3	3	2	-0.87
140	2	F	5	12	6	34	3	4	1	-0.13
141	2	F	5	12	6	30	3	3	1	-0.01
142	2	F	5	12	6	33	4	0	2	-0.21
143	2	F	5	12	6	32	3	2	1	-0.24
144	2	F	5	12	6	27	2	2	4	-0.07

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
145	2	F	5	12	6	22	2	2	2	.
146	2		5	12	6	17	1	2	4	.
147	2	F	5	12	6	23	2	3	3	-0.09
148	2	F	5	12	6	40	4	4	0	0.16
149	2	F	5	12	6	33	2	3	2	-0.17
150	2	F	6	12	6	31	3	3	0	0.09
151	2	F	5	12	6	33	4	4	1	-0.44
152	2	F	5	12	6	26	3	3	2	-0.23
153	2	F	5	12	6	38	4	4	0	0.4
154	2	F	5	12	6	18	3	1	2	0.23
155	2	F	5	12	6	39	4	4	1	0.43
156	2	F	5	12	6	37	4	4	2	-0.25
157	2	F	5	12	6	34	4	4	2	0.26
158	2	F	5	12	6	34	4	3	1	-0.15
159	2	F	5	12	6	37	4	4	0	0.53
160	2	F	5	12	6	30	4	3	0	0.1
161	2	F	5	12	6	30	4	4	2	-0.08
162	2	F	5	12	6	27	3	2	3	0.52
163	2	F	5	12	6	24	2	2	3	-0.54
164	2	F	5	12	6	21	3	4	0	0.14
165	2	F	5	12	6	30	4	3	2	.

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
166	2	F	6	12	6	29	4	4	1	-0.61
167	2	F	5	12	6	35	3	4	2	0.02
168	1	F	5	12	6	28	3	2	4	-0.35
169	1	F	5	12	6	27	2	2	3	0.63
170	1	F	5	12	6	23	3	2	3	-0.12
171	1	F	5	12	6	30	4	3	3	0.75
172	1	F	5	12	6	22	2	2	3	0.65
173	1	F	5	12	6	31	3	3	4	0.43
174	1	F	3	12	6	26	2	2	3	0.64
175	1	F	5	12	6	30	4	4	1	0.28
176	1	F	5	12	6	24	4	2	3	0.12
177	1	F	5	12	6	28	3	2	4	-0.08
178	1	F	5	12	6	23	3	3	2	
179	1	F	5	12	6	21	2	2	3	0.26
180	1	F	5	12	6	23	4	2	2	-0.17
181	1	F	5	12	6	17	2	2	3	0.85
182	1	F	5	12	6	20	1	2	2	0.36
183	3	F	5	12	6	28	4	2	2	0.92
184	3	F	5	12	6	32	3	3	1	0.93
185	3	F	5	12	6	33	3	3	1	0.23
186	3	F	5	12	6	15	3	3	2	0.02

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
187	3	F	5	12	6	32	3	3	0	0.49
188	3	F	5	12	6	32	4	4	4	0.02
189	3	F	5	12	6	33	4	4	2	0.26
190	3	F	3	12	6	35	3	3	3	0.23
191	3	F	5	12	6	34	3	4	1	-0.5
192	3	F	6	12	6	27	3	3	4	-0.18
193	3	F	6	12	6	29	4	4	2	-0.13
194	3	F	4	12	6	30	4	4	0	0.25
195	3	F	5	12	6	35	3	3	1	0.79
196	3	F	5	12	6	24	3	3	3	-0.03
197	3	F	5	12	6	30	4	4	2	0.27
198	3	F	3	12	6	18	4	3	1	0.07
199	2	M	5	13	6	19	2	1	4	-1.16
200	2	M	5	13	6	32	3	4	1	-0.18
201	1	M	5	13	6	21	0	2	2	0.35
202	1	M	5	13	6	22	2	1	2	0.21
203	1	M	5	13	6	21	3	0	4	0.04
204	3	M	3	13	6	26	2	4	4	0.09
205	1	F	5	13	6	26	2	2	0	0.2
206	1	F	5	13	6	37	3	4	2	0.02
207	3	F	5	13	6	28	3	4	2	0.37

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
208	3	F	5	13	6	31	3	3	1	0.02
209	3	F	6	13	6	30	4	4	2	0.08
210	2	M	5	12	7	31	2	1	0	0.02
211	2	M	5	12	7	12	3	3	0	0.62
212	2	M	5	12	7	26	3	3	2	-0.41
213	2	M	5	12	7	15	1	1	1	0.34
214	2	M	5	12	7	29	3	4	0	0.32
215	2	M	5	12	7	21	2	3	4	0.13
216	2	M	6	12	7	25	3	2	2	-0.26
217	2	M	5	12	7	28	2	3	3	-0.1
218	2	M	5	12	7	34	3	3	2	-0.01
219	2	M	5	12	7	28	1	2	3	0.34
220	2	M	3	12	7	32	4	4	0	0.3
221	2	M	5	12	7	19	3	2	2	0.86
222	2	M	5	12	7	23	1	0	4	-0.13
223	2	M	5	12	7	29	3	3	1	0.57
224	2	M	5	12	7	26	2	2	2	-0.23
225	2	M	5	12	7	18	2	3	2	0.15
226	2	M	5	12	7	26	4	3	3	0.01
227	2	M	5	12	7	32	3	3	0	0.17
228	3	M	5	12	7	31	4	4	1	0.63

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
229	3	M	5	12	7	27	3	2	2	-0.36
230	3	M	5	12	7	29	3	4	1	-0.26
231	3	M	6	12	7	24	3	3	3	0.77
232	3	M	5	12	7	23	2	2	2	0.14
233	2	F	5	12	7	22	2	2	3	-0.08
234	2	F	5	12	7	25	2	2	3	-0.62
235	2	F	5	12	7	17	2	2	3	0.04
236	2	F	5	12	7	33	4	4	4	0.1
237	2	F	5	12	7	29	2	2	4	0.09
238	2	F	5	12	7	26	2	2	1	0.87
239	2	F	5	12	7	26	3	3	1	0.02
240	2	F	5	12	7	27	2	3	1	0.16
241	2	F	5	12	7	27	2	3	2	0.52
242	2	F	5	12	7	23	2	1	1	0.7
243	2	F	5	12	7	31	2	2	4	0.63
244	2	F	5	12	7	32	3	3	2	-0.4
245	2	F	5	12	7	25	3	3	2	0.05
246	2	F	5	12	7	19	2	3	1	-0.5
247	2	F	5	12	7	28	2	3	2	0.57
248	2	F	5	12	7	26	3	3	2	0.33
249	2	F	5	12	7	22	3	3	1	0.67

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
250	2	F	5	12	7	35	4	3	1	-0.23
251	2	F	5	12	7	23	3	3	3	0.22
252	2	F	5	12	7	27	1	2	4	-0.16
253	2	F	5	12	7	16	2	2	3	-0.22
254	2	F	5	12	7	28	3	2	1	-0.34
255	2	F	5	12	7	27	3	3	1	-0.04
256	2	F	5	12	7	29	3	3	1	0.07
257	2	F	5	12	7	23	3	2	1	-0.29
258	1	F	5	12	7	29	4	3	2	-0.4
259	1	F	5	12	7	24	3	3	1	-0.08
260	1	F	5	12	7	23	2	2	3	-0.04
261	3	F	5	12	7	30	2	1	1	0.49
262	3	F	5	12	7	36	4	4	1	0.1
263	3	F	5	12	7	37	3	3	1	0.41
264	3	F	5	12	7	21	3	2	2	0.65
265	3	F	4	12	7	34	3	3	1	-0.24
266	3	F	5	12	7	30	3	3	1	0.24
267	3	F	5	12	7	27	2	3	2	1.13
268	3	F	5	12	7	26	2	2	3	0.62
269	3	F	6	12	7	29	3	3	4	0.99
270	2	M	3	13	7	23	2	2	2	0.25

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
271	2	M	5	13	7	29	3	3	2	0.63
272	2	M	5	13	7	6	0	3	4	.
273	2	M	5	13	7	27	4	4	1	0.88
274	2	M	4	13	7	22	0	0	4	-0.6
275	2	M	5	13	7	21	2	2	3	1.18
276	2	M	5	13	7	26	1	2	2	0.83
277	2	M	5	13	7	22	3	3	1	-0.27
278	2	M	5	13	7	29	3	3	1	0.06
279	2	M	5	13	7	30	3	3	1	-0.01
280	2	M	5	13	7	24	2	2	1	-0.38
281	2	M	5	13	7	22	3	3	2	0.44
282	2	M	5	13	7	23	3	3	1	-0.27
283	2	M	5	13	7	21	3	2	1	0.57
284	2	M	5	13	7	20	0	0	4	-1.41
285	2	M	5	13	7	26	2	2	2	-0.63
286	2	M	5	13	7	31	3	3	0	-0.11
287	2	M	5	13	7	34	3	3	1	0.28
288	2	M	5	13	7	26	3	3	2	1.19
289	2	M	5	13	7	23	3	3	3	0.48
290	2	M	5	13	7	18	2	2	2	-0.24
291	2	M	5	13	7	30	3	2	2	-0.34

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
292	2	M	5	13	7	24	3	3	3	0.48
293	2	M	5	13	7	32	3	2	1	0.31
294	2	M	5	13	7	12	1	0	4	-0.99
295	2	M	5	13	7	21	1	2	3	0.64
296	2	M	5	13	7	33	4	4	2	0.69
297	2	M	5	13	7	13	2	1	0	0.31
298	2	M	5	13	7	35	4	4	3	0.82
299	2	M	5	13	7	14	1	1	4	0.12
300	2	M	5	13	7	30	3	3	3	-0.13
301	2	M	5	13	7	19	3	2	0	0.54
302	2	M	5	13	7	32	4	4	1	0.4
303	2	M	5	13	7	28	3	3	1	0.27
304	2	M	5	13	7	31	4	4	1	.
305	2	M	5	13	7	29	3	3	2	0.01
306	2	M	5	13	7	24	4	4	4	-0.98
307	2	M	5	13	7	21	2	2	2	-0.15
308	2	M	5	13	7	22	2	2	2	-0.01
309	2	M	5	13	7	18	2	2	3	0.05
310	2	M	5	13	7	17	2	0	4	0.32
311	2	M	5	13	7	25	2	2	3	0.86
312	2	M	5	13	7	16	3	3	2	0.26

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
313	2	M	5	13	7	27	4	3	0	0.16
314	2	M	5	13	7	25	3	2	2	-0.11
315	2	M	5	13	7	22	2	2	2	-0.74
316	1	M	5	13	7	9	2	2	2	-0.17
317	3	M	5	13	7	23	4	4	0	0.79
318	3	M	5	13	7	33	3	3	1	0.25
319	3	M	5	13	7	25	3	2	3	-0.02
320	3	M	5	13	7	29	4	3	3	0.86
321	3	M	6	13	7	35	2	1	4	-0.3
322	3	M	5	13	7	17	3	0	2	0.43
323	3	M	5	13	7	30	3	2	2	0.77
324	3	M	2	13	7	37	4	4	1	0.13
325	3	M	5	13	7	31	3	3	1	1.06
326	3	M	3	13	7	20	1	1	2	0.13
327	3	M	5	13	7	33	3	3	2	0.27
328	3	M	6	13	7	27	3	3	0	1.04
329	2	F	4	13	7	26	2	1	2	-0.26
330	2	F	5	13	7	24	2	1	3	-0.02
331	2	F	5	13	7	22	2	2	2	0.06
332	2	F	5	13	7	26	3	3	1	0.42
333	2	F	5	13	7	23	2	2	3	0.42

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
334	2	F	5	13	7	19	2	3	4	0.68
335	2	F	5	13	7	22	2	2	3	0.36
336	2	F	5	13	7	29	4	3	2	.
337	2	F	5	13	7	20	2	2	1	-0.03
338	2	F	3	13	7	24	2	2	2	0.53
339	2	F	5	13	7	26	2	2	2	0.22
340	2	F	6	13	7	30	3	3	1	0.66
341	2	F	5	13	7	28	3	3	2	0.17
342	2	F	5	13	7	27	3	2	1	0.73
343	2	F	5	13	7	37	4	4	0	-0.13
344	2	F	5	13	7	24	3	3	2	0.15
345	2	F	5	13	7	24	3	3	0	-0.19
346	2	F	3	13	7	27	3	2	3	0.18
347	2	F	5	13	7	29	4	4	1	0.51
348	2	F	5	13	7	21	2	3	2	0.12
349	2	F	6	13	7	20	3	2	4	0.33
350	2	F	5	13	7	22	3	3	4	-0.28
351	2	F	5	13	7	27	3	2	2	0.08
352	2	F	5	13	7	10	2	3	4	-0.83
353	2	F	5	13	7	28	3	3	3	-0.51
354	2	F	5	13	7	28	2	2	2	0.28

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
355	2	F	5	13	7	26	2	3	4	0.88
356	2	F	5	13	7	33	3	3	2	-0.26
357	2	F	6	13	7	25	3	3	1	0.01
358	2	F	5	13	7	26	3	3	1	0.02
359	2	F	5	13	7	35	3	3	0	0.78
360	2	F	5	13	7	27	4	4	1	0.3
361	2	F	5	13	7	26	3	3	1	-0.38
362	2	F	5	13	7	26	2	3	0	0.09
363	2	F	5	13	7	18	0	4	4	-0.49
364	2	F	5	13	7	25	3	3	1	-0.31
365	2	F	5	13	7	34	4	4	1	0.51
366	2	F	5	13	7	36	3	4	1	0.67
367	2	F	5	13	7	27	3	3	3	-0.14
368	2	F	5	13	7	4	1	1	2	-0.36
369	2	F	3	13	7	29	4	4	0	-0.54
370	2	F	5	13	7	28	4	3	3	0.26
371	2	F	5	13	7	28	2	2	2	0.36
372	2	F	5	13	7	30	2	2	0	0.81
373	2	F	5	13	7	34	2	2	2	.
374	2	F	2	13	7	30	3	2	0	0.29
375	2	F	2	13	7	27	4	4	0	0.39

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
376	2	F	5	13	7	18	4	3	4	-0.19
377	2	F	5	13	7	29	2	3	3	0.13
378	2	F	5	13	7	21	3	2	1	0.09
379	2	F	5	13	7	30	3	2	1	-0.36
380	2	F	5	13	7	27	4	3	0	-0.28
381	2	F	5	13	7	25	3	4	4	0.22
382	1	F	5	13	7	28	2	3	2	.
383	1	F	5	13	7	29	3	3	2	-0.78
384	3	F	5	13	7	23	4	4	0	0.67
385	3	F	5	13	7	21	2	2	2	0.58
386	3	F	5	13	7	27	4	4	1	0.34
387	3	F	5	13	7	26	2	3	2	0.92
388	3	F	6	13	7	25	2	2	2	-0.29
389	3	F	5	13	7	28	2	3	2	-0.86
390	3	F	5	13	7	34	4	4	1	0.72
391	3	F	5	13	7	29	4	3	0	0.47
392	3	F	5	13	7	37	3	3	1	0.98
393	3	F	5	13	7	40	4	4	0	0.66
394	3	F	5	13	7	37	3	3	0	0.85
395	3	F	5	13	7	31	3	3	2	0.23
396	3	F	5	13	7	37	2	3	1	.

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
397	3	F	5	13	7	34	3	3	2	0.28
398	3	F	5	13	7	23	3	3	3	0.68
399	3	F	5	13	7	26	3	3	2	-0.85
400	3	F	5	13	7	27	3	3	2	1
401	2	M	5	14	7	29	3	2	1	0.32
402	3	M	5	14	7	24	4	3	1	0.21
403	3	M	5	14	7	32	4	3	1	-0.22
404	3	M	5	14	7	20	2	2	2	0.22
405	3	M	4	14	7	15	0	4	1	-0.16
406	2	F	5	14	7	31	2	3	3	.
407	1	F	5	14	7	19	2	3	2	-0.3
408	3	F	3	14	7	26	4	4	0	0.77
409	2	M	4	15	7	25	3	3	1	0.35
410	3		6	12	8	24	3	3	3	0.77
411	2	M	5	13	8	26	0	2	3	0.33
412	2	M	5	13	8	20	2	2	3	-0.23
413	2	M	5	13	8	37	4	4	1	-0.18
414	2	M	5	13	8	28	1	2	1	0.66
415	2	M	5	13	8	28	3	3	3	0.34
416	2	M	5	13	8	22	3	2	2	-0.65
417	2	M	5	13	8	28	3	3	4	0.3

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
418	2	M	5	13	8	37	3	3	3	0.28
419	2	M	5	13	8	12	2	1	3	-0.49
420	1	M	5	13	8	28	3	4	2	0.94
421	1	M	5	13	8	30	3	2	0	-0.51
422	1	M	3	13	8	24	3	3	3	0.32
423	1	M	5	13	8	24	2	3	1	.
424	3	M	5	13	8	29	4	3	1	0.51
425	3	M	3	13	8	26	2	2	2	-0.23
426	3	M	4	13	8	28	4	2	0	0.03
427	3	M	5	13	8	33	4	4	1	0.38
428	3	M	5	13	8	31	4	3	1	0.86
429	3	M	5	13	8	26	3	3	1	-0.65
430	3	M	5	13	8	22	2	2	2	-0.22
431	2	F	5	13	8	27	3	3	2	0.48
432	2	F	5	13	8	27	3	2	4	0.45
433	2	F	5	13	8	28	4	2	4	-0.02
434	2	F	5	13	8	38	4	4	1	0.3
435	2	F	5	13	8	33	2	3	3	-0.26
436	2	F	5	13	8	36	4	4	2	0.14
437	2	F	5	13	8	25	3	3	3	0.05
438	2	F	5	13	8	37	4	4	1	0.79

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
439	2	F	5	13	8	35	3	3	0	0.01
440	2	F	5	13	8	17	3	3	1	-0.21
441	2	F	5	13	8	20	1	3	3	0.43
442	2	F	5	13	8	22	2	1	2	-0.87
443	2	F	5	13	8	30	4	4	1	-0.41
444	2	F	6	13	8	19	2	0	4	-0.11
445	2	F	5	13	8	26	3	3	4	-0.19
446	2	F	5	13	8	33	2	3	2	0.3
447	2	F	5	13	8	37	4	4	0	0.51
448	2	F	5	13	8	31	3	3	3	0.62
449	2	F	5	13	8	26	2	1	2	0.1
450	1	F	5	13	8	25	3	3	2	-0.16
451	1	F	5	13	8	30	3	3	1	-0.47
452	1	F	5	13	8	26	3	2	3	0.34
453	3	F	5	13	8	19	3	3	1	-0.76
454	3	F	5	13	8	24	3	3	2	0.72
455	3	F	5	13	8	29	3	3	1	-0.32
456	3	F	5	13	8	26	1	1	2	0.28
457	3	F	4	13	8	20	4	3	1	2.34
458	3	F	5	13	8	28	3	3	1	1.19
459	3	F	5	13	8	37	4	4	1	-0.15

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
460	3	F	3	13	8	23	3	3	3	0.49
461	2	M	5	14	8	33	3	3	3	0.02
462	2	M	5	14	8	34	3	3	1	-0.12
463	2	M	5	14	8	30	3	4	2	-0.05
464	2	M	5	14	8	18	2	1	4	0.01
465	2	M	5	14	8	30	2	3	2	-0.15
466	2	M	5	14	8	28	4	3	0	0.55
467	2	M	5	14	8	24	2	2	2	0.07
468	2	M	5	14	8	24	3	3	1	0.44
469	2	M	5	14	8	31	3	3	1	0.26
470	2	M	5	14	8	21	2	2	2	0.39
471	2	M	5	14	8	16	0	2	4	.
472	2	M	5	14	8	40	4	4	0	-0.17
473	2	M	5	14	8	28	3	3	3	-0.39
474	2	M	5	14	8	36	4	4	0	.
475	2	M	4	14	8	26	3	3	1	0.44
476	2	M	5	14	8	34	3	4	0	-0.04
477	2	M	5	14	8	18	2	2	3	-0.18
478	2	M	5	14	8	27	3	4	2	-0.02
479	2	M	5	14	8	22	3	2	3	-0.51
480	2	M	5	14	8	20	3	3	4	-0.62

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
481	2	M	5	14	8	22	3	2	3	0.05
482	2	M	5	14	8	29	3	3	3	0.64
483	2	M	5	14	8	35	3	4	2	-0.1
484	2	M	3	14	8	32	3	3	0	-0.09
485	2	M	5	14	8	36	3	3	1	-0.03
486	2	M	5	14	8	27	3	3	1	-0.17
487	2	M	5	14	8	10	1	2	4	0.2
488	2	M	5	14	8	31	3	3	2	-0.01
489	2	M	5	14	8	25	2	3	2	0.2
490	1	M	5	14	8	29	3	3	2	-0.46
491	1	M	5	14	8	27	4	3	1	-0.68
492	1	M	5	14	8	26	2	3	1	0.14
493	1	M	5	14	8	29	3	2	4	0.46
494	1	M	5	14	8	33	3	3	2	.
495	1	M	5	14	8	35	4	4	4	-0.4
496	3	M	5	14	8	27	3	3	2	0.22
497	3	M	5	14	8	11	1	0	2	-0.11
498	3	M	5	14	8	21	3	3	2	0.55
499	3	M	3	14	8	29	3	3	1	-0.54
500	3	M	3	14	8	30	3	3	1	0.2
501	3	M	3	14	8	8	0	0	4	0.16

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
502	3	M	5	14	8	15	2	3	2	0.6
503	3	M	4	14	8	32	3	3	0	0.53
504	3	M	5	14	8	24	3	3	2	0.81
505	3	M	5	14	8	24	2	2	1	-0.09
506	3	M	5	14	8	27	3	3	3	0.32
507	3	M	3	14	8	35	3	3	1	0.12
508	3	M	4	14	8	28	3	3	1	0.79
509	3	M	5	14	8	31	4	4	0	0.11
510	3	M	6	14	8	30	3	2	2	0.93
511	3	M	3	14	8	23	3	3	1	1.61
512	3	M	5	14	8	29	2	2	1	0.45
513	3	M	5	14	8	19	2	3	2	0.06
514	2	F	5	14	8	31	3	3	2	-0.57
515	2	F	5	14	8	30	3	3	2	-0.21
516	2	F	5	14	8	25	3	2	1	0.08
517	2	F	5	14	8	29	4	4	2	0.15
518	2	F	5	14	8	40	4	4	1	-0.62
519	2	F	5	14	8	34	3	3	1	0.09
520	2	F	5	14	8	33	3	4	3	0.22
521	2	F	3	14	8	29	3	3	2	-0.15
522	2	F	5	14	8	34	3	3	2	0.4

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
523	2	F	5	14	8	36	4	3	2	-0.02
524	2	F	5	14	8	28	3	3	1	-0.07
525	2	F	5	14	8	22	2	2	3	0.01
526	2	F	5	14	8	25	2	3	3	0.04
527	2	F	5	14	8	32	3	3	2	0.03
528	2	F	5	14	8	29	2	3	2	-0.15
529	2	F	5	14	8	30	4	2	2	-0.06
530	2	F	5	14	8	20	2	2	2	.
531	2	F	5	14	8	36	4	3	1	0.66
532	2	F	5	14	8	24	3	3	2	-0.44
533	2	F	5	14	8	22	3	3	1	0.29
534	2	F	5	14	8	32	3	3	3	-0.58
535	2	F	5	14	8	39	1	2	1	0.26
536	2	F	5	14	8	24	1	0	4	-0.06
537	2	F	5	14	8	33	4	3	1	0.88
538	2	F	5	14	8	26	1	1	2	.
539	2	F	5	14	8	22	3	3	4	0.34
540	2	F	5	14	8	29	3	3	1	0.89
541	2	F	5	14	8	9	2	3	4	0.68
542	2	F	3	14	8	27	3	3	1	0.19
543	2	F	3	14	8	28	4	3	1	0.7

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
544	2	F	5	14	8	29	3	3	2	-0.34
545	2	F	5	14	8	23	1	0	2	0.27
546	2	F	5	14	8	26	2	3	4	-0.68
547	2	F	5	14	8	29	3	3	2	0.32
548	2	F	5	14	8	21	2	1	4	-0.54
549	2	F	5	14	8	33	3	2	4	0.01
550	2	F	5	14	8	19	3	3	1	-0.98
551	2	F	5	14	8	28	3	3	2	-0.12
552	2	F	5	14	8	18	2	1	2	-0.54
553	2	F	5	14	8	26	3	2	3	0.73
554	2	F	5	14	8	31	3	2	2	0.51
555	2	F	5	14	8	36	3	3	2	0.52
556	1	F	5	14	8	36	4	4	3	0.15
557	1	F	5	14	8	25	4	3	2	-0.24
558	3	F	3	14	8	28	3	3	4	.
559	3	F	6	14	8	29	3	3	1	-0.26
560	3	F	5	14	8	25	3	3	2	0.69
561	3	F	5	14	8	27	2	2	2	-0.08
562	3	F	5	14	8	31	4	4	2	0.57
563	3	F	4	14	8	30	3	3	2	0.35
564	3	F	5	14	8	29	2	1	0	0.05

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
565	3	F	5	14	8	20	2	2	2	0.51
566	3	F	6	14	8	26	2	3	2	-0.17
567	3	F	6	14	8	15	3	3	3	0.3
568	3	F	5	14	8	26	3	3	1	0.1
569	3	F	5	14	8	27	1	2	1	0.32
570	3	F	5	14	8	24	3	3	1	0.11
571	3	F	5	14	8	28	2	3	1	0.01
572	3	F	5	14	8	21	3	3	2	0.48
573	3	F	5	14	8	28	3	3	1	0.52
574	3	F	4	14	8	28	2	2	2	0.4
575	3	F	5	14	8	28	3	3	1	0.36
576	3	F	6	14	8	32	2	2	2	0
577	3	F	5	14	8	25	3	3	2	0.26
578	3	F	5	14	8	27	3	3	1	.
579	2	M	5	15	8	6	2	2	4	-0.85
580	2	M	5	15	8	29	4	4	2	-0.19
581	2	M	5	15	8	36	3	3	1	-0.5
582	3	M	5	15	8	31	3	3	1	0.17
583	3	M	4	15	8	27	4	3	1	0.57
584	2	F	5	15	8	31	3	3	2	0.28
585	2	F	5	15	8	22	4	3	3	0.83

Number	School	Gender	Ethnicity	Age	Grade	Sense of Community	Motivation	Engagement	Disruption	Math Growth
586	2	F	5	15	8	22	2	2	2	.
587	3	F	5	15	8	29	3	3	1	0.08
588	3	F	5	15	8	28	3	3	1	0.37
589	2	M	5	16	8	21	3	2	1	-0.17

Note. Math Growth score signified by [.] means one of the following three situations occurred: (1)the student was new to the NC school system or moved from another state, (2)the student was enrolled in the NC school system for less than 140 days, or (3)the student took an alternative assessment rather than the standard EOG assessment for either the current testing year, the previous testing year, or both testing years.