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A Study of Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in a Rural School District in Eastern North Carolina

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A Study of Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in a Rural School District in Eastern North Carolina

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Approval Page

This dissertation was submitted by Katrina Hannon Cobb under the direction of the persons listed below. It was submitted to the Gardner-Webb University School of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

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Dedication

I dedicate this dissertation in memory of my husband Kenny Cobb and my son David Cobb.

To Kenny, thank you for believing in me and making it possible for one of my dreams to come true. You have always believed in me and encouraged me to be the best I can be. I know you are smiling down from heaven, knowing that I am now your little "Dr. Knucklehead."

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Abstract

A Study of Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in Rural School District in Eastern North Carolina. Cobb, Katrina Hannon, 2018: Dissertation, Gardner-Webb University, Rigor/College and Career Ready/Teacher Efficacy/Critical Thinking

This study investigated the importance of rigor and teacher efficacy in relation to student achievement. There are several definitions of the word rigor. Blackburn (2008) defined rigor as "An environment in which each student is expected to learn at high levels, each student is supported so he or she can learn at high levels, and each student demonstrates learning at high levels" (p. 16). ACT/SAT data, the National Assessment of Educational Progress (NAEP), the High School Survey of Student Engagement (HSSSE), and the High School Reform and Work all conclude that students who are college and career ready have graduated high school successfully, completing rigorous courses throughout their high school experience. Several strategies to increase rigor have been defined in this study: questioning (convergent and divergent), Bloom's Taxonomy, Depth of Knowledge, International Baccalaureate (IB) program, the Advanced Placement (AP) program, Worksheets Don't Grow Dendrites, and AVID (WICOR, Cornell Notes, Socratic Seminar, Philosophical Chairs, and Costa's Levels of Inquiry).

"Self-efficacy is the optimistic self-belief in our competence or chances of successfully accomplishing a task and producing a favorable outcome" (Akhtar, 2008, para. 1). Self-efficacy leads to teacher efficacy, which is the teachers' own belief of their "ability to plan instruction and accomplish instructional objectives" (Gavora, 2010, p. 2).

This study analyzed one rural school district in eastern North Carolina, focusing on the three comprehensive high schools through surveys and interviews. The findings in this study indicated that teachers were incorporating rigor into their classrooms using several research-based strategies: differentiation, WICOR, higher order thinking questions, AVID strategies, and inquiry-based learning. Teachers need professional development with content knowledge, standards, lesson plan components, and strategies to meet the needs of all students. Teachers have an array of comfort levels with rigor in their classroom. The following recommendations focus on improving rigor in the school system by creating a budget for the sole purpose to assist with increasing rigor. Remote teaching, where students would meet in the library and sign on to their computers to stream the class. Provide professional development for teachers that focuses on content, how to implement rigor into their content, providing alternative strategies, student creativity and how to have students think critically. Provide all teachers with intense professional development on how to use and implement the Learning Focus Lesson Plan and train all teachers on AVID strategies (WICOR, Socratic Seminars, Cornell Notes, and Philosophical Chairs).

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Chapter 1: Introduction

> Each year, thousands of Oklahoma students graduate from high school with the understanding they are fully ready to pursue a college degree. They have passed end-of-course exams in math, science, English and social studies. Many earned A's and B's in class. When they don their caps and gowns, nearly nine out of ten of them will be handed a diploma certifying they met College Preparatory/Work Ready Curriculum Standards. Months later comes a reality check: They are told they aren't ready for college after all, at least until they take and pass one or more remedial courses. (Robson, 2016, para. 1-4)

After students decorate their dorm rooms and their rigorous classes and schedules begin, some students will flourish, while many will falter (Blair, 2015). According to the ACT results, one in three high school students is not ready to be successful in college-level courses (Bidwell, 2013). The results from the National Assessment of Educational Progress (NAEP) exam reveal that less than 40% of seniors nationwide are college or career ready. "In 2015, the nationwide high school graduation rate was 82 percent, not 40 percent. That leaves a potentially large group of kids who received diplomas but aren't ready to succeed in college" (Education Next, 2016, para. 2).

Statement of the Problem

"Far too many students enter college without the basic content knowledge, skills or habits of mind needed to perform college level work successfully" (Venezia & Jeager, 2013, p. 118).

According to the data collected from the national survey by Achieve (2014), "Too many recent high school graduates report gaps in their preparedness for college and work after high school" (p. 3). The data gathered from the Achieve survey in 2011-2014

consist of 1,347 high school graduates, 741 college students, and 606 high school students who went directly into the workforce. College students felt they were not prepared for college in the following areas: work and study habits (72%), oral communication/public speaking (64%), research (62%), science (55%), mathematics (48%), writing (45%), computer technology skills (41%), reading comprehension (37%), and problem-solving (48%). Students who went directly into the workforce also felt ill-equipped in the following areas: work and study habits (54%), oral communication/public speaking (63%), research (41%), science (67%), mathematics (56%), writing (44%), computer technology skills (44%), reading comprehension (33%) and problem-solving (56%; Achieve, 2014). Colleges and universities require students to take the ACT and/or the SAT their junior or senior year. College applications require scores be sent to various schools the student plans to attend. These tests indicate a student's success in college (Achieve, 2014).

ACT/SAT Data

In 2005, 75% of students who passed the three required math classes (algebra 1, geometry, algebra 2) did not score a 22 or higher on the ACT. A score below 18 predicts that the student will need math remediation courses in college. The data show that students who only take the basic math classes will need remediation classes and are likely to score a C or lower in college math (Zelkowski, 2011).

ACT data from 2011 and 2012 show that only 25% of students nationwide surpassed the college readiness benchmarks in all four content areas, which predicts they have a 50% chance to score a B or higher in their course work as a freshman in college (Venezia & Jeager, 2013). SAT data from 2012 show that only 43% of students nationwide met the standards for college and career readiness, which predicts that they

have a 65% chance to score a B- average or higher in college (Venezia & Jeager, 2013, p, 119).

According to the results from ACT (2013),

> Most states as a whole are also largely unprepared. In only two states (Minnesota and Wisconsin) did more than half of the high school graduates meet three or more of the ACT benchmarks, and no state had more than 56% of ACT-tested students doing so. In five states (Louisiana, Mississippi, Tennessee, Kentucky and North Carolina), less than one third of students met three or four benchmarks. In 2013, only 26% of students successfully met college readiness benchmarks on the ACT in all four tested areas, which means only one in four students are prepared for postsecondary education. (para. 4)

NAEP

"College readiness is commonly understood as the level of preparation a student needs to enroll and succeed in a college program" (Venezia & Jeager, 2013, p. 118). The NAEP is one assessment that determines a student's achievement level. According to data from NAEP in 2009, 38% of high school seniors achieved proficiency or higher in reading, while only 26% were proficient in math (Venezia & Jeager, 2013).

High School Survey of Student Engagement (HSSSE)

The HSSSE administered surveys to 170,000 students in Grades 9-12 in 167 high schools in 28 states. The survey data revealed that 47% of seniors spend less than 3 hours studying a week, yet they receive As and Bs. Fifty-three percent of students felt they put a strong effort in their schoolwork, while 43% of students felt they exceed the expectations set for them. Fifty-one percent of students felt their teachers challenged them to create superlative work, while 8% of students reported they read less than 3 hours

a week on assigned materials. According to the seniors, 17% said they do not spend any time reading assigned materials, 78% of students wrote less than three papers that consisted of five pages, and 24% reported they did not write any papers their senior year (McCarthy & Kuh, 2006).

Hart Research Associates

According to a survey by Hart Research Associates, only 4% of professors at a 2-year college say that students are able to successfully reach expectations and 12% of students are able to reach expectations at a 4-year university, while 53% of students feel they were extremely prepared for college. In the workforce, 18% of employees felt students were extremely prepared, while 17% felt they were not ready for the workforce (Schaffhauser, 2015). High school students are prepared in the areas of computers, technology, teamwork, and verbal communication, yet there are significant gaps in other areas. According to professors and employers, high school students were not proficient in the following areas: critical thinking (82%), comprehension (80%), work/study habits (78%), writing (77%), written communication (76%), problem-solving (76%), conducting research (74%), math (59%) and science (53%; Schaffhauser, 2015).

In 2004, 28% of professors indicated that high school students were considered adequately prepared for life after graduation. In 2015, it dropped to only 15% of students being adequately prepared. In 2004, 49% of employers felt that high schools were adequately preparing students for the workforce. This percentage dropped significantly in 2015 to 29% (Schaffhauser, 2015). According to the North Carolina Workkey Results for the 2011-2012 school year, North Carolina has 40,683 career and technical education (CTE) concentrators and 54% of students in a CTE pathway met the Workkey standards and graduated high school (North Carolina Department of Public Instruction [NCDPI],

2017).

National Academy Foundations

Andrew Rothstein, Chief Academic Officer of the National Academy Foundation, stated,

> Too often, high school students do not demonstrate workplace habits that employers prioritize, including reliability, punctuality, customer service and high-quality task completion. There are also frequent issues with written and presentation skills that are appropriate in a business context. Teamwork and problem solving are the new constants. (Caron, 2011, p. 1)

Marilyn Curtain-Phillips, a high school math teacher and professor, stated that students need the skills to think outside the box and discover several solutions to a problem and the ability to work well in collaborative groups. She also explained that students lack necessary skills in consumer mathematics like balancing a checkbook (Caron, 2011).

Quick Stats Fact Sheet

According to the Quick Stats Fact Sheet, students who enter the workforce after high school need the same skills and knowledge of students entering postsecondary education. The workforce and colleges expect students to have a solid foundation in reading and math. Eighty-four percent of American manufacturing companies feel that high schools are not successfully preparing students for the workforce. They believe there are deficiencies in reading, math, science, attendance, and work ethics. Forty percent of high school graduates are prepared for entry-level positions according to employers (Kline & Williams, 2007).

> Only about a quarter of manufacturing employers look at high schools as a potential pool for talent. When compared with high school graduates, nearly

> twice as many employees see candidates with two-year degrees or job-related certifications as adequate for their entry level positions. (Kline & Williams, 2007, p. 2)

High School Reform and Work

The National Association of Manufacturers (NAM) conducted a national survey in 2001. The survey studied the

> *Most Common Reasons Companies Reject Applicants as Hourly Production Workers* who have not obtained a college education. The study revealed that 69 percent of employees without a college education have inadequate basic employability skills and 34 percent have insufficient work experience. Employers also noted that 32 percent have inadequate reading/writing skills, 20 percent have poor references from previous employers and 18 percent have inadequate oral-communication skills. Other skills that were lacking from employees who have not obtained a college education is the inability to work in a team environment at 12 percent, inadequate problem-solving skills and inadequate technical/computer skills both at 11 percent. A lack of degree or vocational training at 8 percent, problems with citizenship immigration status at seven percent and other concerns were at four percent. (Barton, 2006, p. 3)

The U.S. Census Bureau also conducted a survey and their top three reasons were "attitude, communication skills, and previous work experience" (Barton, 2006, p. 14).

Richard Murmane and Frank Levy studied the requirements for companies hiring employees with sufficient wages (Barton, 2006). The study explained that employees need a solid foundation of ninth-grade reading and math skills to receive middle class wages. To arrive at these results, they used the NAEP standards for eighth- and twelfth-

grade students.

> Eighth grade students performing at the proficient level should be able to conjecture, defend their ideas, and give supporting examples, and understand the connections among fractions, percentages, decimals and other mathematical topics such as algebra and functions. Students at this level should have a thorough understanding of basic arithmetic operations and problem solving in practical situations. Quantity and spatial relationships in problem solving and reasoning should be familiar to them. They should be able to convey underlying reasoning skills beyond the level of arithmetic, as well as compare and contrast mathematical ideas and generate their own examples, make inference from data and graphs, understand the process of gathering and organizing data and be able to calculate, evaluate, and communicate results within the domain of statistics and probability. (Barton, 2006, p. 16)

In 2003, only 29% of eighth graders scored proficient. Twelfth-grade students who scored a 302, scored only three points higher than the proficient score for eighth graders. High school graduates who reach this level would qualify for higher paying jobs (Barton, 2006).

"The vast majority of high school students aspire to some kind of postsecondary education, yet far too many of them enter college without basic content knowledge, skills, or habits of mind they need to succeed" (Venezia & Jaegar, 2013, p. 117).

Purpose

"To teach the rigorous skills and knowledge students need to succeed in future college-entry courses and workforce training programs, education stakeholders have increasingly called for more rigorous curricula, instruction, and assessments" (Hess,

Jones, Carlock, & Walkup, 2009, p. 1). "A rigorous curriculum is focused, coherent and appropriately challenging. The social research group MDRC defines academic rigor as a demanding yet accessible curriculum that engenders critical-thinking skills, as well as content and knowledge" (Hechinger Institute, 2009, pp. 3-4). It is critical for students to create their own questions that result in critical thinking and reflect on their work (Hechinger Institute, 2009).

Several strategies and programs focus on rigor to help ensure that high school students are college and career ready. A few strategies are asking higher level questions through Bloom's Taxonomy, Costa's Levels of Inquiry, and the Depth of Knowledge Model. One program is AVID, which focuses on WICOR, Socratic Seminars, and Philosophical Chairs. The International Baccalaureate (IB) program and the Advanced Placement (AP) program help produce college and career ready students.

One higher level strategy across all content areas is questioning (Davoudi & Sadeghi, 2015). Benjamin Bloom created Bloom's Taxonomy in 1948 (Coffey, n.d.). "Bloom's Taxonomy categorizes the cognitive skills required of the brain when faced with a new task, therefore describing the type of thinking processes necessary to answer a question" (Hess et al., 2009, p. 4). Revised Bloom's focuses on the cognitive processes and knowledge through six levels, "remember, understand, apply, analyze, evaluate and create" (Hess et al., 2009, p. 3).

Costa's Levels of Inquiry focus on three levels of questioning that foster inquiry through open-ended questions. Level 1 questions focus on text explicit questions which students are able to answer by looking in one section of the text. Level 2 questions are text implicit questions, which require students to infer from the text and/or to find the answer by looking in several different places in the text. Level 3 questions focus on

experience, which require the student to think beyond the text to his/her prior knowledge and experiences to answer the question (Costa's Levels of Inquiry, n.d.).

The Depth of Knowledge Model focuses on "the depth of content understanding and scope of a learning activity, which manifests in the skills required to complete the task from inception to finale" (Hess et al., 2009, p. 4).

> The model has four levels, which reflects different levels of cognitive expectation, or depth of knowledge, required to successfully complete the task. Level One focuses on recall and recognition skills. Level Two focuses on skills and concepts while Level Three requires short-term strategic thinking and Level Four promotes extended thinking. (Hess, 2013, p. 4)

> WICOR (Writing, Inquiry, Collaboration, Organization and Reading to Learn) provides a learning model that faculty can use to guide students to comprehend materials and concepts, and articulate ideas at increasingly complex levels (scaffolding) within developmental, general education and discipline-based curricula in their major. (WICOR, n.d., para. 1)

Writing is a crucial skill that students need to enter college and the workforce. It is a form of "self-expression," "self-efficacy," and "self-advocacy" (Custer, 2014, p. 78). Writing helps a person to be able to think critically. AVID's approach is "writing to learn which means: that writing is not only a communication skill learned in English composition class but also a learning skill that can deepen understanding of any academic subject or life experience" (Custer, 2014, p. 78).

Inquiry is the skill of asking questions, which in return creates wonder, searching for answers, knowledge, understanding, and growth. This causes interest to spark, which leads to the exploration of new ideas and concepts and the understanding of their

opinions and why they think the way they do. "Inquiry is perhaps the oldest documented form of teaching, tracing its roots back to the fourth century BC when Socrates engaged fellow Athenians in philosophical conversations in public and private gatherings, using questioning as his primary investigative tool" (Custer, 2014, p. 81).

> Inquiry, which derives from the Latin quaerere, meaning to ask or to seek, has been identified as a key, if not the central component of critical thinking. The derivation of "question" is "quest," to seek answers. Thinking is not driven by answers but by questions … Only students who have questions are really thinking and learning. (Custer, 2014, p. 82)

Inquiry is a powerful tool when there is a connection of collaboration among students.

"Collaborative learning environments are most powerful when designed to both challenge and support students' efforts" (Custer, 2014, p. 90). Collaboration is not just students collaborating with other students; it involves the teacher collaborating with the students. There are six critical components when incorporating cooperative and collaborative learning: positive interdependence, promotes interaction, development of teamwork, interpersonal and small group skills, individual and group accountability, group processing and reciprocal responsibility (Custer, 2014). These types of activities result in open-ended questions that ensure critical-thinking skills (Custer, 2014).

Organization is a skill that students need when entering high school and college to help them manage their time and adjust to their surroundings. AVID focuses on teaching students how to organize their time, resources, assignments, and ideas. Cornell Notes is an organizational tool that teaches students how to organize their notes (Custer, 2014).

Reading to learn is teaching students how to think and read critically. The focus is "reading with a purpose, which can be taught through complex activities that require

students to use their prior knowledge, understanding the structure of texts, and using text-processing strategies during and after reading to improve comprehension" (WICOR, n.d., para. 7).

Socratic Seminars "enhance students' abilities to think critically, resolve conflict, and clarify and articulate values" (Polite & Adams, n.d., p. 3). Socratic Seminars arise from the beliefs of Socrates in asking questions and having discussions. The seminars "align with the work of John Dewey, Lev Vygotsky, Jean Piaget, and Paulo Friere" (Filkins, 2018, para. 1). According to Elfie Israel, the Socratic Seminar focuses on open-ended questions based on a text the student has previously read.

> Within the context of the discussion, students listen closely to the comments of others, thinking critically for themselves, and articulate their own thoughts and their responses to the thoughts of others. The Socratic Seminar provides students the opportunity to learn how to work well and collaborate with others while asking higher-level questions. (Filkins, 2018, para. 2)

The job of the student is to focus the discussion on the text and not their opinion. "Through this type of discussion, students practice how to listen to one another, make meaning, and find common ground while participating in a conversation" (Socratic Seminar, n.d., para. 1). Socratic Seminars focus on a text that requires students to think and lends itself to a deep discussion. It is the student's responsibility to create a discussion focused on the ideas arrived from the text and not their opinions or beliefs. There are five steps in conducting a Socratic Seminar: first select an appropriate text; give students time to prepare for the seminar by reading and taking notes; discuss the rules for the seminar; conduct the seminar with an open-ended question; and last, students need time to reflect and evaluate the Socratic Seminar as a group (Socratic Seminar, n.d.).

Philosophical Chairs is comparable to a debate where the students choose a side (agree, disagree, or neutral) and defend their decision (Duez, n.d.). "In theory, learning happens when students use critical thinking to resolve subsequent conflicts, which arise when presented with alternative perspectives, ideas or contradictions to what they have previously learned or believed" (MacDonald, n.d., p. 2). Philosophical Chairs provides students the opportunity to think critically, verbalize, and write down their thoughts and beliefs (MacDonald, n.d.).

The IB program, created in 1968 in Switzerland, focuses on high school students graduating being college ready and global citizens who can be successful anywhere in the world. Students in the IB program have a rigorous workload, which consists of "taking six interdisciplinary courses, write a research paper, and completing community service" (Koebler, 2011, para. 3). According to Siva Kumari, who is the chief operating officer, the goal of the IB program is to provide students with a vast array of knowledge to be successful in any job in the world (International Baccalaureate Organization, 2018). "We teach a canon of knowledge we think students should know, so that it doesn't matter what job they have or where they go, students are able to adapt to any context" (Koebler, 2011, para. 4).

The AP program is a program where high school students have the opportunity to take advantage of classes that are at the college and university level. There are "35 AP courses in 20 subject areas" for students to enroll in and earn college credit (Zing, 2018, para. 1). The goal of the AP program is to provide students a pathway that offers rigorous and challenging courses. Students have the choice of what subjects they participate in as an AP student (Curry, MacDonald, & Morgan, 1999).

The purpose of this study was to analyze teacher efficacy on rigor and its

strategies, which will help students become college and career ready. This study also analyzed what professional development teachers need to incorporate rigor successfully in their classroom. The strategies described in this study: Higher Level Thinking Questions, Depth of Knowledge, IB program, AP program, and AVID Strategies: WICOR, Socratic Seminars, and Philosophical Chairs require students to think critically.

Significance

> Nationally, too few high school students are graduating prepared for college. Only 25 percent of the class of 2011 who took an ACT exam demonstrated college readiness in all four subjects. This indicates that only 19 out of every 100 high school students graduate prepared for the rigors of postsecondary work. (Royster, Gross, & Hochbein, 2015, p. 208)

NCDPI created the 16 Attributes of a Future Ready Graduate poster. The 16 attributes consist of being

> science savvy, a strong team contributor, a critical thinker, an effective problem solver, a financially literate citizen, a literature consumer of media, a curious researcher, a capable technology user, a creative/innovative thinker, a proficient reader, an effective communicator, a self-directed responsible worker, a skilled mathematician, a relationship builder, a knowledgeable global citizen, a health-focused life-long learner and Multilingual. (NCDPI, 2017, p. 1)

These strategies and skills are important for a student to be successful, but Albert Bandura, a theorist in self-efficacy, stated, “Teachers would do well to implement instructional practices that not only foster knowledge and skill attainment, but also promote the development of the necessary accompanying confidence” (Artino, 2012,

para. 15). Students having knowledge and skills does not always equate to students having the will to apply the knowledge they have obtained. "Students need both the skill and the will to successfully function within different domains and under a variety of circumstances" (Artino, 2012, para. 15). Educators need to focus on mastery experiences through academic self-efficacy by "helping students set clear and specific goals" (Artino, 2012, para. 15), "encouraging the use of challenging and proximal goals" (Artino, 2012, para. 16), "providing honest, explicit feedback to increase students' efficacy beliefs" (Artino, 2012, para. 17), "facilitating accurate calibration of self-efficacy," and "use peer modeling to build self-efficacy" (Artino, 2012, para. 18). "Results from a meta-analysis of more than 100 empirical studies over the last 20 years found that of nine commonly researched psychosocial constructs, academic self-efficacy was the strongest single predictor of college students' academic achievement and performance" (Artino, 2012, para. 19).

The significance of this research is to add to the body of literature on strategies that benefit students for postsecondary education through surveying and interviewing high school teachers about the strategies they use to increase rigor.

Definitions of Key Terms

ACT. American College Testing: "A standardized college admissions test developed by ACT, Inc., measuring English, mathematics, reading, and science skills" (Foreignborn, 2018, para. 1).

AP program. College courses students take in high school and receive college credit (Minnesota Department of Education, 2017).

Collaboration. Working with others to create an end product (Webster, 1963).

CTE. "A term applied to schools, institutions, and educational programs that specialize in the skilled trades, applied sciences, modern technologies, and career preparation" (Partnership, 2014, para. 1).

IB program. Created in the 1960s to "be a rigorous, internationally-recognized diploma for entry into universities that students all around the world could earn" (Seigel, 2015, para. 1).

Inquiry. Asking questions and investigating to discover the answer (Webster, 1963).

Assumptions

Based on the researcher's experience and background in education, three assumptions were made regarding this study. First, high school students are not prepared for college when they graduate high school. This assumption is based on students graduating with an alternative diploma (graduating with only 22 credits instead of 28) and many students graduating with less than a 17 composite score on the ACT. A second assumption is that teachers are not prepared to teach students at a rigorous level. This assumption is based on teachers not fully understanding what the word rigor means. Teachers are not sure how to successfully implement rigor into their teaching, and they have not been provided adequate training on rigor. Last, teachers do not have a high sense of teacher efficacy. This assumption is based on hearing teachers say things like, "My kids cannot do that" and "Students don't care about learning, so there is nothing I can do to teach them."

Limitations to this Study

A limitation for this study was the candidate could only analyze surveys teachers completed and would not know how honest the participants were with their responses.

Teacher lack of experience and professional development training with understanding and utilizing rigor in their classroom could negatively affect the survey results.

Delimitations to this Study

A delimitation for this study was that the teachers surveyed all worked at the three high schools identified for this study. There were three panel interviews involving the School Improvement Team, which was comprised of only a small group of stakeholders. The candidate is an administrator at one of the three high schools. This study focused on one of 271 school districts in North Carolina.

Theoretical Framework

In the 2011-2012 school year, only 25% of students surpassed the College Readiness Benchmark in all four areas (Venezia & Jeager, 2013). The push in education is to increase college readiness through teaching a rigorous curriculum. There are four major theories of learning: behaviourism, constructivism, social constructivism, and critical pedagogies (Westbrook et al., 2013, p. 11).

Behaviourism was derived from the work of Thornike (1911), Pavlov (1927), and Skinner (1957; Westbrook et al., 2013). This theory was popular in the 1960s and 1970s. The focus was trial and error and rewarding students when they reached different levels of achievement. The teacher was the focus, the one in charge. Each content area (math, reading, etc.) was taught in isolation, and students did not have input on how they learn. Behaviourism did not differentiate and believed that all students learned the same way such as rote learning and memorization (Westbrook et al., 2013, p. 11).

Constructivism was derived from the work of Piaget (1896-1980). Constructivism builds on the student's prior and existing knowledge. When there is a gap with the student's prior knowledge, accommodations are made to help the student

learn the concept at hand. This approach also challenges students in order to continually make progress in their learning. Students work on tasks individually and in small groups focusing on problem-solving and projects. Students move from concrete to abstract learning. Child-play developed through constructivism by Locke, Rousseau and Froebell in the 1600s, which focused less on whole group teaching and more on the individual student. Child-play focuses on play, the child's interest and allows the student to be active in their learning process (Westbrook et al., 2013).

Social constructivism focuses on the social aspect of learning through student-to-teacher and/or student-to-student interaction through the Zone of Proximal Development (ZPD) where the teacher or a high-achieving student helps the struggling student in areas in which they are weak (Vygotsky, 1986). Social constructivism provides "Small group, pair and whole-class interactive work, extended dialogue with individuals, higher order questioning, teacher modeling, showing, reciprocal teaching and co-operative learning can all be seen as justified by social constructivism" (Westbrook et al., 2013, p. 11).

Critical pedagogies derived from Paulo Freire (1972) focused on the student and less on the teacher (Westbrook et al., 2013). The teacher encourages and empowers students to think critically and "to act on the world as they learn in order to change it" (Westbrook et al., 2013, p. 11).

The International Center for Leadership in Education (2018) created the Rigor/Relevance Framework

> to examine curriculum, instruction, and assessment along the two dimensions of higher standards and student achievement. Teachers can use it to monitor their own progress in adding rigor and relevance to their instruction, and to select appropriate instructional strategies for differentiating instruction and facilitator,

higher achievement goals. (p. 1)

The y-axis pertains to Bloom's Taxonomy progress from remembering to complex thinking. The x-axis is the Application Model designed by Bill Daggett. The five levels focus on how the knowledge is implemented. The lowest level is knowledge in isolation (one content) and moves to the highest end where knowledge "applies to real-world unpredictable situations" (International Center for Leadership in Education, 2018, p. 2). The framework consist of four quadrants (A, B, C, D). "Quadrant A (Acquisition) represents simple recall and basic understanding. Quadrants B (Application) and D (Adaptation) represent action or high degrees of application" (International Center for Leadership in Education, 2018, p. 2). Quadrant B focuses on using skills and applying the skill, while Quadrant D is where students have the ability to obtain information from multiple sources and to solve sophisticated problems. "Quadrant C (Assimilation) embraces higher levels of knowledge" (International Center for Leadership in Education, 2018, p. 3). Students today are tech savvy and have access to Google to receive answers to their questions in mere seconds. For this reason, education needs to focus on how students apply that information to real-world scenarios. This shift will prepare students to succeed in the 21st century. These skills are more important than knowledge to employers. Quadrants B and D are critical in the workforce. Quadrants A and C were important prior to technology, but now the focus and need are Quadrants B and D. "The Rigor/Relevance Framework is a fresh approach to looking at College and Career Ready standards and assessments. It is based on traditional elements of education, yet encourages movement from acquisition of knowledge to application of knowledge" (International Center for Leadership in Education, 2018, p. 3).

Research Questions

The following questions served as the driving force for this study.

1. What research-based strategies are teachers using to incorporate rigor into their classrooms to prepare students to be college and career ready?
2. What professional development do teachers need to incorporate rigor successfully in their classroom?
3. What is the teacher's comfort level with implementing rigor in their classroom?

Summary

According to the ACT results, one in three high school students is not ready to be successful in college-level courses (Bidwell, 2013). The results from the NAEP exam reveal that less than 40% of seniors nationwide are college or career ready. "In 2015, the nationwide high school graduation rate was 82 percent, not 40 percent. That leaves a potentially large group of kids who received diplomas but aren't ready to succeed in college" (Education Next, 2016, para. 3). "At least 569,751 students at public two- and four-year campuses were enrolled in remedial classes in the fall of 2014" (Butrymowicz, 2017, para. 5).

Organization of Study

This study contains five chapters. Chapter 2 focuses on the literature review of what rigor is, including researched-based strategies for implementing rigor into the classroom and teacher efficacy. Chapter 3 analyzes the methodology of the study. This chapter discusses the participants and the instruments used to conduct the survey. Chapter 4 states the results from the study, while Chapter 5 analyzes the data and provides recommendations for further study.

Chapter 2: Review of Related Literature

Introduction

"Thinking is like exercise, it requires consistency and rigor. Like barbells in a weightlifting room, the classics force us to either put them down or exert our minds. They require us to think" (DeMille, 2017, para. 2). Rigor is a word constantly thrown around in education, yet it is not understood or defined by educators. A group of math teachers searched synonyms for rigor and found

> "affliction," "inflexibility," "difficulty," "severity," "rigidity," "suffering," and "traditionalism"—none of which describe characteristics of rigorous mathematics instruction. No wonder the teachers were confused! However, two additional words included in the list—"thoroughness" and "tenacity"—provided avenues for some serious thought about what "rigor" implies. (Keasler & Headley, 2015, para 2)

Purpose

The purpose of this study was to provide strategies and skills to teach students at a rigorous level. This will ensure student success in high school, college, and the workforce (Hess et al., 2009).

Rigor

What does the word rigor mean? There are several different definitions of rigor. Blackburn (2008) defined rigor as "Rigor is creating an environment in which each student is expected to learn at high levels, each student is supported so he or she can learn at high levels, and each student demonstrates learning at high levels" (p. 16).

John Boggess who wrote *The Three Rs Redefined for a Flat World* defined rigor as "The quality of thinking, not the quantity. Rigorous learning can occur at any grade

and in any subject" (Blackburn, 2008, p. 8).

Beane wrote *Rigor and Relevance: Can We Have our Cake and Eat it Too?* His definition is

> Rigor would be used to say something about how an experience is carried out and to what degree. Specifically, a rigorous experience would be one that involves depth and care as, for example, in a scientific experiment or literary analysis that is done thoughtfully, deeply with sufficient depth and attention to accuracy and detail. (Blackburn, 2008, p. 8)

Wasley, Hampel, and Clark (1997) collaborated to create *Kids and School Reform* and described rigor as the learner has to be held to high expectations and take charge in his or her learning.

Washor and Mojkowki (2006/2007) wrote *What do you mean by Rigor?* They described rigor as students being immersed in the content through real-world situations and collaborating with experts in that field (Washor & Mojkowki, 2006/2007).

Strong, Silver, and Perrini (2001) defined rigor as "Goal of helping students develop the capacity to understand content that is complex, ambiguous, provocative, and personally or emotionally challenging" (p. 7).

Wagner wrote *Rigor Redefined*, where he

> names seven 21st century "survival" skills students today need to master [in order] to thrive in the new world of work: critical thinking and problem solving, collaboration and leadership, agility and adaptability, initiative and entrepreneurialism, effective oral and written communication, accessing and analyzing information, and curiosity and imagination. (Ainsworth, 2010, p. 7)

Jerry Weast, the superintendent of the Montgomery County Public Schools in

Maryland stated,

> Academic rigor quite simply means giving students a curriculum that will prepare them to succeed in college or the world of work. For us, that means setting high standards for success and then lining up each grade to meet that high standard. (Hechinger Institute, 2009, p. 2)

Jennifer Granholm, Governor of Michigan, defined rigor as

> Academic rigor means raising the bar, elevating expectations, and increasing the level of challenge in our academic standards for our children. It also means changing the expectations and behavior of our students, faculty, administrators, and leaders. We need to have the mindset that all our children must go to college or get technical training in order to be prepared for 21st century jobs. (Hechinger Institute, 2009, p. 6)

Williamson and Blackburn (2010) summarized rigor as

> Rigor is more about a process, a way of thinking, involving depth and thought. It is also about the content that is being taught and the design of the lesson, the support provided for students, and the expectation that every student will be successful. (p. 23)

The following literature focuses on strategies to increase rigor with questioning, Bloom's Taxonomy, Depth of Knowledge, AVID Strategies (WICOR, Cornell Notes, Philosophical Chairs and Costa's Levels of Inquiry) and strategies that use multiple intelligences. This chapter also focuses on college preparation programs (IB, AP, and teacher self-efficacy.

Questioning

Charles Degarmo said,

> To question well is to teach well. In the skillful use of the question more than anything else lies the fine art of teaching; for in it we have the guide to clear and vivid ideas, the quick spur to imagination, the stimulus to thought, the incentive to action. (Advanced Summer Institute, 2008, para. 1)

Frazee and Rudnitski (1995) classified questions into two categories: convergent and divergent questions. Convergent questions have a right or wrong answer that is content specific. Divergent questions are open-ended questions that require students to use multiple thought processes to arrive at an answer. There is not one right or wrong answer. Divergent questions allow students the opportunity to practice their critical-thinking skills. According to Frazee and Rudnitski, it is important to open a lesson with an initial question for eight reasons: "It promotes thinking, creates focus, initiates discussion, appraises experiences, organizes concepts, aids evaluation, reinforces reading and it's motivational" (p. 246).

An essential question focuses on what the students need to learn. According to Zmuda and Toaino (2001),

> A good essential question had to be clear and extremely focused, but it also had to be thought-provoking enough to stimulate student engagement and drive thought and discussion in many directions. It had to have a perspective, yet be inclusive enough that students would be able to use it not only to organize their thoughts about the day-to-day work of the whole course but also to see how perspective shapes all kinds of study. (p. 13)

An effective essential question can motivate students to learn information in depth

and not just at the surface level. Zmuda and Toaino (2001) reiterated this by saying,

> An effective essential question inspires thought. It inspires teachers to frame the content in a manner that is accessible, engaging, and interesting for their students. It inspires students not only to think within the confines of the given units or courses content focus, but also to think as a lifelong learner. An essential question celebrates previously acquired knowledge, provokes participants to want to share that knowledge, and engages them in a line of inquiry in pursuit of a more detailed and broader understanding. (p. 22)

Bloom's Taxonomy

> The traditional model in which the teacher teaches and the students listen while making notes no longer provides them with the skills that will be necessary in the future. In a way, it teaches nothing but facts. The methods used to teach and learn these skills will need to be transformed. (Pohjolainen, 2016, p. 1)

Benjamin Bloom created Bloom's Taxonomy in 1956, which derived from the three domains of learning (cognitive, affective, and psychomotor). Bloom's Taxonomy focuses on the cognitive domain knowledge. There are six levels: "knowledge, comprehension, application, analysis, synthesis and evaluation" (Anderson & Krathwohl, 2001, pp. 67-68). Lorin Anderson who was a student of Bloom's revised the six levels in 2001 from nouns to verbs. The six levels educators use today are remembering, understanding, applying, analyzing, evaluating, and creating (Anderson & Krathwohl, 2001).

Depth of Knowledge Model

Norman Webb developed the Depth of Knowledge Model:

> The model is based upon the assumption that curricular elements may all be

> categorized by the cognitive demands required to produce an acceptable response. Each grouping of tasks reflect a different level of cognitive expectation, or depth of knowledge, required to complete the task. (Webb's Depth of Knowledge Guide, 2009, p. 5)

The Depth of Knowledge consist of four levels: Level 1: Recall and Reproduction; Level 2: Skills and Concepts; Level 3: Short-Term Strategic Thinking; and Level 4: Extended Thinking. Level 1 knowledge consists of activities and questions that are recall and reproduce skills. This involves students working with facts, vocabulary, simple formulas, etc. Level 2 knowledge involves students comparing and contrasting information that goes beyond recall and reproducing knowledge. Students are able to explain how and why when answering questions. Level 3 knowledge requires students to use higher order thinking skills in a short-term period, usually one or two class periods. Students analyze and evaluate real-world problems that have a predictable outcome. Level 4 knowledge also requires students to use higher order thinking skills over an extended amount of time. Students solve real-world problems that have an unpredictable outcome (Webb's Depth of Knowledge Guide, 2009, pp. 7-14).

AVID

"The Advancement Via Individual Determination (AVID) program, a college-readiness system targeting populations traditionally underrepresented in postsecondary education, provides students with consistent academic support while enrolled in a rigorous course of study" (Bernhardt, 2010, p. 203). AVID's main goal is to work with students of all ethnic backgrounds and low-income students to prepare them to be successful in high school and college.

The AVID curriculum exposes students, many of whom will likely be the first in

> their family to attend college, to the types of experiences, knowledge, and language useful for navigating complex school bureaucracies and learning how schools function on a daily basis. To help accomplish this, students are taught to self-advocate, encouraged to take responsibility for their education, and exposed to various strategies for effectively collaborating and interacting with teachers, administrators, counselors, and other school personnel. (Bernhardt, 2010, p. 213)

The AVID program incorporates several strategies to increase rigor and student achievement.

WICOR

WICOR is a strategy that requires students to actively think about their reading and connect it to their writing and critical thinking, which helps students understand the material at a deeper level (Custer, 2014).

W: The W in WICOR stands for writing as learning, embedded in all content areas, and enables students to process and analyze their content (Custer, 2014). Custer (2014) explained writing as,

> A basic to thinking, learning and growth, requiring students to consider issues in new, complex ways, contributing to self-knowledge, and helping them to clarify and order experience and ideas. Writing consists of an essential, complex set of tools that enhance critical thinking—good writers tend to be good thinkers, and improving cognitive skill enhances one's writing ability. (p. 73)

I: I stands for inquiry, which is a strategy that scaffold students to think critically and take control of their learning (Custer, 2014). "AVID's emphasis on inquiry focuses on the application of Costa's three levels of 'intellectual functioning'" (Custer, 2014, pp. 73-74), whereby learning to ask progressively more complex questions and students

become progressively more metacognitive—aware of their own thinking processes.

C: The C stands for collaboration, which allows students to help each other learn and enhance their own learning. "Thinking is not driven by answers but by questions" (Foundation for Critical Thinking, 2017, p. 1), placing inquiry as fundamental to the higher level cognition essential for college success. The collaboration strategy allows students to be actively engaged in their learning process (Custer, 2014).

O: The O stands for organization, which enables students to successfully set goals, priorities, and use time management to reach their set goals (Custer, 2014). Cuseo, Fecas, and Thompson (2010) stated that college students who struggle with time management also struggle with managing college (Custer, 2014).

> Management of time, energy and learning to set priorities can make the difference between success and failure for new college students. In addition, students must learn to plan effectively for academic assignments, organizing information and ideas for papers and projects. (Custer, 2014, p. 74)

R: The R stands for reading to learn.

> AVID's approach to "critical reading" provides faculty with common-sense and research-based strategies designed to help students read more effectively. Skills such as "reading with purpose" can be scaffold with more complex activities to ensure that students are connecting reading material to prior knowledge, understanding the structure of texts, and using text-processing strategies during and after reading to improve comprehension. (Custer, 2014, p. 74)

According to Conley, colleges expect students to be independent learners and responsible for learning the content (Bernhardt, 2010). Another rigorous AVID strategy that incorporates writing is Cornell Notes.

Cornell Notes

Mary Catherine Swanson, founder of AVID, implemented Cornell Notes as one of the first strategies to help students think through the lecture by writing down questions or main ideas in the margins of their notes (Ruenzel, 1997). "Cornell Notes engages students not only in the recording of notes, but also requires reflection and a proven system of reviewing that involves both retrieval and application of cognitive skills for mastery of content" (Custer, 2014, p. 104). The recommendation is that students review their notes at least three times to fully understand and master the content: "This critical process includes (1) reading over notes immediately after class to identifying main ideas; (2) converting key ideas into questions; and (3) writing a summary of the notes" (Custer, 2014, p. 104).

McCoy, Basso, Gall, Gall, Jacobsen, and Bullock analyzed numerous note-taking strategies (McCoy & Basso, 1996). They each concluded that Cornell notes were powerful, straightforward and an organized strategy to implement (McCoy & Basso, 1996).

Williams (2004) conducted research on Cornell Notes for her dissertation and used research from Muskingum College. The research stated,

> Cornell method of note-taking offers several advantages: (a) the results are more organized notes allowing students to quickly identify key concepts from a lecture. (b) The notes can easily be used as a study guide for exam preparation; (c) the arrangement of information is aesthetically pleasing and easy to scan, making it easy to locate particular pieces of information; and (d) the strategy may be adapted to a number of presentation formats. (Williams, 2004, p. 28)

Williams (2004) conducted a study with observations, one-on-one interviews, and

a questionnaire with eighth grade AVID students in social studies and science in Tennessee. Through observations, she answered four research questions.

Research Question 1: "Do eighth-grade students feel that note-taking is important" (Williams, 2004, p. 62)? Sixty percent of students actively participate in note-taking when the teacher would say this is important or write it down. All students (100%) were organized and ready to participate in taking notes. Students eagerly began taking notes but did not continue throughout the lesson (Williams, 2004).

Research Question 2: "Do eighth grade students feel that Cornell Note-Taking System is useful for organizing lecture materials" (Williams, 2004, p. 65)? The Cornell Note-Taking System was beneficial for the students based on their behavior during class instruction. This resulted in over 75% of students satisfied with their grades from the test (Williams, 2004).

Research Question 3: "Do eighth grade students feel that the Cornell Note-Taking System helps them achieve academically" (Williams, 2004, p. 66)? Approximately 75% of students took advantage of the 5 minutes of studying allotted during classroom time to review their notes. Fifty percent of students changed their study habits and methods (Williams, 2004).

Research Question 4: "What are eighth-grade student's perceptions of Cornell's Note-Taking System" (Williams, 2004, p. 68)? "Fifty percent of the participants began to complain about the writing involved, 10% made gestures of disappointment, 10% made no gesture, and 10% did not pay attention to what the instructor was saying" (Williams, 2004, p. 68).

Williams's (2004) research concluded that 85% of eighth-grade students agreed that note-taking is important, and 94% agreed it is useful to organize materials. Cornell

Notes allow students to organize their notes for Socratic Seminars.

Socratic Seminar

> In a Socratic Seminar activity, students help one another understand the ideas, issues, and values reflected in a text through a group discussion format. Students are responsible for facilitating their group discussion around the ideas in the text; they shouldn't use the discussion to assert their opinions or prove an argument. Through this type of discussion, students practice how to listen to one another, make meaning, and find common ground while participating in a conversation. (Socratic Seminar, n.d., para. 1).

This allows students the opportunity to expand their confidence to articulate their ideas using text-based evidence (Socratic Seminar, n.d.). Dewey (1933) believed active students learn more than students who do not take an active role in their learning. Dewey believed the goals of the Socratic Seminar should "stimulate intellectual eagerness, awaken an intensified desire for intellectual activity and knowledge and love of study" (p. 262).

Leondard Nelson, a German professor of philosophy, has studied the role of the teacher in Socratic seminars. He explained that the role of the teacher is to provide "a genuine mutual understanding among the students, the concentration on the respective question to prevent digression, and the preservation of the good ideas that had come up in the course of the discussion" (Loska, 1998, p. 238). According to Nelson, the Socratic Seminar discussion would cover the main idea through questions, the teacher, and misconceptions cleared by their classmates through questioning and discussions (Loska, 1998, p. 238).

Socratic Seminar is an open-ended discussion based on a text that students have

engaged with previously and learn from each other through analyzing the text aloud (National Paideia Center, n.d.). Students read and analyze a text while incorporating critical reading skills and create higher level questions using Costa's Levels of Intellectual Functioning.

> Taking Cornell Notes while studying the assigned text is an excellent strategy to use in preparation for a Socratic Seminar. Before the seminar begins, students share their questions, and choose one question to start the seminar. Seated in a circle, students then ask clarifying questions and/or pose responses; the seminar continues in this manner until time is up. The instructor is involved as a facilitator, redirecting the dialogue as necessary, and monitoring the process. Following the seminar, the activity is debriefed and students are provided with an opportunity to make final comments; they are then asked to reflect on the experience in writing. (Custer, 2014, pp. 108-109).

Socratic Seminars help students reach other educational goals: "vocabulary development, interpretative and comparative reading, text analysis, gain experience in synthesis and evaluation" (Tredway, 1995, p. 115).

Koellner-Clark, Stallings, and Hoover (2002) conducted research at Forest Park High School in Georgia analyzing Socratic Seminars in mathematics. The focus for this research was students who were in their second year in algebra on the topic of functions. Each teacher conducted Socratic Seminars in one of their classes and not in the other class. This research found that Socratic Seminars led to students taking responsibility to effectively communicate their ideas with their peers about the concept at hand. Students who are verbal learners were successful in the Socratic Seminar even when they were not as proficient on the paper/pencil test. They concluded, "Students had a forum for

articulating and organizing their mathematical understanding; meanwhile, their teachers could focus on listening to and reflecting on students' understanding" (Koellner-Clark et al., 2002, p. 686). This research concluded that students who participated in the Socratic Seminars scored higher on their assessments than the students who did not participate in the seminars (Koellner-Clark et al., 2002). Tredway (1995) agreed with this research, saying, "When students actively and cooperatively develop knowledge, understanding, and ethical attitudes and behaviors, they are more apt to retain these attributes than if they had received them passively" (para. 12).

During the ASCD's 1992 Annual Conference in Washington, DC, 25 participants trained in Socratic Seminars observed a group of 20 students conducting a Socratic Seminar. The two groups participated in a Socratic Seminar focusing on the same text and had the same guiding question. The participants from the conference concluded, "Students demonstrated intellectual and emotional insights that they, as adults, had overlooked" (Tredway, 1995, para. 29). Another strategy that allows students the opportunity to discuss and analyze their learning is Philosophical Chairs.

Philosophical Chairs

Philosophical Chairs "empowers students' understanding of impacts based on decisions made by a factor of different corresponding events leading up to it" (Bonifacio, 2013, p. 1). This activity requires students to choose a side and use textual evidence to create an argument for their side. This allows "students to produce and hear academic language from their peers, students are able to model what their thinking process is and learn from appropriate models of their peers" (Bonifacio, 2013, p. 1). Through Socratic Seminars and Philosophical Chairs, students ask higher order thinking questions using Costa's Level of Inquiry.

Costa's Levels of Inquiry

Costa's Levels of Inquiry is an AVID strategy to help students analyze their thinking about the information they are learning at a higher level (Ensor, 2009). Through using Costa's questions, students assess the level of their questions in their notes, as they read, and in their writing (Bok, 2006). Costa has three levels of questioning (Costa's Levels of Inquiry, n.d.): Level 1: gathering knowledge; Level 2: processing knowledge; and Level 3: applying knowledge.

Studies on AVID

The following two studies analyze the effects of implementing AVID strategies in high school. Connell (2015) conducted face-to-face interviews with three AVID students in a Colorado high school that focused on three main research questions.

> Research Question 1 focused on the
>
> Students' perceptions of the AVID metacognitive literacy strategies. The study found that students' perceived development of their ability to see the strategies occurred over time. Participants discussed ownership of the strategies and active mental engagement as they participated in literacy activities across all school subjects and contents. (Connell, 2015, p. 86)
>
> Research Question 2
>
> Investigated high school AVID students' perception of their implementation of AVID metacognitive literacy strategies on an assigned task. The study found that students perceived actively reading, putting ideas in their own terms, and an ease of completion as a result of the metacognitive literacy strategies on a task. (Connell, 2015, p. 86)
>
> Research Question 3

> Investigated high school AVID students' perception of their growth in literacy when using the metacognitive literacy strategies. The study found that students described surface level literacy before implementation of the AVID metacognitive literacy strategies and a newfound self-awareness after implementation. (Connell, 2015, pp. 86-87)

Connell (2015) concluded that through his study, the findings suggested "AVID students perceive growth in their self-awareness, confidence, and ability to know and understand what they know and understand through their understanding and use of metacognitive literacy strategies" (p. 87).

AVID strategies help students prepare for college. A study conducted in Texas discovered that twice as many AVID students took the AP science exam, and three times as many took the AP English and history exams (Connell, 2015). In Hawaii, a study compared middle school exam scores of AVID and non-AVID students. On the reading assessment, 92% of AVID students passed, while only 62% of non-AVID students passed. In math, 62% of AVID students passed, while only 38% of non-AVID students passed (Hawaii P-20, 2010). Data collected and analyzed from the California High School Exit Exam discovered that 75% of the African-American male students enrolled in AVID passed, while only 48% of non-AVID African-American males passed. AVID played a significant role in the rate of passing this exam in a ratio of 77:48 for Hispanic students (Martinez & Klopott, 2005).

In Texas, there was a review of 10 schools in a 3-year time span after 2-3 years of implementing AVID. Three schools did not grow and stayed at the acceptable rating, two schools grew from acceptable to recognized, two schools grew from acceptable to the highest rating exemplar, and three schools grew from low performing to acceptable

(Connell, 2015).

Lemons (2014) conducted observations, small group interviews with students, and a teacher interview with an eighth-grade class in Tennessee. She concluded,

> Students developed socially and emotionally through AVID strategies and environmental facts. Students noted that the class was trusting and highly collaborative, which produced a comfortable environment where they were accustomed to sharing their personal perspectives and opinions. The strategies used to engage and promote critical thinking were all interactive, rigorous, and reflective. These three components allowed students to engage in multiple ways and ultimately encouraged them to verbalize or write their thoughts, which were often at Costa's level three of cognition. (Lemons, 2014, p. 74)

Rigor is essential for student growth but does not happen overnight. The research above discussed several strategies teachers can implement in their daily lessons to increase rigor, which in turn will increase student achievement. The students benefit from rigorous classes, which will increase student growth and proficiency.

College Preparation Programs

IB program. The IB program founded in 1968 is nonprofit and based in Switzerland. The IB program known for their diploma program is offered to students in their junior and senior year of high school. This rigorous program requires students to

> Complete courses at standard (SL) and higher (HL) levels in six subject areas: two languages, individuals and societies, mathematics and computer science, the arts, and experimental sciences. In addition, students study Theory of Knowledge, write a 4,000 plus-word Extended Essay and perform 150 hours of Creativity, Action and Service. (Smerdon & Borman, 2012, p. 12)

Siva Kumari, chief operating officer of IB, explained that the goal of the program is to provide students with a vast amount of knowledge to be marketable for jobs across the nation. "We teach a canon of knowledge we think students should know, so that it doesn't matter what job they have or where they go, students are able to adapt to any context" (Koebler, 2011, para. 4).

Researchers in several countries have studied the IB program and student performance. Conley and Ward (2009) of the Educational Improvement Center in Eugene, Oregon stated,

> The IB standards demonstrates a very high degree of alignment with the Knowledge and Skills for University Success (KSUS) standards in all subject areas. In addition, many of the individual IB standards are at a level more advanced than entry-level college courses. (p. 6).

The University of California studied IB graduates from 2000-2002 to determine how IB students fare in college. The results showed that students who participated in the IB program in high school had a higher grade point average after their first year and at graduation than students who were not in the IB program (Hill & Saxton, 2014).

AP program. The AP program "is an advanced, college preparatory program allowing students to qualify for college credits based on course completion exam scores" (Smerdon & Borman, 2012, p. 10) . The AP program has offered students, for the last 50 years, the opportunity to take college credit courses while in high school. The number of students completing the AP exams has grown 111% from 1997 to 2005. With this expansion, 67% of high schools offer AP classes, while most of the schools were located in the cities, urban areas, and in towns. The AP program is seeing more students take the exams, but the scores are not rising; the majority of students score 3 of 5, a 3 is the lowest

passing grade. Students are being introduced to college-level material but are not able to score high enough to obtain college credit (Smerdon & Borman, 2012). Gonzalez, O'Connor, and Miles (2001) stated that no matter what the score is on the test, the AP class helps students improve content mastery in math and physics. Research has shown that the key to success is for students to take AP classes and the exam; students who do this earn a higher GPA and receive college credit and are more likely to succeed in college than their peers who do not enroll in AP classes (Smerdon & Borman, 2012).

Connifey-Marlin (2016) conducted a study to examine high school student ACT composite scores compared to how many AP classes they took. She studied 397 eleventh grader's ACT scores from the 2014-2015 school year. The students were in three groups: (a) 242 juniors who did not take any AP classes, (b) 66 juniors enrolled in one AP class, and (c) 89 juniors enrolled in two or more AP classes. Using these groups of students, Connifey-Malin analyzed the ACT plan data from the fall of their tenth-grade year and the ACT subtest scores from their junior year. The results showed that the composite mean from each group increased as students participated in more AP classes: Group 1 composite mean was 20.44, Group 2 mean was 21.43, and Group 3 mean was 22.19. Through analyzing each subtest, there was significant growth from Group 1 to Group 3. She concluded her study by noting that student ACT scores aligned with how many AP classes they had taken (Connifey-Marlin, 2016).

Hertberg-Davis and Callahan (2008) conducted a qualitative study "To examine and describe student's perceptions of AP courses and IB programs to determine the appropriateness of these programs for high-end learners from a variety of populations" (pp. 200-201). They gathered data from 23 high schools in seven states and interviewed and observed 200 teachers, 300 students, 25 administrators, and eight program

coordinators. One teacher said,

> Most students enrolled in these courses believed that the challenging level, quality of teachers and learning environments within them were far superior to other courses they had taken in high school and believed that taking these courses would provide benefits in the future. (Hertberg-Davis & Callahan, 2008, p. 202)

One IB student stated, "She chose the IB program at her school because she wanted to be challenged and did not want to be subjected to the 'busywork' characteristics of other classes" (Hertberg-Davis & Callahan, 2008, p. 202). Another IB student said,

> I enjoy what I do and it just seems like the challenge is worth taking. I think it is fun to go over and beyond what the regular… to go deeper into the material where other classes wouldn't provide it if it were regular. (Hertberg-Davis & Callahan, 2008, p. 202)

An AP student said, "In her regular classes students were not required to think, as opposed to AP courses, in which thinking was emphasized" (Hertberg-Davis & Callahan, 2008, p. 202). Another AP student stated, "The type of work that you do in the AP classes is more thinking critical, and the regular class is you just read questions, look for the answer in the book and you really don't do much thinking" (Hertberg-Davis & Callahan, 2008, p. 202). Students in these classes were pleased with the challenging work but not the heavy workload that was required. These students as a group "identified two key factors characterizing the improved learning environment: (a) the opportunity to learn with students of similar ability, motivation, academic interest and (b) the adult like relationships they have with their IB and AP teachers" (Hertberg-Davis & Callahan, 2008 p. 204). Students in IB and AP classes believed the sacrifices were beneficial for them to receive a solid high school education (Hertberg-Davis & Callahan, 2008).

College Board Study

The College Board conducted a study through Hart Research Association studying high school graduates to see if high school prepared them for college. The board studied 1,500-2010 graduates. Three major themes emerged from this study:

> 1. High school requirements are too easy and school curriculums don't make enough academic demands on students; 2. Students should be required to take more math and science courses - that decision shouldn't be left to them; 3. As a result of lax demands, high school graduates aren't sufficiently prepared to handle many college courses. (Stern, 2012, para. 3)

The results from this study indicated that 80% of high school graduates would like the curriculum to be strengthened to incorporate rigorous assignments and assessments (Stern, 2012). The students also said that the AP and IB courses offered a more enriching education than standard high school classes and provided them with the necessary tools to be successful in college (Stern, 2012). Forty percent of students wished they had taken more math classes, and 30% wished they had taken more science classes to be successful in college (Stern, 2012).

Worksheets Don’t Grow Dendrites Strategies

Tate (2016) provided 20 strategies that are researched based and incorporate different multiple intelligences. Examples of these strategies include the following:

Brainstorming and Discussion: Research shows that students learn and retain 90% of what they say or discuss with others (Dale, 1969). The benefits of utilizing small group discussions supplement the learning taking place in the classroom, help the brain remember content, and provide students the opportunity to work with peers to solve problems and analyze content at a deeper level (Alexopoulou & Driver, 1996). Students

become actively engaged in the learning process when they create higher order questions because they are interested in the topic (Report of the National Reading Panel, 2000).

Drawing and Artwork: Students with learning disabilities increase their critical-thinking skills through drawing figures (Jing, Yuan, & Liu, 1999). Visualizing vocabulary allows students who are spatial learners to draw a representation of the definition of a vocabulary word (Silver, Strong, & Commander, 1998).

> Based on 1999 and 2000 test results, students who took studio art, art appreciation, and art design scored forty-seven points higher on the mathematics and thirty-one points higher on the verbal portion of college entrance exams than students who were not enrolled in visual art classes. (Tate, 2016, p. 10)

Field Trips: It is critical for students to understand the connection between what they are learning in the classroom and life experiences to connect new information to prior knowledge (Lieberman & Miller, 2000). "Results of numerous research studies overwhelmingly concluded that experiences outside of the classroom consistently provides significant gains in both cognitive and affective achievement for all students, or all grade levels, and particularly for students categorized as at-risk" (Tate, 2016, p. 16).

Reciprocal Teaching and Cooperative Learning: This strategy provides students with the opportunity to work in small groups to teach and learn from each other, which is essential for 21st century learners (Uchida, Cetron, & McKenzie, 1996). Research shows that students who struggle with learning a skill or concept understand the information when another student explains the material versus a teacher (Kohn, 1999). Forty middle school students participated in a study, and the results showed that their performance on quizzes improved dramatically after they participated in reciprocal peer tutoring (Malone & McLaughlin, 1997).

Project-Based and Problem-Based Instruction: This strategy "Links new information to previously stored information that enable students to realize that they already have some knowledge about the new topic and that the activity is relevant to their personal lives" (Tate, 2016, p. 76). Through relating real-life experiences to new information, students retain the information.

Graphic Organizers, Semantic Maps, and Word Webs: Graphic organizers provide students a tool to connect and chunk information (Parry & Gregory, 1998). Concept maps incorporate both visual and verbal strategies, which enhances learning (Sousa, 1995). "Ten years of research indicate that graphic organizers constructed before reading facilitate comprehension for elementary students while graphic organizers constructed after reading result in improved vocabulary and comprehension scores for secondary students" (Tate, 2016, p. 28).

Self-Efficacy/Teacher Efficacy

"Rigor is the result of work that challenges students' thinking in new and interesting ways" (Gerstein, 2017, para. 3). These strategies and programs tie into self-efficacy and teacher efficacy. Self-efficacy "is the optimistic self-belief in our competence or chances of successfully accomplishing a task and producing a favorable outcome" (Akhtar, 2008, para. 1). Gandhi grasped the idea of self-efficacy and the importance self-efficacy in one's own life. He said, "Your beliefs become your thoughts. Your thoughts become your words. Your words become your actions. Your actions become your habits. Your habits become your values. Your values become your destiny" (Akhtar, 2008, para. 3).

Albert Bandura developed the idea of self-efficacy and defined self-efficacy as "People's judgments of their capabilities to organize and execute course of action

required to attain designated types of performances" (Artino, 2012, p. 4). There are four main sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and emotional and physiological states. Mastery experience relies on past experiences that were successful to increase one's self-efficacy, while failures decrease one's self-efficacy. Vicarious experience is when someone observes others and they believe they can be successful through hard work and dedication (Artino, 2012). Verbal persuasion focuses on others influencing one's self that they have the necessary skills to master a skill or activity (Akhtar, 2008). Emotional and physiological state focuses on how you perceive yourself based on your emotional and physiological situations (Akhtar, 2008).

Self-efficacy focuses on one's own belief of obtaining goals, while teacher self-efficacy is the teachers own belief of their "ability to plan instruction and accomplish instructional objectives" (Gavora, 2010, p. 2). Teacher efficacy arose over 30 years ago when researchers at the Rand Corp studied the following two concepts: Teachers are not in charge of student motivation, it comes from the home environment; and teachers who try hard can reach all students, even students who are not motivated to learn. Teachers were asked to express how they agree or disagree with the two concepts, which is how teacher efficacy was developed (Protheroe, 2008). Research was conducted on teacher efficacy, and teachers with strong teacher efficacy had the following attributes: They had a high level of organization, willing to try new ideas and opportunities. To increase student success, they do not refer challenging students to the exceptional needs program; they "are more persistent and resilient when things do not go smoothly and are less critical of students when they make errors" (Protheroe, 2008, p. 43). The main question is how do teachers develop a high standard of teacher efficacy? Mastery experience

plays a large role in teacher efficacy when they first begin in education through student teaching and in their first few years of teaching. A.W. Hoy built upon Bandura's work, and he believed that vicarious experiences and social persuasion play a role in teacher efficacy (Protheroe, 2008).

The RAND Foundation was the first group to conduct research on teacher efficacy over 25 years ago. They created two self-efficacy questions in a survey that examined the success of reading programs and then again through studying the cost of instructional programs. The results showed a positive connection between teacher efficacy and student success in the classroom (Gavora, 2010).

The Teacher Efficacy Scale (TES) measures teacher efficacy through a questionnaire that consisted of 30 questions. The survey now has 16 questions due to a revision. Other researchers have revised the 16 questions down to 10. The TES is broken down into two dimensions: Personal Teaching Efficacy, the teacher's belief of their abilities to be an effective teacher; and General Teaching Efficacy, the belief that teaching affect students positively. The results showed that

> Teachers who scored high on both dimensions were less likely to criticize a student following an incorrect answer and more likely to persist if a student failed a learning task initially. High-efficacy teachers also were more likely to divide a class for small group instructions as opposed to whole-class instruction. (Gavora, 2010, pp. 4-5)

Summary

According to Gojak (2013),

> Rigor involves all partners in teaching and learning. Teachers must consider rigor in planning lessons, tasks, and assignments. Rigorous lessons build on and extend

> prior knowledge. They encourage productive struggling. Although the objective of a lesson should be clear in the teacher's mind, the lesson should not focus on one correct path to a solution or even one correct answer. (para. 5)

Chapter 3 focuses on the methodology of the study on rigor. The participants for the study work at the three comprehensive high schools in one rural school district in eastern North Carolina. The teachers completed two online surveys that focused on the importance of rigor and teacher self-efficacy. The School Improvement Team at each school participated in interviews to analyze trends in the county.

Chapter 3: Methodology and Procedures

Introduction

"Every obstacle is destroyed through rigor" (Leonardo da Vinci, as cited in The Painter's Keys, n.d., para. 80).

Educational stakeholders have raised the bar for a more rigorous curriculum and testing in order for students to be successful in college and in the workforce (Hess, 2013).

> A rigorous curriculum is focused, coherent and appropriately challenging. The social research group MDRC defines academic rigor as a demanding yet accessible curriculum that engenders critical-thinking skills as well as content and knowledge. Students should raise questions, think, reason, solve problems and reflect. (Hechinger Institute, 2009, p. 4)

Purpose

The purpose of this study was to define what rigor looks like in the three comprehensive high schools in a rural school district in eastern North Carolina and provide teachers with workable strategies that will enhance rigorous classroom environments, which will enable students to be college and career ready when they graduate high school.

Research Questions

1. What research-based strategies are teachers using to incorporate rigor into their classrooms to prepare students to be college and career ready?
2. What professional development do teachers need to incorporate rigor successfully in their classroom?
3. What is the teacher's comfort level with implementing rigor in their

classroom?

Context

According to the 2016 Census, the county chosen for this study had a population of 81,671; 80.2% of adults over the age of 25 received their high school diploma, while only 18.6% of people earned a bachelor's degree or higher. The county consists of 26 schools: 14 elementary schools, six middle schools, three comprehensive high schools, two early colleges, and one alternative school. The student population was 45% African-American, 31% Caucasian, and 24% other. Fifty-four percent of students received free or reduced lunch. In the 2016-2017 school year, the county graduated 836 students: 28.3% went on to a 4-year college; 10% attended a private 4-year university; 38.6% attended community college; 7% joined the military; and 14% went straight to the workforce.

A recent publication entitled, *Roadmap of Need 2018*, published by the Public School Reform (2018), analyzed each county in the state. The data from this study showed that only 51.30% of third-grade students were reading at grade level, 50% of Math l students were proficient, and the ACT composite score was a 17.80. This study also presented findings such as graduation rate (73%) and short-term suspension rate (383.53 per 1,000 students; Public School Reform, 2018).

Research Design

The candidate wrote a letter to the superintendent (Appendix A) requesting permission to conduct the study in the county and completed the online form (Appendix B) for requesting research. The superintendent replied through email that permission (Appendix C) was granted. Next, the candidate wrote a letter to the principals (Appendix D) explaining the study and asking for permission to conduct the study in their schools. Then the candidate wrote a letter to the teachers (Appendix E) explaining the study and

how to complete the survey questions. A letter was also written to the School Improvement Team representatives (Appendix F) explaining the interview process.

The researcher utilized the results from the two surveys with the entire population of teachers at the three comprehensive high schools in the county. The School Improvement Team at each school participated in an interview that had 12 questions. The results from these instruments provided data that answered the three research questions for this study.

Instruments

The National Association of Secondary Schools created a survey Middle Level Academic Rigor and Support Self-Assessment Tool for teachers to rate themselves on their knowledge and comfort level of rigor in their classroom. The candidate emailed asking permission to use the survey (Appendix G), and permission (Appendix H) was granted. The results gained from the survey supplied answers for Research Question 1. The survey consisted of 48 questions (Appendix I) using the Likert scale of 1-5; 1 representing not important, and 5 representing very important. Each question analyzed two domains: the importance of rigor at their school, and does rigor exist at their school. The National Association of Secondary Schools gave the candidate permission to edit the survey. The candidate narrowed the questions down to 22 questions for the survey and 12 questions (Appendix J) for the interview. The 12 interview questions linked to the survey questions. To gain information for Research Question 2, Interview Questions 6 and 7 addressed the professional development opportunities that the participants felt would increase knowledge about rigor and strategies for implementation in the classroom. The remaining 10 interview questions provided insight for Research Question 3 that focused on the comfort level of implementing rigor.

The second instrument used was the Teacher Sense of Efficacy Scale created by Tschannen-Moran and Woolfolk-Hoy (2001). The candidate completed the online permission form to use the survey and was granted permission (Appendix K). The survey (Appendix L) consisted of 15 questions using the Likert scale of 1-5; 1 representing nothing, and 5 representing a great deal. The self-efficacy survey provides understanding of teacher beliefs in themselves to provide instruction on a deeper level. The results gained from the survey supplied the answers for Research Question 3 that focused on the comfort level of implementing rigor.

Data Collection

The data for this study was a mixed-method approach. The candidate conducted surveys with the teachers at the three high schools in the district using Google Forms. A week before receiving the surveys, the educators received an email explaining the importance of the study and that it was an anonymous survey. One week later, the educators received a second email with the hyperlinks for the two online surveys. A week later, the educators received a follow-up email regarding completing the surveys. To validate the quantitative piece, the candidate used qualitative data through conducting face-to-face focus group interviews. A week before the interviews, the participants received an email explaining the purpose of the interview, the interview questions, and that the interview was voluntary and anonymous. Teachers received a second email the day before the interview to remind everyone of the interview. The participants received a written copy of the interview questions when they entered the conference room at their school. Each session began by the candidate reading the instructions from the Interview Introduction Sheet (Appendix M). The focus groups consisted of stakeholders who are on the School Improvement Team. Each year, the staff

elects the School Improvement Team. This team consists of a teacher from each department, a counselor, administrators, and parents. The administrators and parents were not part of the interview. The candidate digitally recorded and transcribed the interviews.

Data Analysis

The candidate used chi-square goodness of fit to examine three hypotheses. For the Teacher Sense of Efficacy Scale survey, the null hypothesis is teachers believe they have high teacher efficacy, which promotes college and career ready students. The alternate hypothesis is that teachers believe they do not have high teacher efficacy, which promotes college and career ready students. There are two hypotheses for the Middle Level Academic Rigor and Support Self-Assessment Tool survey: One focused on the importance or rigor; and one focused on does rigor exist in schools. The null hypothesis for is rigor important is that it is important for schools to be rigorous enough to produce college and career ready students. The alternate hypothesis is that it is not important for schools to be rigorous to produce college and career ready students. The null hypothesis for does rigor exist in school is that rigor does exist in schools. The alternate hypothesis is that rigor does not exist in schools. The candidate analyzed the three interviews to determine the existence of common themes and keywords among the three high schools. The transcripts were analyzed to identify the existence of outliers between the schools.

Population

The participants for this study all teach in one rural eastern school district in North Carolina. The candidate surveyed teachers from the three comprehensive high schools, which consist of 194 staff members. All teachers had access to participate in the surveys. The surveys were created in Google Forms and emailed to all high school

teachers, and all results were anonymous. The school district has three comprehensive high schools which consist of 24 history teachers, 26 math teachers, 26 English teachers, 22 science teachers, 12 foreign language teachers, 35 CTE teachers, 15 physical education teachers, 18 exceptional children teachers, five JROTC teachers, and 11 teachers who teach the arts (band, dance, chorus). Of the 194 teachers, 21 had 0-3 years of experience, 59 had 4-10 years of experience, 47 had 11-15 years of experience, 45 had 16-20 years of experience, 38 had 21-25 years of experience, 25 had 26-30 years of experience, and 13 had 31 or more years of experience.

In addition, the candidate conducted face-to-face interviews with the three School Improvement Teams. The teams consist of a teacher from each department, a counselor, administrators, and parents. The administrators and parents were not part of the interview.

Summary

The researcher's goal for this study was to determine which research-based strategies teachers use to incorporate rigor into their classroom, what professional development do teachers need to incorporate rigor successfully, and what is the teacher's comfort level with implementing rigor into their classroom. The study accomplished its goals through teachers completing two online surveys and the School Improvement Team participating in a face-to-face interview. The results from the surveys were analyzed through chi-square goodness of fit to see if the null hypothesis would be rejected or not rejected. The researcher compiled the data from the surveys into bar graphs and analyzed the qualitative data from the three interviews looking for trends and outliers. The results successfully answered the three research questions.

Chapter 4: Data Presentation and Analysis

Introduction

"A quarter-century ago, the nation was transfixed by the question, *Where's the beef?* Now, the question we should be asking ourselves about our nation's schools is, *Where's the rigor?* or, *Where's the academic beef?*" (Strauss, 2010, para. 1-3).

"Far too many students enter college without the basic content knowledge, skills or habits of mind needed to perform college level work successfully" (Venezia & Jeager, 2013, p. 118).

Chapter 4 analyzes the results from the three comprehensive high schools in a rural school district in eastern North Carolina. To complete this study and answer the three research questions, the candidate conducted interviews with the school leadership team and surveyed teachers from these three schools. The research questions for this study included the following:

1. What research-based strategies are teachers using to incorporate rigor into their classrooms to prepare students to be college and career ready?
2. What professional development do teachers need to incorporate rigor successfully in their classroom?
3. What is the teacher's comfort level with implementing rigor in their classroom?

This study took place in a rural school district in eastern North Carolina. All three comprehensive high schools participated in the study and all have earned an accountability grade of a C as determined by NCDPI's annual performance report card. The schools serve 3,250 students and employ 194 teachers to include 23 history teachers, 26 math teachers, 26 English teachers, 22 science teachers, 12 foreign language

teachers, 35 CTE teachers, 15 physical education teachers, 18 exceptional children teachers, five JROTC teachers, and 11 teachers who teach the arts (band, dance, chorus). Of the 194 teachers, 21 had 0-3 years of experience, 59 had 4-10 years of experience, 47 had 11-15 years of experience, 45 had 16-20 years of experience, 38 had 21-25 years of experience, 25 had 26-30 years of experience, and 13 had 31 or more years of experience.

Data Collection

The candidate collected data using two surveys and interviews. Eighty teachers completed the Teacher Sense of Efficacy Scale survey, and 97 teachers completed the Middle Level Rigor and Support Self-Assessment Tool. The candidate uploaded the survey questions in Google Forms. The candidate created the surveys in Google Forms and emailed the teachers the links to complete the surveys. The survey window was open for 2 weeks. The candidate sent an email explaining the survey and two follow-up emails regarding completing the surveys. The candidate compiled the data in Google Sheets.

Thirty members of the three high school's School Improvement Teams participated in interviews. The interviews took place in the conference room at each of the three comprehensive high schools. The interviews lasted approximately one hour. The candidate videoed and transcribed each interview using Google Docs to analyze the data.

Data Analysis

Middle Level Academic Rigor and Support Self-Assessment Tool survey. The two surveys used a Likert scale with a rating of 1-5. The Middle Level Academic Rigor and Support Self-Assessment Tool survey consisted of 21 question in two parts. The first part focused on "Is rigor important at your school," with 1 representing not

important and 5 representing very important. The second part consisted of "Does rigor exists at your school," with 1 representing nonexistent and 5 representing fully exists as an ongoing practice. To analyze the data in percentages, the candidate grouped responses of 1 and 2 together as nonimportant or nonexistent, a score of 3 as neutral, and a score of 4 and 5 as very important or fully exists. The chi-square goodness of fit analyzed the data to see if the results were significant or were representative of random results. The null hypothesis represented that it is important for schools to be rigorous enough to produce college and career ready students. The alternative hypothesis represented that it is not important for schools to be rigorous enough to produce college and career ready students. Tables 1-3 provide results from the chi-square goodness of fit that was used for statistical data and interpretive results.

Table 1

Is Rigor Important at Your School?

	Observed	Expected	Difference	Difference Sq.	Diff. Sq. / Exp Fr.
1	103	91	12.00	144.00	1.58
2	271	274	-3.00	9.00	0.03
3	560	566	-6.00	36.00	0.06
4	475	475	0.00	0.00	0.00
5	418	421	-3.00	9.00	0.02
					1.700

Note. The Chi^2 value is 1.7. The *p v*alue is 0.791. The result is not significant at p=≤0.05.

The chi-square goodness of fit test states that the results from the rigor survey focusing on "Is rigor important" were not random results. There was no rejection of the null hypothesis.

The second part of this survey focused on "Does rigor exist in schools?" The chi-square goodness of fit analyzed the data to see if the results were significant or random

results. The null hypothesis was that rigor exists in schools, which promotes college and career ready students. The alternative hypothesis was that rigor does not exist in schools.

Table 2

Does Rigor Exist at Your School?

	Observed	Expected	Difference	Difference Sq.	Diff. Sq. / Exp Fr.
1	122	93	29.00	841.00	9.04
2	289	279	10.00	100.00	0.36
3	621	577	44.00	1936.00	3.36
4	513	484	29.00	841.00	1.74
5	317	429	-112.00	12544.00	29.24
					43.734

Note. The Chi^2 value is 43.734. The *p* value is < 0.001. The result is significant at p=≤0.05.

The chi-square goodness of fit test states that the results from the rigor survey focusing on "Does rigor exist" were random results and was rejected.

Teacher Sense of Efficacy Survey

The Teacher Sense of Efficacy Survey consisted of 15 questions with a response of 1 representing none and 5 representing a great deal. To analyze the data in percentages, the candidate grouped responses with 1 and 2 together as very little influence, a response of 3 as some influence, and responses of 4 and 5 as having a great deal of influence. The chi-square goodness of fit analyzed the data to see if the results were significant or representative of random results. The null hypothesis was that teachers believe they have high teacher efficacy, which promotes college and career ready students. The alternative hypothesis was that teachers believe they do not have high teacher efficacy, which promotes college and career ready students.

Table 3

Teacher Sense of Efficacy Survey

	Observed	Expected	Difference	Difference Sq.	Diff. Sq. / Exp Fr.
1	22	14	8.00	64.00	4.57
2	144	129	15.00	225.00	1.74
3	432	429	3.00	9.00	0.02
4	573	572	1.00	1.00	0.00
5	258	285	-27.00	729.00	2.56
					8.896

Note. The Chi^2 value is 8.896. The *p* value is 0.064. The result is not significant at p=≤0.05.

The chi-square goodness of fit test states that the results from the efficacy survey were not random results. There was no rejection of the null hypothesis.

Results

Research Question 1: What research-based strategies are teachers using to incorporate rigor into their classrooms to prepare students to be college and career ready? The Middle Level Academic Rigor and Support Self-Assessment Tool survey provided insight to this research question, which consisted of two parts, "Does rigor exist in your school" and "Is rigor important at your school?" For Research Question 1, the candidate analyzed the section, "Does rigor exist at your school?" The participants answered the questions using a Likert scale with responses of 1-5, 1 being nonexistent and 5 indicating rigor fully exists as an ongoing practice.

Question 13 asked, "Do teachers effectively use project-based learning to foster students' success?" Thirty percent of teachers said this was nonexistent, 42% of teachers were neutral, and 28% of teachers said project-based learning fully exists.

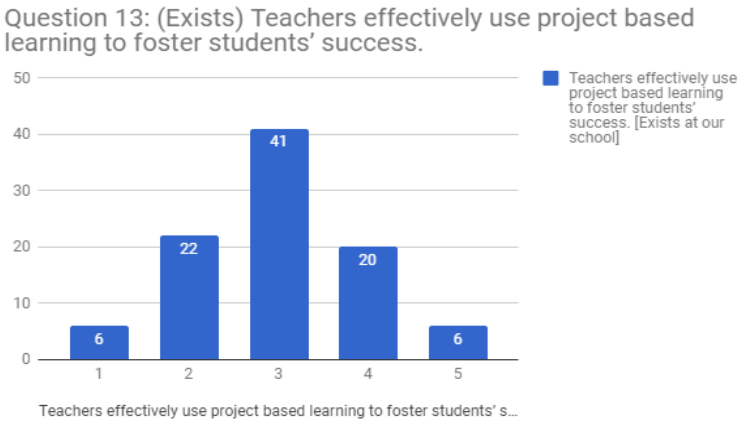

Figure 1. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Twenty-four percent of teachers said it is not important to implement project-based learning, 39% of teachers were neutral, and 38% of teachers felt that it is very important to implement project-based learning.

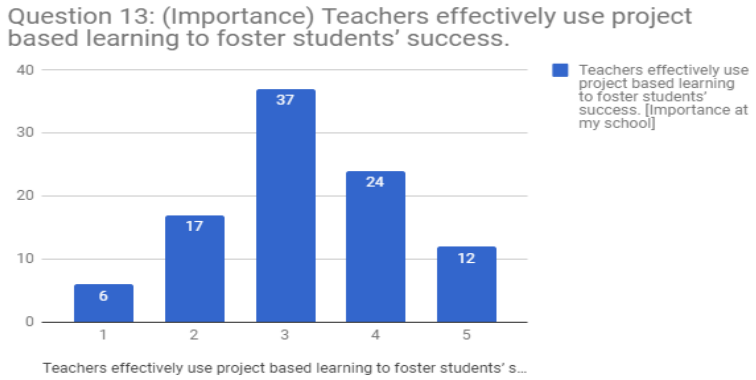

Figure 2. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Question 15 stated, "Do teachers consistently differentiate instruction in ways that engage all students based on their interests, academic needs and learning styles?" Nineteen percent of teachers stated that differentiation does not exist, 39% of teachers

were neutral, and 41% of teachers stated differentiation is fully implemented in their school.

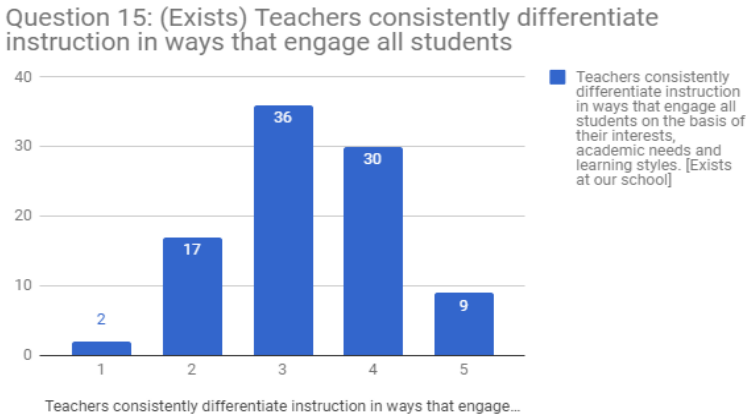

Figure 3. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Thirteen percent of teachers said it is not important to differentiate instruction, 30% of teachers were neutral, and 58% of teachers felt that it is very important to differentiate instruction.

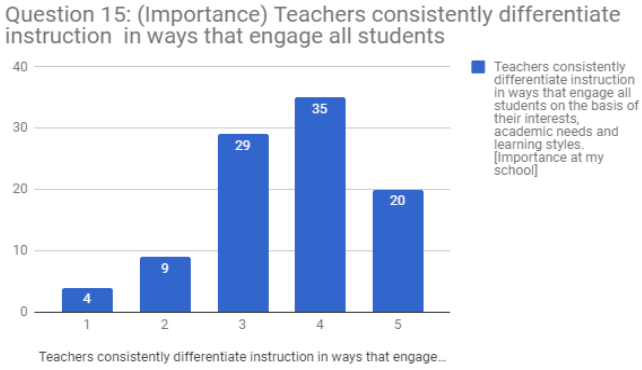

Figure 4. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Question 16 asked, “Does the school provide small-personalized learning

environments in which teachers assess their students' learning styles to provide the most effective instructional strategies?" One percent of teachers said this does not exist, 34% of teachers were neutral, and 24% of teachers stated personalized learning environments fully exist at their school.

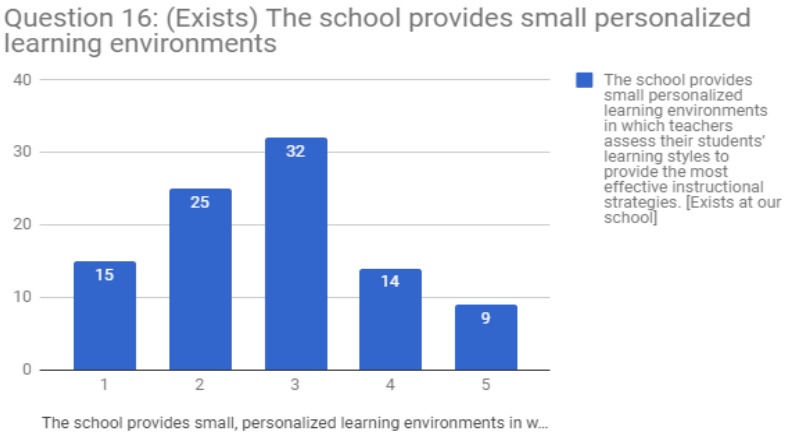

Figure 5. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Thirty percent of teachers felt that it was not important at their school to provide personalized learning environments, 27% of teachers were neutral, and 43% of teachers felt that it was very important.

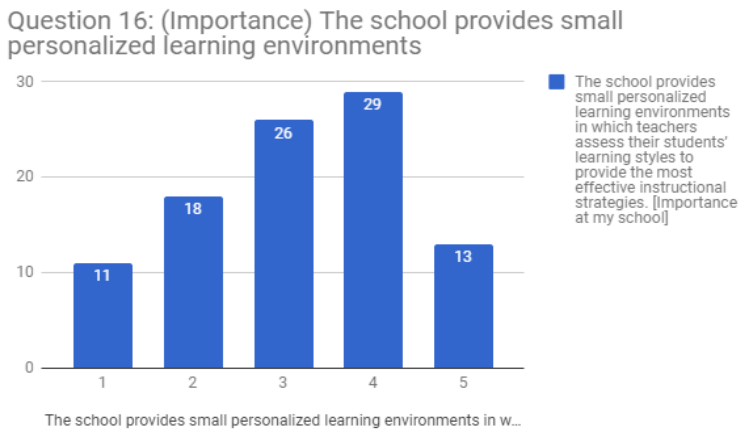

Figure 6. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Question 7 asked, "Does the school identify students who are struggling academically and provides them with extra academic support?" Thirty percent of the surveyed teachers stated that the school does not provide students with extra academic support, 33% of teachers were neutral, and 37% of teachers stated that students receive academic support and it is in full existence at their school.

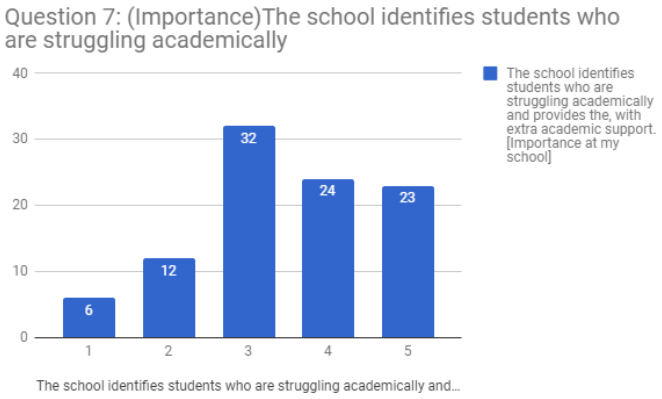

Figure 7. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Eighteen percent of teachers stated that the school does not provide students with

extra academic support, 33% of teachers were neutral, and 49% of teachers stated that students receive academic support and it is important at their school.

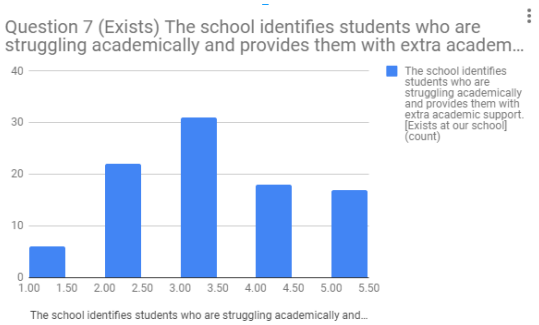

Figure 8. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Question 18 asked, "Does the school provide programs to assure the successful mastery of English language and numeric skill?" Twenty-five percent of teachers said that the school does not provide programs to help students master the English language and numeric skills, 46% of teachers were neutral, and 27% of teachers stated that there are programs that are fully implemented to help with the English language and numeric skills.

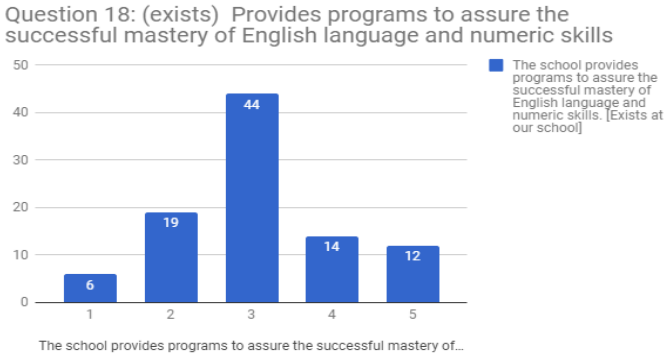

Figure 9. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Twenty percent of teachers felt that it is not important at their school to assure success of the English language and numeric skills, 43% of teachers were neutral, and 37% of teachers felt that it is very important to assure success of the English language and numeric skills.

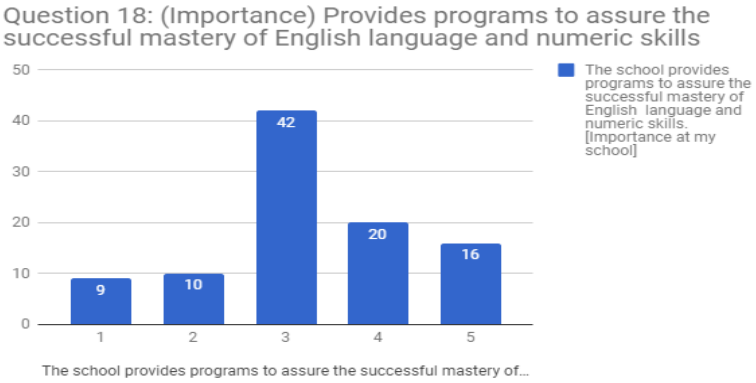

Figure 10. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Question 19 stated, "The school provides personalized learning by establishing academics for small school learning settings." Forty-two percent of teachers said that the school does not provide personalized learning, 34% of teachers were neutral, and 24% of teachers said personalized learning fully exists.

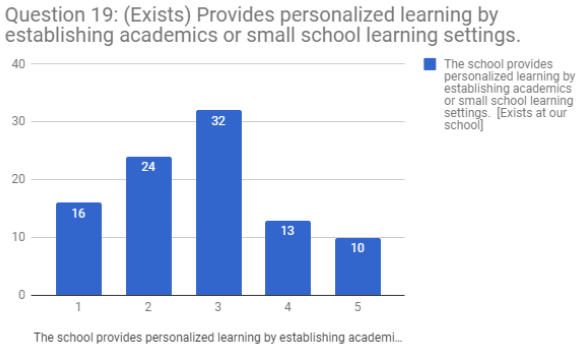

Figure 11. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

Thirty-five percent of teachers felt that it is not important at their school to provide personalized learning, 34% of teachers were neutral, and 31% of teachers felt that it was very important to provide personalized learning.

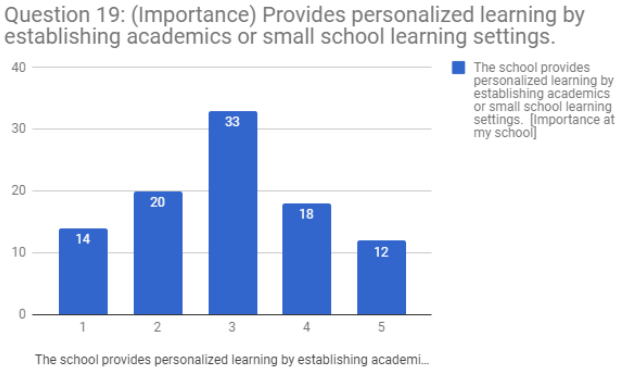

Figure 12. Reference to the Middle Level Academic Rigor and Support Assessment Tool Survey.

The School Improvement Teams for all three comprehensive high schools participated in interviews to gain insight into how they incorporate rigorous strategies into their classrooms. Table 4 provides strategies that teachers integrate into their lessons to increase learning. Several strategies were repeated consistently throughout the three interviews. Five of the strategies were mentioned more than 10 times; AP classes (18 times), IB classes (14 times), incorporating technology (15 times), teaching critical thinking skills (11 times), and CTE classes (12 times).

Table 4

Strategies that Teachers Integrate into Their Lessons to Increase Learning

AP classes (18 times)	Higher order thinking (8 times)	Teach critical-thinking skills (11 times)	Performance based task assessments (3 times)
IB (14 times)	Essential questions (9 times)	Inquiry-based learning (6 times)	Differentiation (9 times)
Learning Teams (4 times)	Collaboration (5 times)	Certification for job skills (3 times)	Ask open-ended questions (9 times)
AVID (8 times)	Anchor charts (5 times)	Modeling (7 times)	CTE classes (12 times)
Incorporating technology (15 times)	Socratic Seminars (3 times)	Link learning to real-world situations (5 times)	Hands-on Labs (5 times)

Research Question 2: What professional development do teachers need to incorporate rigor successfully in their classroom? Interview Questions 6 and 7 aligned to this research question. Question 6 asked, "How does your school provide opportunities for teachers to strengthen their existing content knowledge and instructional delivery capacity?" All 30 teachers interviewed agreed that there is a lack of professional development that focuses on content knowledge. One teacher said, "There is not a lot going on for content knowledge in the county, you have to go out of the county to receive training that focuses on content knowledge. There is a ton of in-county training for instructional delivery." The county has provided intensive Learning Focus training for teachers who teach CTE and teachers who teach Math l, English 2, and biology because

these classes are tied to the end-of-course (EOC) testing, which is part of the school accountability grade. Learning Focus is the conceptual framework that the teachers use to create lesson plans. The county, along with each school, provides training on different components of the Learning Focus Lesson Plans template such as essential questions, anchor charts, and summarizing. Another teacher stated, "On-site teachers who are well versed with Learning Focus train teachers on how to create Learning Focus Lesson Plans to ensure that instruction is being presented appropriately for students in the class." Due to budget cuts, only two of the three high schools have Instructional Technology Facilitators (ITFs) who provide professional development training using an array of technology. One of the PE teachers stated, "There is no professional development for PE teachers, yet we teach one third of the population." One of the CTE teachers stated, "I cannot remember any CTE teacher who wanted to attend summer conference that wasn't given the money to attend, which helps us all stay on top of the changes in our curriculum and it changes so much." One of the JROTC officers stated, "We attend yearly conferences and collaborate with our local peers, which helps us maintain our standards." One of the teachers explained how professional development is designed for their school by stating,

> The School Improvement Team receives feedback from each department on what kind of professional development they need. The leaders bring it back to the team, and they discuss and design professional development for the year based on the needs of the teachers.

Question 7 asked, "Why is it important for teachers to participate in professional development activities that prepare them to teach accelerated courses?" One teacher stated,

> Year to year, the standards change on what colleges are looking for based on changes in society, particularly, I am thinking of the changes in technology. If you have been in a classroom for twenty years and all of a sudden, you have technology such as Chromebooks, iPads, extensions on Chrome that we use and students learn how to use them faster than most of us do. In order to be able to deliver effective instruction that will engage the students, we have to be able to keep up with the changes in technology to stay updated, especially when you are teaching accelerated courses. You have students who are ahead of the learning curve. They are looking for something to engage them in the accelerated courses. The standards are always changing.
>
> You have to know what the changes are, know how to teach to the changes and teach to the changes so you can prepare them for success. I think if you don't get training to address these changes, you just become stagnant and students are not prepared.

Another teacher stated, "To make sure we meet the need of all our students, we must be as smart as them." An IB teacher explained,

> It is invaluable to have people who understand the ins and outs of the test and serve as resources and to also be able to gain insight from the experts. If you are going to teach these classes and students participate in the exam, it is imperative to understand what students must accomplish in the classroom to get them ready for the exam. You have to understand the writing standards and the outside work students are required to do, you have to learn what you need to do for the student to be successful.

Research Question 3: What is the teacher's comfort level with implementing

rigor in their classroom? Ten of the interview questions aligned with this question. Question 1 asked, "In which ways does your school offer a challenging curriculum that engages all students?' One teacher stated, "There are not prerequisites for students to take honors classes. If students want to challenge themselves or their parents want them challenged, they can sign up for the class. Teachers also recommend students for the honors program." All three schools have honors and AP classes, while one school in the district has IB classes and any student in the district can attend that school for the IB program.

Schools offer honors classes in all content areas and in the arts. One teacher explained that the district has a partnership with the community college, and juniors and seniors are able to take college-level courses and earn high school and college credit. The CTE and business classes offer classes where students can earn a certificate to make themselves marketable for the workforce such as Serv Safe and Microsoft Word. One teacher stated,

> What does challenging curriculum mean? It can mean many things, I think of AP/IB, those higher-level courses, but reading here is tough. Literacy is tough here even in the standard classes. You can offer a challenging or rigorous curriculum without offering those higher-level courses, but you also have to engage all our students as well. They do not have enough classes to meet their needs so I think the question is,
>
> > How do we meet the needs of the students at the lowest level, offering them the resources they need at their level, but also not forgetting about the few who are at the top that do need a challenging curriculum? How do we meet all those needs and I don't think it is possible with the budget that

we have?

Another teacher stated,

> We need to challenge all our students, not only the high level students, but the low level students as well. We can challenge and give rigor to the low performers even though it is a different type of rigor that you give to an AP class. Empathizing with and engaging students is important at every level.

There were also some concerns stated by a few teachers. One concern was that at one school, there were no AP math or science classes due to the budget cuts. Another concern was student placement in honors classes who were not prepared for the high expectations or the workload.

Question 2 asked the respondent to "Describe how your school has established a rigorous core curriculum that reflects secondary, post-secondary, and real-world readiness standards." One teacher stated,

> I think we do a fantastic job offering real world courses. Our CTE classes are phenomenal, but we are doing a disservice for students who have secondary and postsecondary aspirations. I am not just talking about AP or IB courses, because we do not have the population for that; however, we do have a perfect population for the AVID program. They are not IB students, they are middle level students. AVID is a program that could save the school, and we are dwindling it down to two classes. We are taking the AVID classes that used to be yearlong courses and stripping them down to one semester. I do not think our school provides a rigorous curriculum for preparing students regarding secondary and post-secondary education. It is not just the top of the top, it is our middle level students that need to go to college too and we are doing them a disservice.

A science teacher provided an example:

> The science state standards require students to think critically to solve real world problems. In physical science, they are provided with two of the three sources of information and they have to be able to manipulate a formula to come up with the third part.

Another teacher stated that students in honors English are learning to write papers that will help prepare them for college and learning how to use citations effectively. A common trend among the schools was to incorporate technology into the classroom where students work with decoding, building robotics, and using the green screen. The schools also provide students the opportunity to participate in job shadowing and internships for the career fields that interest them.

Question 3 asked, "In which ways does your school provide a strong mathematics program that meets national standards and does not award promotion credit for general or remedial math offerings?" A math teacher explained the following:

> To the extent of NC standards aligning to National standards, we, on a regular basis unpack the NC standards. We use those as the guidelines for our individual math courses. Every time there is a change to a NC standard, we are on top of it. The major tool we use is (Accelerated Math), which is aligned to National Math standards. The NC standards and National standard math classes are only awarded for math credit not foundational classes; it is just an elective credit, but not a math credit.

A JROTC officer responded by stating, "The ASVAB scores are higher due to the strong mathematical program." The teachers explained that the schools offer higher level math that is rigorous and prepare students for college to include Calculus, AP Calculus, IB

Math 1 and 2, AP Statistics, and Math 171 and 172, which are community college level math classes. Remediation and interventions are provided to help students succeed in math to ensure they are prepared for the test, graduation, and life after graduation. One of the teachers had a student who attended a high school in the county and stated, "I had a child that went through the mathematical program who is now at the university level and math was never his weak point, but he has not been surprised by any math he has seen in college."

Question 4 asked, "In which ways does your school provide a strong science program that meets applicable content and laboratory standards?" A science teacher stated that they meet content standards but not the laboratory standards. She further explained this by saying,

> As far as lab standards, we do not have a separate lab for the students. We used to have that but it had to be converted into a classroom so we don't have individual labs. Most teachers are doing labs in their classroom, but it is not up to standards: no eyewash station, no shower, do not have gas except in the chemistry lab that is now a classroom. Our biggest problem, like most things, is the budget; we do not have the funding for chemicals and lab equipment. As far as our content, we are right where we need to be. We follow the Standard Course of Study and make sure the students are ready for their testing, but for labs, most teachers have resorted to things they can go buy at the grocery store or Wal-Mart. We just don't have the lab or lab equipment here.

Another science teacher explained that they do have a laboratory, and teachers are able to sign up and use the lab as needed. One teacher collaborates with the local electrical company, and students are able to conduct experiments to learn how much

electricity their classrooms and schools uses each month. To enhance the science program, clubs such as the Ham Radio Club, National Science Honors Society, and the Science Club are part of the school.

Question 5 asked, "How do all teachers consistently plan and deliver high quality instruction?" One teacher explained that the county has adopted Learning Focus Lesson Plans for all teachers to use to create rigorous lessons that ensure student success with essential questions, collaboration, and higher order questioning. Teachers create lesson plans in departmental meetings and in PLCs. Another teacher discussed collaboration by stating,

> Teachers work together in all content areas, and teachers teach using a standardized lesson plan and gets on board because no one wants to embarrass themselves in front of their peers for not teaching what you are supposed to be teaching. A solid foundation has to carry on to the next level. I know in the math department each level feeds into the next level and nobody wants to be in the level below and someone say what in the world, didn't you teach these students anything?

Another teacher analyzed the word consistently by stating,

> Consistently plan and being able to deliver high quality instruction are key words. I think, sometimes, consistency struggles a little bit with the way we plan because from year to year we are given a different format of lesson plans. One year, we are doing this and the next year we are doing something else and so by the time teachers actually excel with one lesson plan, it's like that's actually not working for the county and we need you to do this one. I think there is not enough turnaround time for teachers to be trained on it. For example, here we are

trying to do Learning Focus Lesson Plans, but only a handful of our teachers have been trained on Learning Focus, yet we are expected to produce these lesson plans each week. I think this is an issue. Yes, I think a format is helpful, especially with beginning teachers, if this is what they want to see in our classroom. This is how you can develop an effective lesson and I think that is beneficial, but I also think there needs to be more resources allocated to training and to looking at some of these techniques teachers are being asked to do and explain to teachers this is what we want to see when we walk into your classroom. We want to see an anchor chart posted on the wall. But what is an anchor chart and how do you effectively create it? What purpose does it serve in your classroom? I think those things, without being explained to teachers, just feels as if it is another task they just have to check off their list. I think consistency is lacking in that step. I think high quality instruction, even if your teacher is a high quality teacher, is hard. I think that when you have 35 students in a classroom, even if you have a really great lesson plan, it is hard to deliver that lesson plan at a high quality because you are having to deal with 35 different personalities in a room or when you are not given the equipment. In science, if you do not have the lab equipment, you may have the greatest lesson plan in the world, but your lesson is going to lack that quality because you are not able to give them those hands on experiences that they need. I know all of this boils down to budget and having enough money to do these things in school. I think if people want to see rigor in the schools, then we have to have a budget for rigor. I think this is something that all NC schools, all schools in the world, struggle with.

Another teacher said,

> CTE has small rooms and huge classes. You can plan for many things, but student behavior drives whether you are going to have high quality instruction. Just as much as what you planned, it is hard to deliver, especially when you have teachers in classrooms with 28 students and some of them with special needs. They are not the highest functioning students in the class or in CTE. We get the whole shebang in one class with the brightest students and the low-performing students, all in one class. When you have restraints like that, it makes it really hard.

Question 8 asked, "How do teachers consistently differentiate instruction in ways that engage all students based on their interests, academic needs and learning styles?" One teacher stated, "I think if you put them in teams, I know a lot of teachers here have their students in learning teams and have team projects. You can always mix the students a little bit so they can peer teach." Another teacher stated,

> I believe when you do the learning teams, it helps them to be able to see the viewpoint of their peers and we also facilitate with visuals, hands-on activities and lectures. We are entertainers and I think that many of our teachers do that well, to be able to entertain each of those areas to reach our students. You know a lot of times, if you are with them for more than a week, you learn their best way of learning.

A third teacher stated,

> I think one thing our teachers do well is differentiation. I use this in my classroom by giving students some type of choice of what assignment they complete. Recently, I gave my students a choice. There were three assignments: one was heavy on writing, one was heavy on creative writing and art, and the

> other one was technology-based. I think all of them were equally rigorous in what the assignment was, but it allowed the students to have choices in which skills they knew they were best in. I think this is something that we do well, but again, this goes back to when you have 35 students in a room or five students who are classified OCS or 504 who need extra help. When you have those students mixed into the general population, it's harder to differentiate, especially when you have that number of students in one room.

Another teacher explained that their teachers analyze data in PLCs and decide which students need remediation and which teacher will remediate the students. They use data to drive instruction. The librarian discussed how she orders books across all reading levels, so all students are able to read books in the library. Another teacher discussed how the use of Chromebooks allows teachers to assign different assignments without anyone knowing but the student and the teacher.

Question 9 asked the respondents to "Explain how the school identifies students who are struggling academically and provides them with extra academic support." One teacher explained that the master schedule allows for 30 minutes of interventions daily. Some teachers have used their planning period to tutor students to improve in areas in which they are weak. The math department offers smart lunch for students who need to do their homework or need math help. Another teacher stated,

> I think our struggle is identifying those students in advance. I believe that many of our students have some sort of issue, which prevents them from learning the way they should. I think many times teachers do not pay attention to it the way they should, not all teachers, some teachers do a great job with that. I am thinking in particular of AVID and how we identify students who are good candidates

> versus students who are not a good candidates, or how are we identifying students who are good candidates for any of the programs that we have. I cannot say with certainty how we do that effectively. I think we are better with that, but I don't know what the protocol is for students who are struggling to go through the formal process for a 504 or an IEP because by the time they come to me as a junior, they have been identified. I think we can improve this at the high school and elementary school level.

Another teacher explained that the county has adopted the Multi-Tier Support System (MTSS) to help students who are not proficient in class. The schools have started training on this and are slowly incorporating it into their schools.

Question 10 asked, "How does the school encourage student participation in academic development programs offered by colleges and universities?" One teacher explained that they communicate with students through email and through the television system. They advertise information about colleges, upcoming programs, and important deadlines. Students receive calls to the office to let them know of opportunities for Governor's School and encourage them to apply. Another teacher said,

> Through the counselors, they see and are in contact with the students all the time and assist and help them select college classes that they can take during school instead of going home and not doing anything. They enroll in these classes to further them in their college or career path.

Each year, sophomores attend an assembly to hear about the North Carolina School of Science and Math. JROTC does a week-long STEM camp in the summer that was started last summer at Virginia Tech with college professors. All three high schools have a college advisor who promotes colleges and assists students to complete applications and

scholarships in order to attend developmental programs and college after graduation. All the high schools have partnered with the community college and students can take Career and College Promise (CCP) classes as a junior and senior if they have a 3.0 GPA or higher. Another teacher discussed that students can participate in Upward Bound where they receive tutoring, summer school, and live on a college campus for a week to prepare them for understanding the life of a college student.

Question 11 asked, "How much can you do to help your students think critically?" One teacher stated,

> As a computer programing teacher, for a lot of students it is the first time they have experienced a new way of thinking. I have to teach them that if they are not at least a little bit frustrated then they are not being challenged because they don't know how to do it, you have to coach them through it and you have to tell them that they have to ty without knowing the answer, they have to take a chance and experiment. They are going to get it wrong multiple times and that is normal. You have to coach them because that is the nature of the class and they eventually learn.

Another teacher said,

> It is the student that has to make the choice, am I going to challenge myself to think this way, am I going to push myself to think this way, or am I going to say this is not for me, it is too hard and not try. We cannot think for the students and I think sometimes a lot of teachers feel that is what they are being asked to do, particularly when standardized test scores reflect our performance as a teacher.

Another teacher discussed that it was critical to hold students to high expectations and to not accept anything less. A science teacher said, "Force students to go out of the confine

of that particular lesson to make connections, even personnel connections." They also discussed using higher level questioning, inquiry-based learning, and performance based task assessments that link to real-world situations.

Question 12 asked, "How do you help students to think critically?" One teacher said, "Ask critical questions, sometimes they are very basic questions for these kids to make them think outside the box or think a little different about something." Another teacher said, "Encourage open ended questions by the teacher and no opt out when we ask a question, we should expect an answer from the student that goes beyond a yes or no answer." Another teacher said, "Do not spoon feed them." Teachers discussed modeling for their students and then let them create an experiment or project, analyze case studies, and document analysis using primary sources.

The Teacher Sense of Efficacy Survey also answers Research Question 3 focusing on their comfort level with implementing rigor into the classroom. This survey consisted of 15 questions using a Likert scale of 1-5: 1 (*nothing*), 2 (*very little*), 3 (*some influence*), 4 (*quite a bit*), and 5 (*a great deal*).

Question 1 asked teachers to think about how much they can do to help their students think critically. One percent of teachers said there was nothing they could do to help their students think critically, 23% of teachers said that they had some influence, and 76% of teachers said they could help students think critically quite a bit.

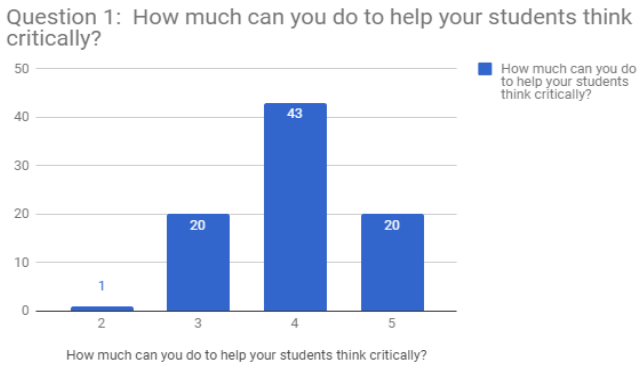

Figure 13. Reference to the Teacher Sense of Efficacy Survey.

Question 4 asked, "How well can you respond to difficult questions from your students?" Two percent of teachers said there was very little they could do when responding to difficult questions, 13% of teachers felt comfortable, and 85% felt very comfortable answering difficult questions from students.

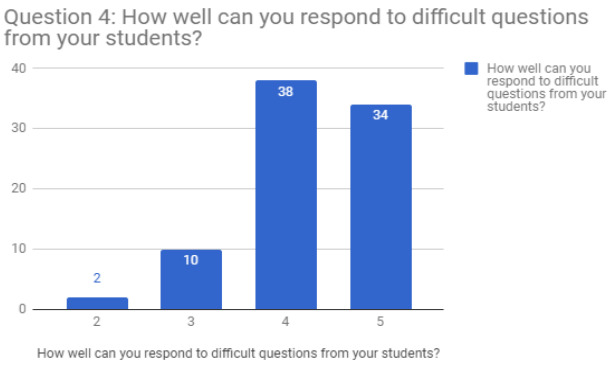

Figure 14. Reference to the Teacher Sense of Efficacy Survey.

Question 6 asked, "How much can you gauge student comprehension of what you have taught?" One percent of teachers felt like there is very little they can do to gauge student comprehension, 16% felt that they have some influence with gauging student comprehension, and 83% of teachers felt very comfortable with gauging

comprehension.

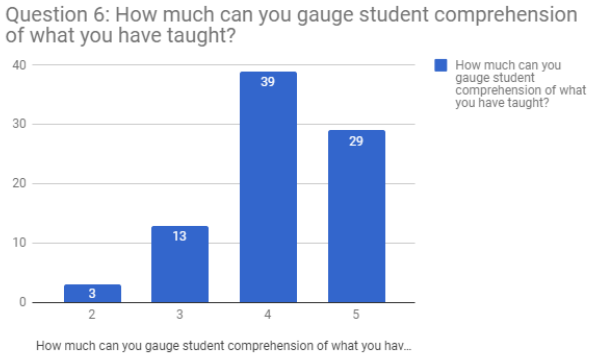

Figure 15. Reference to the Teacher Sense of Efficacy Survey.

Question 7 asked, "To what extent can you craft good questions for your students?" One percent of teachers feel that they cannot construct good questions, 16% of teachers felt that they can somewhat craft good questions, and 83% of teachers felt that they can construct quality questions for their students.

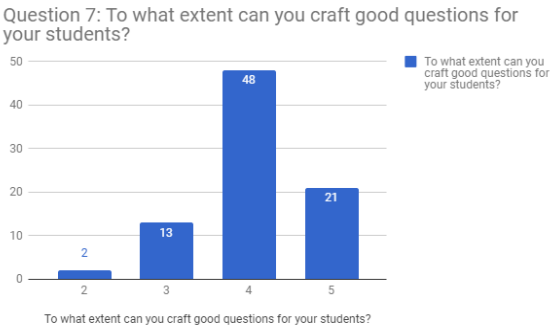

Figure 16. Reference to the Teacher Sense of Efficacy Survey.

Question 8 asked teachers to think about how they foster student creativity. Five percent of teachers felt that they do very little with fostering student creativity, 29% of teachers felt that they have some influence with fostering student creativity, and 66% of teachers felt that they have a lot influence.

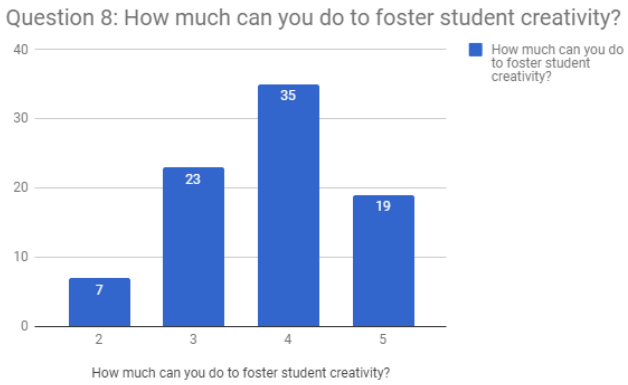

Figure 17. Reference to the Teacher Sense of Efficacy Survey.

Question 11 asked, "How much can you use a variety of assessment strategies?" One percent of teachers felt they have very little influence with using a variety of assessment strategies, 19% of teachers felt they have somewhat influence, and 80% of teachers felt they have a lot of influence.

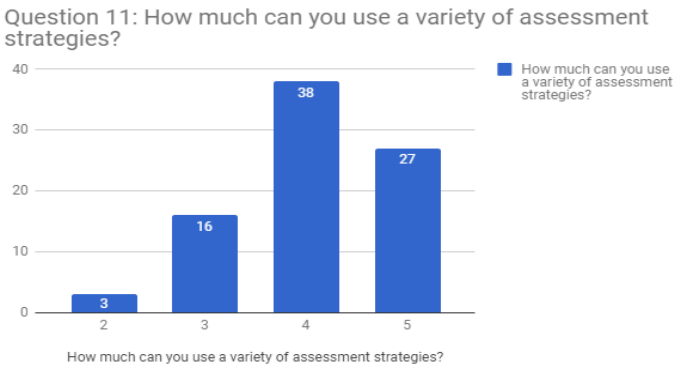

Figure 18. Reference to the Teacher Sense of Efficacy Survey.

Question 14 asked, "How well can you implement alternative strategies in your classroom?" Four percent of teachers felt there is very little they can do with implementing alternative strategies, 30% of teachers felt they have some influence, and 66% of teachers believe there is a lot they can do with implementing alternative strategies

in their classrooms.

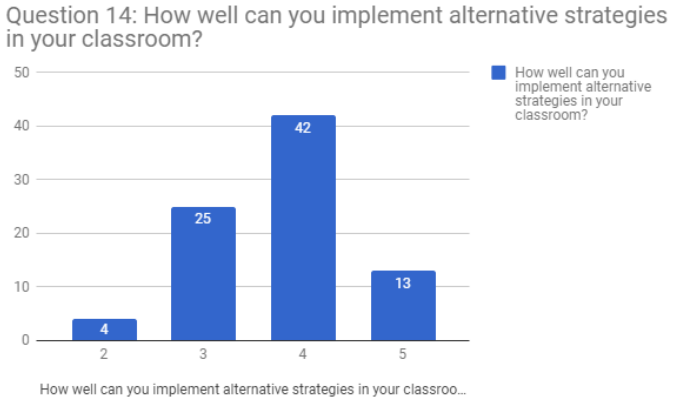

Figure 19. Reference to the Teacher Sense of Efficacy Survey.

Question 15 asked, "How well can you provide appropriate challenges for very capable students?" Four percent of teachers believe they have no influence with providing appropriate challenges for very capable students, 14% of teachers felt they have some influence, and 82% of teachers felt they can provide appropriate challenges for very capable students.

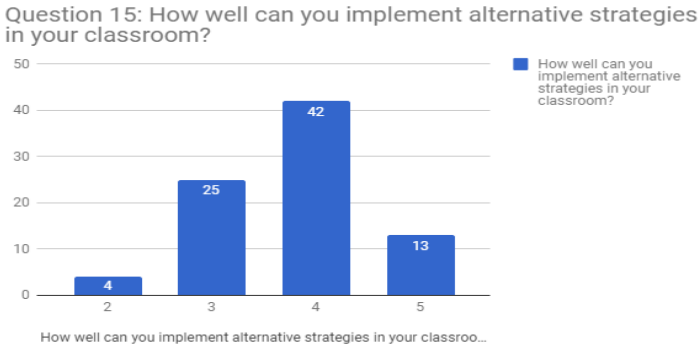

Figure 20. Reference to the Teacher Sense of Efficacy Survey.

Summary

Chapter 4 was organized by the three research questions and results provided

from the two surveys and the interviews by the School Leadership Teams to answer the questions. The next chapter focuses on the interpretation of the data, recommendations for further study, and conclusion with regard to rigor, teacher self-efficacy, and student achievement in three high schools in a rural school district in eastern North Carolina.

Chapter 5: Summary, Conclusions, and Recommendations

Introduction/Purpose

"Our job is to teach the students we have. Not the ones we would like to have, not the ones we used to have. Those we have right now" (BAM Radio, 2017, para. 1).

The purpose of this study was to define what rigor looks like in three comprehensive high schools in a rural school district in eastern North Carolina and to provide teachers with workable strategies that will enhance rigorous classroom environments, which will enable students to be college and career ready when they graduate high school. The candidate conducted this study in support of the following quote:

> Each year, thousands of students graduate from high school with the understanding that they are fully ready to pursue a college degree. They have passed end-of-course exams in math, science, English and social studies. Many earned A's and B's in class. When they don their caps and gowns, nearly nine out of ten of them will be handed a diploma certifying they met College Preparatory/ Work Ready Curriculum Standards. Months later comes a reality check: They are told they aren't ready for college after all, at least until they take and pass one or more remedial courses. (Robson, 2016, para. 1-4)

Summary of Key Findings

Through the data analysis in Chapter 4, it is evident that teachers understand the importance of rigor but need training on how to implement rigor into their classrooms. Teachers felt that professional development and an enhanced budget are needed to successfully implement rigor to ensure all students are college and career ready when they graduate high school. Teachers believe they have a strong influence with critical

thinking but are not sure how to implement the critical thinking in their classrooms.

Interpretation of Findings

Chapter 5 analyzes the data from the previous chapter to answer the following three research questions.

1. What research-based strategies are teachers using to incorporate rigor into their classrooms to prepare students to be college and career ready?
2. What professional development do teachers need to incorporate rigor successfully in their classroom?
3. What is the teacher's comfort level with implementing rigor in their classroom?

Research Question 1

What research based strategies are teachers using to incorporate rigor into their classrooms to prepare students to be college and career ready? According to the Middle Level Academic Rigor Survey, there are some disparities about what exists at their schools and what they feel is important. Differentiation is a strategy to increase rigor based on the student's level to ensure success. Fifty-eight percent of teachers felt it is very important to incorporate differentiation, while only 41% of teachers felt differentiation exists at their school. Differentiation is a strategy some teachers incorporate but is not implemented countywide by all teachers.

Small, personalized learning environments allow teachers the opportunity to assess a student's learning style and best meet their needs. Twenty-four percent of teachers said that small, personalized learning takes place, yet 43% of teachers felt that it is important to ensure student success. A small population of teachers incorporate small, personalized learning environments in their classroom to increase rigor.

Another strategy is to provide programs to ensure students have successfully mastered the English language and numeric skills in order to increase their rigor. Only 27% of teachers believe programs exist to help students master this program, and only 37% of teachers felt that this is important. Students need to be able to master these skills in order to be successful and prepared for college and the workforce.

Personalized learning allows students the opportunities to enroll in courses that will help them in college and/or in their career choice. Twenty-four percent of teachers believe personalized learning exists at their school, and only 31% of teachers believe personalized learning is important.

Table 5 compares the data from the Middle Level Academic Rigor Survey in the two areas of "does rigor exist at your school" and "is rigor important at your school." In the four areas (differentiation, small personalized learning, identifying struggling students, and English/numeric skills), there is a significant difference in the exist and the importance column. There was a 17% difference with differentiation from "does it exist in your school" to 'is it important at your school" and a 19% difference with small personalized learning. There was an 11% difference with identifying struggling students from "does it exist in your school" to "is it important at your school" and a 10% difference with English/numeric skills.

Table 5

Comparing Data from Does Rigor Exist at Your School to is it Important at Your School

	Exist			Important		
Differentiation	No Existence 19%	Neutral 37%	Fully Exist 41%	No Existence 13%	Neutral 30%	Fully Exist 58%
Small Personalized Learning	No Existence 42%	Neutral 34%	Fully Exist 24%	No Existence 30%	Neutral 27%	Fully Exist 43%
Identifying Struggling Students	No Existence 30%	Neutral 33%	Fully Exist 37%	No Existence 18%	Neutral 33%	Fully Exist 49%
English/ Numeric Skills	No Existence 25%	Neutral 46%	Fully Exist 27%	No Existence 20%	Neutral 43%	Fully Exist 37%

Through analyzing the data collected from this survey, some teachers are using differentiation; small, personalized learning environments; providing English and numeric programs; and personalized learning to increase rigor in their classroom. Not all teachers in the county implement these strategies.

The interviews with the School Improvement Teams allowed teachers the opportunity to discuss strategies they implement in their classrooms. Common trends that were shared by all three comprehensive high schools involved AP and IB classes. All three comprehensive high schools offer AP classes, and one of the three high schools offers IB classes. Any student who is interested in the IB program can attend the school that offers the IB program.

With implementing Learning Focus Lesson Plans countywide, all teachers are being introduced to and implementing essential questions, collaboration, higher level questioning and anchor charts into their daily lessons.

Social studies teachers provide students the time and opportunities to complete

document analysis using primary resources. This skill allows students to incorporate their literacy skills, think critically, and collaborate with their peers.

All three comprehensive high schools discussed how the AVID elective teachers, along with other teachers who are AVID trained, incorporate strategies that ensure student success in high school, college, and in the real world. Teachers discussed incorporating WICOR, Socratic Seminars, Costa's Levels of Inquiry, and Cornell Notes.

Teachers in the district are using researched-based strategies to incorporate rigor into the classroom. The concern is that not all teachers are incorporating these strategies into their classrooms on a perpetual basis.

Research Question 2

What professional development do teachers need to incorporate rigor successfully in their classroom? The interviews shed light on professional development that teachers need to successfully implement rigorous activities into their classrooms. Teachers felt they receive plenty of professional development on instructional strategies but not on content knowledge. Their concern is that the standards and tests constantly change, yet they are not receiving training on the changes and how to teach the material based on the changes. Technology is constantly changing. Teachers felt they need training on the newest technology trends to be able to engage students and keep them interested in learning.

The district has adopted a new lesson plan format, Learning Focus Lesson Plans by Max Thompson. Some, but not all, teachers have participated in training on how to complete the form. They felt that they need specific training on the different components of the lesson plans. Teachers want to receive professional development on anchor charts, word walls, essential questions, collaboration, and understanding the difference in

assignments and assessments.

Research Question 3

What is the teacher's comfort level with implementing rigor in their classroom? Through the interviews with the School Improvement Teams, it was apparent that literacy skills is a concern for high school teachers. Teachers struggle with incorporating rigor into their classroom when students are not able to read on grade level. Teachers also struggle with meeting the needs of all students, especially with large class sizes. Another concern with teachers feeling comfortable implementing rigor is not having the materials and resources readily available for students. Critical-thinking skills are a concern for teachers when implementing rigor because students do not know how to think critically and are scared to get an answer wrong. Teachers felt comfortable implementing rigor when they consistently plan with their departments and when they incorporate learning teams.

The results from the Teacher Efficacy Survey showed that teachers felt very comfortable with having students think critically. Sixty-seven percent of teachers felt comfortable having students think critically, while 33% felt some influence with having students think critically. These results relate to the interview, in that some teachers struggle in how to teach students to think critically. This indicates that critical thinking could be an area where teachers need professional development.

Eighty-five percent of teachers felt comfortable answering difficult questions students raise. Thirteen percent of teachers felt they have some influence answering difficult questions. This leads to the conclusion that teachers are comfortable answering questions students create.

Eighty-three percent of teachers felt comfortable crafting good questions for their

students. Sixteen percent of teachers felt they had some influence with constructing good questions. This indicates that the majority of the teachers are able to create good questions to increase critical thinking.

Sixty-six percent of teachers felt they have a strong influence with student creativity. Twenty-nine percent of teachers felt they have some influence, and 5% feel they have very little influence. This indicates that student creativity could be an area where teachers need professional development.

Eighty percent of teachers felt comfortable with creating a variety of assessments to assess student learning. Nineteen percent of teachers felt that they have some influence with creating a variety of assessments. These data show that some teachers would benefit from professional development in this area.

Sixty-six percent of teachers felt comfortable with implementing alternative strategies in their classroom to ensure student success. Thirty percent of teachers felt they have some influence with alternative strategies. This indicates that alternative strategies could be an area where teachers need professional development.

Eighty-two percent of teachers felt comfortable with providing appropriate challenges for very capable students. Fourteen percent of teachers felt they have some influence with creating appropriate challenges for students. This correlates with the data from the interviews. One of the teachers discussed that it is very difficult to meet the needs of the high flyers when you have a large class and students with learning disabilities.

Table 6 breaks downs the Efficacy Survey into percentages of how teachers feel with how much influence they have on student learning. Teachers as a whole felt that they had a lot of influence with creating a variety of assessments, student comprehension,

challenging high-level students, responding to difficult questions ,and crafting good questions. Sixty-six percent of teachers feel they have a lot of influence with providing alternative strategies and with student creativity. Sixty-seven percent of teachers feel they have a lot of influence with having students think critically. Nineteen percent of teachers feel they have some influence with creating a variety of assessments, 30% feel they have some influence with providing alternative strategies, and 33% have some influence with having students think critically.

Table 6

Breakdown of TES Survey

	Results			Results	
Variety of Assessments	Very Little Some Influence A lot of Influence	1% 19% 80%	Student Creativity	Very Little Some Influence A lot of Influence	5% 29% 66%
Provide Alternative Strategies	Very Little Some Influence A lot of Influence	4% 30% 66%	Critically Thinking	Very Little Some Influence A lot of Influence	1% 33% 67%
Student Comprehension	Very Little Some Influence A lot of Influence	1% 16% 83%	Respond to Difficult Questions	Very Little Some Influence A lot of Influence	2% 13% 85%
Challenging High Level Students	Very Little Some Influence A lot of Influence	4% 14% 82%	Craft Good Questions	Very Little Some Influence A lot of Influence	1% 16% 83%

The TES survey is broken down into two dimensions: Personal Teaching Efficacy, the teacher's belief of their abilities to be an effective teacher; and General Teaching Efficacy, the belief that teaching affect students positively. The results showed that

Teachers who scored high on both dimensions were less likely to criticize a

> student following an incorrect answer and more likely to persist if a student failed a learning task initially. High-efficacy teachers also were more likely to divide a class for small group instructions as opposed to whole-class instruction. (Gavora, 2010, pp. 4-5)

The RAND Foundation was the first group to conduct research on teacher efficacy over 25 years ago. They created two self-efficacy questions in a survey that examined the success of reading programs and then again through studying the cost of instructional programs. The results showed a positive connection between teacher efficacy and student success in the classroom (Gavora, 2010, pp. 4-5).

Limitations of the Study

A limitation for this study was the candidate could only analyze surveys that teachers completed and would not know how honest the participants were with their responses. Ninety-seven teachers completed the surveys, yet the survey went out to 194 teachers. Teacher lack of experience and professional development training with understanding and utilizing rigor in their classroom could negatively affect the survey results. The School Improvement Teams had a different number of teachers interviewed: One school had four teachers, a second school had 14 teachers, and the third school had 12 teachers in the interview.

Recommendations for Further Study

This study focused on teacher perspectives on implementing rigor into their classrooms in the three comprehensive high schools in one school district. This study could be expanded by studying several districts analyzing teacher perspectives on implementing rigor in their classrooms.

In the literature review section, AVID strategies were discussed as a possible

method to implement rigor and create college and career ready students. A study could compare AVID and non-AVID students analyzing student success in high school and college. Do AVID students take more rigorous classes than non-AVID students, and if so, why?

The analysis of subgroups provides additional opportunities for study. Do some subgroups take more rigorous high school classes than other subgroups such as AP, IB, and AVID? What is the driving motivation for the courses they select?

Future research could study the effectiveness of the preparedness of beginning teachers by examining how they incorporate rigor into their classroom. This research could identify the college classes beginning teachers are required to take with an analysis of any training received on what rigor is and how to incorporate rigor into the classroom by reviewing these courses and preparation they receive before they get into the classroom. Colleges could better prepare future teachers to provide more rigorous opportunities for our students.

Another lens could be to examine the professional development in which teachers have participated in the last 5 years. Are teachers trained on what rigor is and how to incorporate rigor? Is rigor a focus for the county when planning professional development for teachers? For teachers who participate in rigor training, do they have a choice in participating in the professional development, what type of follow-up is held to determine the effectiveness of the skills taught, and what is the teacher's ability to use them effectively in the classroom.

A common thread through the interviews was the lack of budget to incorporate rigor. Teachers felt that their needs to be a budget to purchase materials and provide training to better incorporate rigor. The researcher could examine does the lack of

funding negatively impact rigor in schools. The examiner could also take this a step further and compare school districts that have a lack of funding with districts that do have funding for rigor and compare their school accountability grades, number of higher level courses that are offered (IB, AP, honors), and graduation rates.

The interview participants also discussed that students have to be willing to think critically and outside the box with rigor. An examiner could study student perspectives on rigor. How do students feel about collaboration, completing projects, and answering higher level thinking questions? Does student perspective on rigor correlate to their grades and the classes that they take? Does student self-efficacy play a role in the courses in which they enroll?

It is easy for a teacher to say they incorporate rigor into their classroom, but how do you know if they truly implement rigorous strategies on a daily basis? A study could focus on analyzing lesson plans and observations of teachers over a year's time span. Do teachers actually follow through with what is on their lesson plans? Are teachers asking higher level thinking questions, and are students able to answer the questions effectively?

Recommendations for Practice

The following recommendations focus on improving rigor in the school system:

- Create a budget for the sole purpose to assist with increasing rigor. The budget would cover professional development for administrators and teachers. It would also cover materials for hands-on projects, labs, supplementary resources, and lab equipment.
- Remote teaching, where students would meet in the library and sign on to their computers to stream the class, would allow the opportunity to increase

the number of AP and IB classes offered in the district. One teacher would teach the class, and students from other high schools would enroll and participate online.

- Career Management is a CTE class that focuses on different careers. This course could offer students the ability to create resumes and learn how to fill out college applications and job applications. The class could require students to collaborate with peers to create a hands-on project and present it to the class and to other stakeholders.
- Provide professional development for teachers that focuses on content and how to implement rigor into their content.
- Train all teachers on AVID strategies (WICOR, Socratic Seminars, Cornell Notes, Philosophical Chairs)
- Based on the efficacy survey, provide professional development in the following areas:
    - Providing alternative strategies
    - Student creativity
    - How to have students think critically
- Provide all teachers with intense professional development on how to use and implement the Learning Focus Lesson Plans and on the following components:
    - Essential questions
    - Collaboration
    - Anchor charts

- Projects

Theoretical Framework

There are four major theories of learning: behaviourism, constructivism, social constructivism, and critical pedagogies (Westbrook et al., 2013). Through this study, all four learning theories were present in the three comprehensive high schools.

The Behaviourism Theory was apparent with the high school schedules as evidenced by departmentalization according to content. The students were scheduled for a math course for 90 minutes, a science class for 90 minutes, etc. The teachers are certified and trained in their content subject and were not comfortable with integrating other subjects into their content areas. This became evident during the teacher interviews. When the researcher asked Question 3, all participants looked at the math teacher to answer this question, and they looked at the science teacher to answer Question 4 that pertained to science. The teachers also discussed how they tutor students in their content. Math teachers help students for the math portion of the ACT, while the science teachers tutor for the ACT in science.

The Constructivism Theory was implemented by incorporating small groups and creating problem-solving projects. Twenty-eight percent of teachers said project-based learning fully exists at their school, and 38% of teachers felt it is very important to implement at their school. During the interviews, collaboration was discussed five times, and teachers modeling was discussed seven times.

The Social Constructivism Theory was integrated by implementing the ZPD through the use of differentiation. Forty-one percent of the teachers stated differentiation was fully implemented in their school, and 58% of the teachers feel it is very important to differentiate instruction. During the interviews, differentiation was discussed eight times.

Teachers discussed how to differentiate for students who were struggling and for the advanced learners.

The Critical Pedagogies Theory was incorporated with teachers asking students critical-thinking questions and not allowing students to opt out of answering a question. Teachers in the interviews discussed they empower students to think critically through the use of creating an experiment or projects, analyzing case studies, and documenting analysis using primary sources. According to the TES, 66% of teachers believe they have a lot of influence with teaching students how to think critically. During the interviews, the subject of teaching students how to think critically and asking higher order thinking questions was discussed 11 times.

Teachers are beginning to incorporate the Rigor/Relevance Framework into their lessons. One of the teachers in the interview stated that they incorporate rigor through offering real-world classes. She mentioned that the CTE classes do a phenomenal job incorporating real-world situations. Another teacher in the interview stated that the Learning Focus Lesson Plans incorporate the framework through the use of essential questions (discussed nine times in the interviews), collaboration (discussed five times in the interviews), and higher order thinking (discussed 11 times in the interviews). The Rigor/Relevance Framework has four quadrants. Quadrant A is acquisition: This focuses on students being able to remember and understand knowledge. Differentiation is a strategy that would fall in Quadrant A because the goal is to differentiate instructions for the students to understand and learn the material. According to the Middle Level Academic Rigor and Support Assessment Tool survey, 27% of teachers stated teaching English/numeric skills fully exist at their school, and 37% of teachers felt it is very important. This skill also is a skill that students need to remember and understand to be

able to build a solid foundation. Quadrant B, application, focuses on students being able to answer questions and solve problems. This was evident in the study through essential questions (discussed nine times in the interviews) and asking higher order thinking questions (discussed 11 times in the interviews). Quadrant C, assimilation, is where students "use the knowledge automatically and routinely to analyze and solve problems and create solutions" (International Center for Leadership in Education, 2018, p. 2). This was achieved through teachers having their students conduct document analysis using primary sources and hands-on labs (discussed five times in the interviews). Quadrant D, adaptation, is where students "think in complex ways and apply their knowledge and skills" (International Center for Leadership in Education, 2018, p. 3). This was evident with students taking AP classes (discussed 18 times in the interviews), IB classes (discussed 14 times in the interviews), asking and answering open-ended questions (discussed three times in the interviews), and linking learning to real-world situations (discussed five times in the interviews).

Chi-Square Goodness of Fit Data

Through this study, the researcher has concluded that teachers understand that rigor is essential in preparing students to be successful in college and in the workforce. Teachers are aware that they need training on how to implement rigor in their classroom and in their school as a whole. Teachers believe they play an important role with their beliefs through teacher self-efficacy in implementing rigor into their classroom. Teachers truly do want their students to be successful and think critically, yet they feel that there are obstacles that are out of their control, such as class size and budgets.

Through analyzing the survey data using a chi-square goodness of fit test, two of the three null hypotheses were not rejected. The null hypothesis for teacher efficacy is

that teachers believe they have high teacher efficacy, which promotes college and career ready students. From the 97 participants, 66% of teachers believe they have a large influence on helping students think critically. Twenty-eight percent of teachers believe they have some influence, and 7% of teachers feel they have no influence with helping students to think critically as represented in Figure 21. The results from the deviation in chi-square goodness of fit as seen in Table 3 were not significant so the null hypothesis was not rejected.

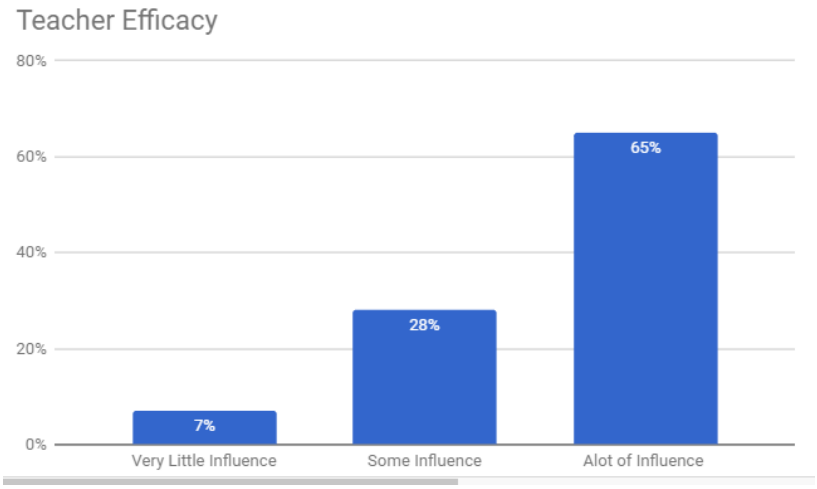

Figure 21. Reference to the Teacher Sense of Efficacy Survey.

The null hypothesis is that it is important for schools to be rigorous enough to produce college and career ready students. From the 97 participants, 51% of teachers believe rigor is important at their school. Thirty percent of teachers were neutral, and 19% of teachers felt that rigor was not important at their school as shown in Figure 22. The results from the deviation in chi-square goodness of fit as seen in Table 1 were not significant, so the null hypothesis was not rejected.

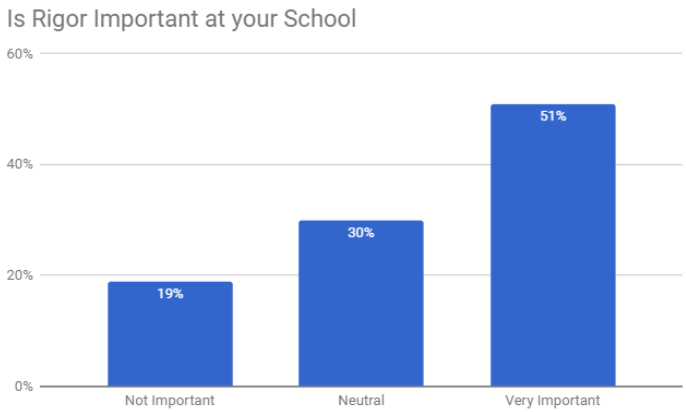

Figure 22. Reference to the Middle Level Academic Rigor and Support Self-Assessment Tool Survey.

The null hypothesis is that rigor exists in schools, which promotes college and career ready students. From the 97 participants, 41% of teachers believe rigor exists at their school. Thirty-two percent of teachers were neutral, and 27% of teachers felt rigor was not important at their school as shown in Figure 23. The null hypothesis was rejected as indicated in Table 2.

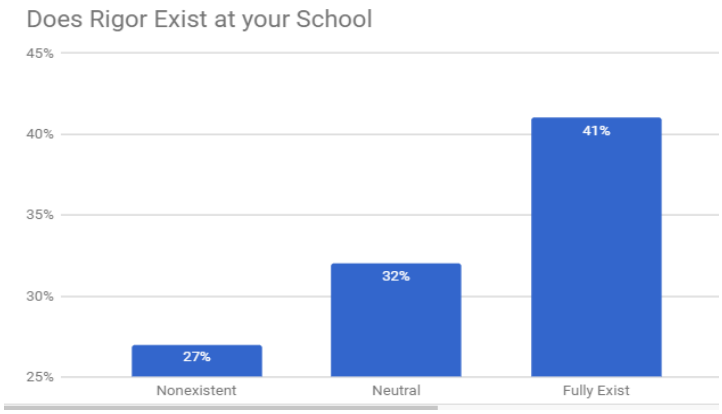

Figure 23. Reference to the Middle Level Academic Rigor and Support Self-Assessment Tool Survey.

Conclusion

In conclusion, teachers are incorporating rigor into their classrooms using several research-based strategies. A few of the strategies include differentiation, WICOR, higher order thinking questions, AVID strategies, and inquiry-based learning. Teachers need professional development with content knowledge, standards, lesson plan components, and strategies to meet the needs of all students. Teachers have an array of comfort levels with rigor in their classroom. Sixty-five percent of teachers who participated in this study believed they have a great amount of influence with students and their critical-thinking skills.

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Appendix A

Letter to Superintendent

March 2017

Dear Superintendent of District W,

I am conducting a mixed method study that involves both qualitative and quantitative measures that will analyze Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in a Rural School District in Eastern North Carolina. I am a graduate student in the doctoral education program at Gardner-Webb University.

The quantitative data for this study will be obtained through a questionnaire of twenty-two items to determine teachers comfort level with rigor by answering each question in two categories: 1. The importance of rigor at their school and 2. The level rigor exists at their school. The teachers will use a Likert scale to answer each question one to five, one being not important and five very important. Additionally, a fifteen question survey on Teacher Self Efficacy, with a Likert Scale of one to five with one representing nothing and five representing a great deal, is also included on the survey Teachers will receive the survey in their email through Google Forms. The survey responses will be anonymous. A letter is also included with the survey to explain the importance of this survey and to let everyone know that this survey is voluntary.
The qualitative data for this study, obtained through interviewing the School Improvement Team at each of the three comprehensive high schools in their conference room. The participants will receive the twelve interview questions as they enter the conference room. To ensure accuracy of the interviews, the candidate will digitally record and transcribe. Each teacher will receive a letter to identify themselves in order

for teachers to remain anonymous. The teachers will receive an invitation to the interview explaining the purpose and letting them know that this is voluntary.

I am respectfully requesting your permission to conduct this study within your district. I appreciate your time and consideration.

Sincerely,

Katrina H. Cobb

Appendix B

Request for Conducting Study

Request for Research Application

SUMMARY

County endeavors to provide opportunities for research studies of quality to be conducted within the system by graduate students and by other professionally and technically qualified Individuals and research organizations,

Factors which are considered In assessing whether the school system will cooperate In a proposal for research include the following;

I . The technical soundne5S Of the proposal design
2. The appropriateness of the research topic
3. The availability of research sites and subjects of the kinds requested
4. The nature and amount of the interruption required in the ongoing educational program 5, The privacy of respondents
6. The kind end number of data gathering procedures or instruments to be used in the study
7- The need for the schools to safeguard the personal and legal rights of students, parents, and staff

The following categories of research will be accepted for screening and evaluation:

I . Unsolicited research proposals from individuals or organizations independent of
2. Proposals for studies for masters' theses and doctoral dissertations originating from employees
3. Proposals for studies for doctoral dissertations originating from proponents other than employees
4. Responses to requests for proposals for external audits and research
5. Proposals for research activities originating within offices, departments, divisions, end other units, transmitted through their central office administrative channels.

Applications will be reviewed by Accountability technology Services, Final approval is given by the Superintendent, Legal reference: G.s, 115C-36, 47 Article 16

Accountability technology Services does not provide applicants with assistance in research design, instrument development, data analysis, or report writing except as authorized by the Superintendent In the application,

Student and parent participation in a study is voluntary. Participation of personnel also is voluntary unless specifically indicated by the Superintendent. Any instruments to be administered to the research subjects must display a clarifying statement to this effect on its fact sheet; Anonymity of any participant must be preserved. The identity of schools offices or the school system cannot be revealed unless authorized by the Superintendent,

INSTRUCTIONS

Applicants wishing to conduct research in are required to complete the Request for Research Application and submit two copies to: Accountability technology Services

Page 1 of 5
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E. REQUESTED PARTICIPATION OF STAFF

1. Will teachers be asked to assist with the study? Z Yes Cl No

A 30 minute interview, 5 minute survey If "Yes," for how much time?

2. Will other school system

If "Yes," who and for how much time?

F. SIGNATURE AND ACKNOWLEDGEMENT

Researchers must provide one complete copy of each report or product developed as a part or outcome of the research project, and, upon request from, an executive summary of no more than 25 pages. Researchers may not charge for any of these reports, products, or summaries; and all will be provided within 30 days of the development of the report or product, I acknowledge that reserves the right to immediately revoke its approval to conduct research if it should be determined that any terms or conditions of the application have been breached.

Indicate compliance with the the requirements and understand that I must comply.

G. SIGNATURE OF THESIS COMMITTEE CHAIRPERSON

The following is to be signed by the chairperson Of the applicant's thesis/dissertation committee {if applicable), I have reviewed the enclosed research proposal and find it to be technically competent, theoretically sound, and significant in focus.

Signature, Chairperson Title

Title of research

Appendix C

Permission to Conduct the Study

Ms. Cobb,

Your Request for Research Application has been approved and looks forward to working with you on this project.

Congratulations Again,

Appendix D

Letter to High School Principal

March 2018

Dear High School Principal of District W,

I am conducting a mixed method study that involves both qualitative and quantitative measures that will analyze Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in a Rural School District in Eastern North Carolina. I am a graduate student in the doctoral education program at Gardner-Webb University. I would like the opportunity to conduct the survey with your teachers.

The quantitative data for this study will be obtained through a questionnaire of twenty-two items to determine teachers comfort level with rigor by answering each question in two categories: 1. The importance of rigor at their school and 2. The level rigor exists at their school. The teachers will use a Likert scale to answer each question one to five, one being not important and five very important. Additionally, a fifteen question survey on Teacher Self Efficacy, with a Likert Scale of one to five with one representing nothing and five representing a great deal, is also included on the survey Teachers will receive the survey in their email through Google Forms. The survey responses will be anonymous. A letter is also included with the survey explaining the importance of the survey and letting everyone know that this survey is voluntary.
The qualitative data in this study came through interviewing the School Improvement Team at each of the three comprehensive high schools in their conference room. The participants will receive the twelve interview questions as they enter the conference room. To ensure accuracy of the interviews, the candidate will digitally record and transcribe. Each teacher will receive a letter to identify themselves in order for teachers to remain anonymous. The teachers will receive an invitation to the interview explaining the purpose of the interview and letting them know that this is voluntary.

I am respectfully requesting your permission to conduct this study with your teachers. Please let me know when would be a good time to send out the surveys and when to conduct the interview. I look forward to hearing back from you. I truly appreciate your time and consideration.

Sincerely,

Katrina H. Cobb

Appendix E

Letter to Educators

March 2018

Dear District W. School Educator,

I am writing to let you know that next week you will receive a Google Form Survey to complete focusing on rigor. This survey is voluntary and all responses are anonymous.

The research study is *A Study of Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in a Rural School District in Eastern North Carolina.* This study will analyze the implementation of rigor at the three high schools, professional development that teachers need to implement rigor and teachers perceptions of teacher efficacy.

The survey consist of twenty-two questions using the Likert-Scale from one to five, one being not important and five being very important. Each question analyzes two domains: 1. The importance of rigor at your school and 2. Does rigor exist at your school? Additionally, a fifteen question survey on Teacher Self Efficacy, with a Likert Scale of one to five with one representing nothing and nine representing a great deal, is also included on the survey Please feel comfortable in answering these questions honestly because the responses will all be recorded anonymously.

Thank you for taking the time to complete this survey. I greatly appreciate your time and support. This data will help increase rigor in our school district, which will increase student achievement.

Sincerely,

Katrina H. Cobb

Appendix F

School Improvement Team Letter

March 2018

Dear School Improvement Team Leaders of District W,

I am writing to let you know that next week you will receive a Google Calendar invitation with a date, time and location for a School Leadership Team Interview focusing on rigor. This interview is voluntary and all responses are anonymous.

The research study is *A Study of Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in a Rural School District in Eastern North Carolina*. This study will analyze the implementation of rigor at the three high schools, professional development that teachers need to implement rigor and teachers perceptions of teacher efficacy.

The interview consist of twelve open-ended questions revised from the surveys and changed from statements to questions. You will receive the questions when you enter the conference room. Please feel comfortable in answering these questions honestly, because the responses will be anonymous. I will be digitally recording the interview to transcribe the data into a word document. There will be a letter on the table at each seat and that is how I will address each participant.

Thank you in advance for being willing to participate in the interview. I greatly appreciate your time and support. This data will help increase rigor in our school district, which will increase student achievement.

Sincerely,

Katrina H. Cobb

Appendix G

Middle Level Academic Rigor and Support Self-Assessment Tool Request

Good afternoon,

I am a Doctoral candidate at Gardner-Webb University in Boiling Springs, NC. I am conducting research on rigor and teacher self efficacy at the high school level. My research title is: Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in a Rural School District in Eastern North Carolina. I would like permission to use the Survey: Middle Level Academic Rigor and Support Self-Assessment Tool. I need permission in writing. Thank you very much for your time and consideration.

I have included a link to the survey. http://mymassp.com/files/u1/MS_Academic_Rigor_Survey.pdf

2006 National Association of Secondary School Principals: www.principals.org

Appendix H

Middle Level Academic Rigor and Support Self-Assessment Tool Permission

March 19

NASSP gives Katrina Cobb, doctoral candidate at the Gardner-Webb University, permission to use the survey *Middle Level Academic Rigor and Support Self-Assessment Tool* for her doctoral research on rigor and teacher self-efficacy at the high level.

Josephine Franklin
Associate Director, Professional Learning
NASSP | National Association of Secondary School Principals
www.nassp.org | www.nhs.us | www.njhs.us | www.nasc.us | www.nehs.org

From: Katrina Cobb [mailto:katrina.cobb@
Sent: Friday, March 16, 2018 3:06 PM
Subject: Request to use a survey in my dissertation

Appendix I

Survey Questions

Survey Questions

Step 1: Please rate ‘Importance at my school’ from 1 to 5. 1= not important, 5= very important.

Step 2: Please rate ‘Exists at our school’ from 1 to 5. 1= nonexistent, 5= fully exists as an ongoing practice.

1. The school offers a challenging curriculum that engages all students.
2. The school has established a rigorous core curriculum that reflects secondary, post-secondary, and real-world readiness standards.
3. The school provides accelerated study in a wide variety of academic disciplines.
4. Students, representing the diversity of the school population, enroll in courses that provide accelerated study in all content areas.
5. The school provides a strong mathematics program that meets national standards and does not award promotion credit for general or remedial math offerings.
6. The school provides a strong science program that meets applicable content and laboratory standards.
7. The school provides additional academic support resources for students who need them before and after school, during lunch, and/or on weekends to assure that students meet rigorous core course requirements.
8. The school provides students with opportunities to earn high school credit through accelerated coursework.
9. The school offers structured programs and/or a pathway of courses that emphasize post-secondary academic and career preparation.

10. The school provides students with learning opportunities through community service and individual research projects that link academic preparation and real-life applications.
11. The school offers a variety of course combinations and programs that enable students to connect academic and work-related skills.
12. The school provides opportunities for teachers to strengthen their existing content knowledge and instructional delivery capacity as needed.
13. Teachers effectively use project based learning to foster students' success.
14. Teachers consistently plan instruction to meet the academic needs of culturally diverse groups of students.
15. Teachers consistently differentiate instruction in ways that engage all students based on their interests, academic needs and learning styles.
16. The school provides small, personalized learning environments in which teachers assess their students' learning styles to provide the most effective instructional strategies.
17. The school identifies students who are struggling academically and provides them with extra academic support.
18. The school provides programs to assure the successful mastery of English language and numeric skills.
19. The school provides personalized learning by establishing academics for small school learning settings.
20. The school expects all students to engage and perform as if they are preparing for postsecondary education.

21. The school encourages student participation in academic development programs offered by colleges and universities.

Appendix J

Interview Questions

Interview Questions

1. Describe ways your school offers a challenging curriculum that engages all students?
2. Describe how your school has established a rigorous core curriculum that reflects secondary, post-secondary, and real-world readiness standards?
3. In which ways does your school provide a strong mathematics program that meets national standards?
4. List the methods how your school provides a strong science program that meets applicable content and laboratory standards?
5. How do teachers consistently plan and deliver high quality instruction?
6. How does your school provide opportunities for teachers to strengthen their existing content knowledge and instructional delivery capacity?
7. Why is it important for teachers to participate in professional development activities that prepare them to teach accelerated courses?
8. How do teachers consistently differentiate instruction in ways that engage all students on the basis of their interests, academic needs and learning styles?
9. Explain how the school identifies students who are struggling academically and provides them with extra academic support.
10. How does the school encourage student participation in academic development programs offered by colleges and universities?
11. How much can you do to help your students think critically?
12. How do you accomplish this?

Appendix K

Teacher Sense of Efficacy Scale Permission

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Appendix L

Teacher Sense of Efficacy Scale

Teacher Sense of Efficacy Scale

Teacher Beliefs How much can you do?

Directions: This questionnaire is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below. Your answers are confidential.

Nothing (1) **Very Little (2)** **Some Influence (3)** **Quite A Bit (4)** **A Great Deal (5)**

1. How much can you do to help your students think critically? (1) (2) (3) (4) (5)

2. How much can you do to motivate students who show low interest in schoolwork? (1) (2) (3) (4) (5)

3. How much can you do to get students to believe they can do well in schoolwork? (1) (2) (3) (4) (5)

4. How well can you respond to difficult questions from your students? (1) (2) (3) (4) (5)

5. How much can you do to help your student's value learning? (1) (2) (3) (4) (5)

6. How much can you gauge student comprehension of what you have taught? (1) (2) (3) (4) (5)

7. To what extent can you craft good questions for your students? (1) (2) (3) (4) (5)

8. How much can you do to foster student creativity? (1) (2) (3) (4) (5)

9. How much can you do to improve the understanding of a student who is failing? (1) (2) (3) (4) (5) 10. How much can you do to adjust your lessons to the proper level for individual students? (1) (2) (3) (4) (5)

11. How much can you use a variety of assessment strategies? (1) (2) (3) (4) (5)

12. To what extent can you provide an alternative explanation or example when students are confused? (1) (2) (3) (4) (5)

13. How much can you assist families in helping their children do well in school? (1) (2) (3) (4) (5)

14. How well can you implement alternative strategies in your classroom? (1) (2) (3) (4) (5)

15. How well can you provide appropriate challenges for very capable students? (1) (2) (3) (4) (5)

Appendix M

Interview Introduction

Interview Introductions

Before each interview the following instructions will be read aloud to inform the participants about the study and how the interview process will be conducted.

Title of Research Study: A Study of Rigor, Teacher Self-Efficacy, and Student Achievement in Three High Schools in a Rural School District in Eastern North Carolina.

Focus of the Study: The purpose of this study is to define what rigor looks like in three high schools in Eastern, North Carolina, and to provide teachers with workable strategies that will enhance rigorous classroom environments.

Researcher's Role: As the researcher, I will introduce myself and have all participants sign all necessary forms before the interview begins. I will keep all the responses confidential and use the data from the digital recording to transcribe the data.

Interviewee Selection: The candidate chose the School Improvement Teams to participate in the interview process.

Data Gathering: Once all interviews are completed, I will transcribe the digital recordings to a word document. Data analysis of the three interviews will shed light on trends across the three comprehensive high schools.

Introduction: I appreciate each of you agreeing to participate in the interview and taking time out of your busy schedule to do this. The purpose of the interview is to gain a deeper

understanding of how rigor implementation occurs in your school and allows you the time to explain answers in a deeper manner versus the survey that did not allow explanations. I am recording the interview so that I can make sure I correctly document each response. Does anyone have an objection of me recording the interview? Does anyone have any questions before we start?