

Recruitment, Retention, and Utilization of Adequately Prepared High School Mathematics
Teachers in Florida's Rural Districts

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A dissertation submitted in partial fulfillment of the requirements for the degree of

Doctor of Education in Educational Leadership

School of Education

Florida Southern College

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Date of Approval: March 2, 2018

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TABLE OF CONTENTS

	Page
LIST OF TABLES	vi
LIST OF FIGURES	vii
I. INTRODUCTION	1
Overview	1
Purpose of the Study	2
Problem Statement	3
Significance of the Study	4
Theoretical Framework	6
Research Questions	8
Assumptions	8
Limitations	9
Delimitations	9
Definitions	9
Summary	10
II. LITERATURE REVIEW	11
Adequately Prepared Educators	11
Content Knowledge	11
Teaching Experience	16
Teacher Education Program/Pedagogical Training	17
Teacher Certification	18
Personal Attributes	19

Alternative Certification	22
History.....	22
Traditional Certification vs. Alternative Certification.....	27
Alternative Certification Comparisons by State	28
National Alternative Certification Programs	35
Alternative Certification in STEM Fields.....	37
Recommendations	41
Recruitment and Retention	45
Recruitment.....	45
Suggestions for Recruiting.....	48
Retention	52
Suggestions for Retention	55
III. METHODOLOGY	59
Approach.....	59
Researcher Role and Assumptions.....	59
Participant Selection	60
Data Gathering Technique	61
Data Analysis Technique	61
Ethical Considerations	62
Proposed Interview Questions	63
IV. RESULTS	65
Introduction.....	65
Description of Participants.....	66

Data Analysis	67
Interview Data.....	68
Results.....	69
Themes That Emerged from Research Question 1, Part A.....	69
Themes That Emerged from Research Question 1, Part B	72
Themes That Emerged from Research Question 1, Part C	75
Themes That Emerged from Research Question 2, Part A	78
Themes That Emerged from Research Question 2, Part B	81
Themes That Emerged from Research Question 2, Part C	83
Themes That Emerged from Research Question 3, Part A.....	84
Themes That Emerged from Research Question 3, Part B	87
Themes That Emerged from Research Question 3, Part C	91
Summary	92
V. DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS.....	94
Introduction.....	94
Summary of the Study	94
Summary of Findings.....	99
Findings of Research Question 1, Part A.....	99
Findings in Relation to the Literature	101
Conclusion	102
Findings of Research Question 1, Part B	102
Findings in Relation to the Literature	103
Conclusion	104

Findings of Research Question 1, Part C	104
Findings in Relation to the Literature	106
Conclusion	106
Findings of Research Question 2, Part A	107
Findings in Relation to the Literature	108
Conclusion	109
Findings of Research Question 2, Part B	109
Findings in Relation to the Literature	110
Conclusion	111
Findings of Research Question 2, Part C	111
Findings in Relation to the Literature	112
Conclusion	112
Findings of Research Question 3, Part A	113
Conclusion	113
Findings of Research Question 3, Part B	114
Findings in Relation to the Literature	115
Conclusion	116
Findings of Research Question 3, Part C	116
Findings in Relation to the Literature	117
Conclusion	117
Implications for Action	117
Recommendations for Policymakers	119
Recommendations for Future Research	120

Conclusion	121
REFERENCES	123

LIST OF TABLES

	Page
Table 1 Participant Descriptive Data	67

LIST OF FIGURES

	Page
Figure 1	Qualities of Adequately Prepared Educators71
Figure 2	Recruiting Techniques74
Figure 3	Retention Techniques.....77
Figure 4	Hiring Difficulties80
Figure 5	Implications of Alternative Certification82
Figure 6	Retention Strategies for Alternatively Certified84
Figure 7	Certification Types on Sampled Campuses86
Figure 8	Impact of Certification on Scheduling.....90
Figure 9	Effects of Certification on School Culture.....92

Abstract

This study investigates recruitment, retention, and utilization of adequately prepared high school mathematics teachers in Florida's rural districts. The research is a result of public concern regarding low passing rates on End-of-Course exams in secondary mathematics classes. Fearing this problem might be the result of unprepared mathematics teachers, the study investigates methods for recruiting and retaining educators in rural areas with low socioeconomic student populations. Given the inconsistency in government regulation and low minimum criteria set by the state, identifying adequately prepared educators is a difficult task for administrators. This is notably arduous in critical shortage areas like mathematics and science, where successful educators must possess substantial content knowledge. This phenomenological study identifies methods of recruitment, retention, and utilization that can assist districts in filling mathematics classrooms with competent teachers by examining best practices of rural Florida high school principals whose schools have the highest achievement scores in mathematics and student bodies with a similar low socioeconomic status. Principal interviews identify methods for recruiting and retaining adequately prepared applicants for mathematics positions, strategies to deal with the effects of alternative certification on recruitment and retention, and strategies that maximize the instructional effectiveness of mathematics teachers who have diverse levels of certification. In addition to helpful methods and strategies for administrators, the qualitative study uncovers a desperate lack of applicants for mathematics teaching positions. As a result, the study includes implications for action and suggestions for policymakers with the hope of improving the quality and availability of exceptional mathematics educators in Florida's rural districts.

CHAPTER 1: INTRODUCTION

Overview

A good lawyer once stated that a case could be won or lost on the day the jury was selected. He insisted that by ascertaining a potential juror's fundamental beliefs and qualities in advance, an attorney could increase his/her odds of winning the case. This is accomplished by asking the right questions during the interview process. The importance of that first contact, analysis, and evaluation cannot be underestimated. The same can be said for education. Principals can keep or lose their jobs based on the results of the hiring process. Overly obligated administrators do not have time to micro-manage every teacher employed on their campus; however, studies have shown that classroom instruction is the most important factor in influencing student learning (Leithwood & Louis, 2012). This emphasizes the importance of selecting adequately prepared teachers who can be trusted to support a school's mission. For a school's performance to be effective, the right people must be in the right place (Collins, 2001).

Leaders who are responsible for the education of American children, from government officials to school administrators, often face an ethical dilemma when confronted with teacher shortages and budget cuts. When faced with questions about the quality of American education and the lack of highly qualified candidates, government officials feel the need to intervene. Policymakers in the past understood what recent studies have proven: "Teacher quality is one of the most important variables for student success" (Evans, 2010, p. 25). Recent studies also note that teachers lacking appropriate certification can have a negative impact on student achievement (Ludlow, 2013). These facts, coupled with predictions of a severe shortage of math and science teachers by 2015 and a publicized lack of minority teachers, led politicians to create alternative routes to teacher certification in an attempt to avoid a crisis (Peterson & Nadler, 2009). Policies

with exceptions, such as alternative certification and out-of-field teaching, have been created to assist administrators in filling vacant positions, but misuse of these measures can have negative consequences. These policies create the possibility of authorized classroom placement of teachers who do not have sufficient content knowledge to adequately teach the subject matter. Today's administrators must keep in mind that they have an ethical duty to place adequately prepared teachers in every classroom to ensure each student gets the best possible education.

Purpose of the Study

The purpose of this study is to investigate recruitment, retention, and utilization of adequately prepared high school mathematics teachers in Florida's rural districts. In an effort to identify effective practices, the study will concentrate on principals at rural Florida high schools that have the highest achievement scores in mathematics and student bodies with a similar socioeconomic status. First, the research will explore the essence of principals' perceptions of recruiting and retaining adequately prepared mathematics teachers. Second, the study will focus on principals' perceptions of the effects of alternative certification on recruitment and retention of adequately prepared mathematics teachers in Florida's rural districts. This focus is essential based on the recent increase in the use of alternative certification as a pathway to teaching high school mathematics. The research will include the history of alternative certification and its progression. In addition, examples of effective and ineffective alternative certification programs will be detailed to assist principals in hiring competent educators. Ascertaining these differences will aid principals in focused recruitment, retention, and professional development (Evans, 2010). Lastly, the research will examine principals' perceptions of the actual effects of various types of certification on school culture. It is the hope of this researcher that the information collected from the shared experiences of high school administrators located in Florida's rural

schools that demonstrate the highest performance in mathematics can be utilized to improve mathematics programs throughout the state.

Problem Statement

Florida's passing rates for End-of-Course exams in Algebra I, Geometry, and Algebra II are unacceptable. The Florida Department of Education (2017) reported the passing rates for the Spring 2017 exams as follows: 62% for Algebra I, 54% for Geometry, and 49% for Algebra II. This problem could be a result of inadequately prepared instructors. Despite the government's insistence on highly qualified educators and the creation of alternative certification to attract exceptional teachers in critical shortage areas, the failure rate continues to be an issue. Recruiting and hiring adequately prepared teachers can be difficult, and the lack of qualified teachers can negatively impact student achievement (Ludlow, 2013). Recruiting is especially difficult in rural and urban areas that contain many students from lower socioeconomic levels. Highly qualified applicants tend to be rare in these areas where the salaries are often below the national average. Unconventional hiring policies, such as alternative certification and out-of-field emergency certification, can create a larger and more diverse applicant pool for vacant teaching positions, yet the sizable number of alternative hiring programs and the variation between those programs can create ethical dilemmas for those in charge of the hiring and placement of new teachers. The lack of consistency and government regulation can make it difficult to identify highly qualified candidates based solely on minimum criteria set by the state. This problem is especially prominent in critical shortage areas such as mathematics and science where successful educators must possess substantial content knowledge. A study is needed to determine effective practices for recruiting and retaining adequately prepared mathematics teachers in Florida's rural districts. Additionally, further research is needed to examine the

effects of alternative and other types of certification on recruiting, retaining, and utilizing educators in critical shortage areas such as mathematics and science. The results of this study could identify methods of recruitment, retention, and utilization that could assist districts in filling mathematics classrooms with competent educators.

Significance of the Study

Public education in America is under attack. Politicians and many members of the voting public have lost faith in the current system. Fears of American youth falling behind in the international arena have prompted an assessment driven school environment that has changed the face of education. Public education needs to regain the faith of the American public and the political system. This battle needs to be fought in the trenches, American classrooms. Trust must be earned; therefore, it is necessary for districts to ensure that educators in every classroom are adequately prepared. Studies have shown that classroom instruction is the most important factor in influencing student achievement (Leithwood & Louis, 2012). This emphasizes the importance of selecting highly effective teachers who can be trusted to properly educate students. For a school's performance to be effective, every classroom teacher must be adequately prepared to teach the subject matter for which he/she is responsible.

Mathematics and science are notably scaffolded in nature. Prerequisite knowledge is necessary to master additional topics. Students must build on previous knowledge of the subject to master new skills. Teachers in these fields need to be extremely knowledgeable in the content to help students make connections to previous knowledge and bridge the gap to more complex topics. Many mathematics courses, such as calculus, require knowledge of several different prerequisite topics. The current measure of "highly qualified" does not take this into consideration. Teachers are considered highly qualified by the state and nation if they have a

bachelor's degree and have passed the certification exam in the field they plan to teach. No consideration is given to specific expertise demonstrated by college coursework. The certification exam is designed to test competence, but is it sufficient? To teach in a Florida high school long term, an educator must pass the Mathematics 5-9 Certification Test or the Mathematics 6-12 Certification Test. According to the Florida Department of Education (2013), the certification for grades 5-9 test contains the following topics: knowledge of problem-solving and reasoning skills (13%); knowledge of mathematical manipulatives and models and instructional technology (6%); knowledge of assessment in mathematics (9%); knowledge of connections among mathematical concepts (7%); knowledge of number sense, operations, and proportionality (9%); knowledge of foundations of algebra (14%); knowledge of algebraic thinking (11%); knowledge of data analysis, statistics, and probability (7%); knowledge of two-dimensional geometry (15%); and knowledge of measurement and spatial sense (9%). To achieve this certification, according to the Florida Department of Education (FDOE) (2017), a teacher needs to get only 71% of the questions correct. An educator with this certification can teach Algebra I, Geometry, and other topics considered to be freshman courses. The Florida Department of Education (2013) reports that the certification exam for grades 6-12 tests the following: knowledge of algebra (13%), knowledge of advanced algebra (12%), knowledge of functions (8%), knowledge of geometry (15%), knowledge of coordinate geometry (6%), knowledge of trigonometry (7%), knowledge of statistics and probability (10%), knowledge of calculus (9%), knowledge of mathematical reasoning (5%), and knowledge of instruction and assessment (15%). To receive a passing score on this exam, according to the FDOE, an educator needs to get 67% of the questions correct. A teacher with this certification can teach any topic at the high school level. An educator who fails the calculus and trigonometry sections could still

pass the certification exam and be certified to teach AP Calculus. In addition, an educator can teach for up to three years on a temporary certificate before a passing score is mandated. When Title I funds are involved, the teacher is given only one year to pass the exam. Are these measures enough to ensure that Florida mathematics teachers are adequately prepared? To regain public trust, administrators must fill each classroom with educators who are experts in their content. Anything less could have a negative impact on society's perception of public education.

This study will examine best hiring practices by exploring the essence of administrators' perceptions of recruiting, retaining, and utilizing adequately prepared mathematics teachers. Once identified, these practices can be shared with low performing high schools in Florida's rural districts to assist those schools in employing the best educators in hopes of raising student achievement. This study will also investigate the true financial costs associated with recruitment and retention, in an effort to save money in districts whose educational budgets are habitually inadequate. Improving teacher quality, raising student test scores, and saving taxpayer funds should all contribute to repairing society's current perception of public education.

Theoretical Framework

Given the fundamental significance of improving public education to fulfil society's responsibility to every student, this study will view the importance of filling mathematics classrooms with adequately prepared educators through an ethical lens. This is especially necessary when analyzing the qualifications of mathematics teachers in Florida's high school classrooms. Shapiro and Gross's (2013) four ethical paradigms can assist in understanding the implications of these decisions from every perspective. The first paradigm, the ethic of justice, illustrates the need for equity and fairness in hiring practices (Shapiro & Gross, 2013). Students

and teachers expect to work in an environment that judges employees equally and fairly in order to select those that are highly effective. Studies also suggest that high levels of ethical conflict are associated with decreased job satisfaction and increased turnover rates (Valentine, Hollingworth, & Eidsness, 2014). In addition, studies have shown that a teacher's trust in his/her colleagues has a large impact on school effectiveness (Papa & Baxter, 2008). "The only way to deliver to people who are achieving is to not burden them with the people who are not achieving" (Collins, 2001, p. 53). In order to restore America's faith in the public education system, principals must give greater attention to filling classrooms with adequately prepared teachers who will be an asset to their colleagues and the teaching profession. The second paradigm, the ethic of critique, "is rooted in the idea that educators must question their assumptions and the assumptions that have become part of educational institutions" (George, 2010, p. 84). This ethic insists that administrators explore new hiring options with an open mind and investigate the fairness and justice of current practices. Alternative hiring practices introduce a wide array of practical, theoretical, and ethical issues. Each program represents diverse characteristics in candidates, design, rigor, length, and ultimate quality. While investigating their unique characteristics might seem daunting and pointless, this research is necessary because many individuals rely on the ultimate quality of the teachers supplied by those initiatives. Shapiro and Gross's (2013) third paradigm, the ethic of care, is instrumental to educators and administrators. Educators chose the profession because they truly care about every student and hope to give them the tools needed to achieve their absolute best. And lastly, the ethic of the profession insists that educators uphold the high standards to which the vocation is held (Shapiro & Gross, 2013). Researchers note that hiring qualified employees is critical for an institution to attain a level of high performance, whether in the corporate or educational arena

(Bowers, 2008). It is crucial that principals surround themselves with teachers who are effective in their classrooms. Optimal placement of these instructors is also important for an institution to succeed. No matter how inspiring a principal is, research has shown that inadequate teachers can have a negative impact on student achievement (Ludlow, 2013). Educators are given the task of preparing the country's most valuable resource, its children. Any decision that has an impact on the lives of students should not be made without considerable thought and research. Ethical hiring practices that result in adequately prepared educators in every classroom are necessary to restore the public's faith in the teaching profession.

Research Questions

1. What practices do high school principals at highest achieving schools in Florida's rural districts use to recruit and retain adequately prepared applicants for mathematics positions?
2. How do principals perceive alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts?
3. What strategies do principals use to maximize the instructional effectiveness of mathematics teachers who have diverse levels of certification?

Assumptions

The following assumptions were made:

1. End-of-Course exam scores reported by the State of Florida are a reliable and valid measure of school performance.
2. Principals' responses to interview questions will be honest and exhaustive.

Limitations

1. This study investigates practices at three Florida high schools located in rural districts; therefore, generalizations beyond the scope of this sample must be made with caution.
2. The study relies on scores from End-of-Course exams to determine which rural Florida high schools are high performing. No other data are included to evaluate performance.

Delimitations

1. The study will include three districts from Florida's Institute for Small and Rural Districts (ISRDR).
2. Florida Virtual School and schools associated directly with university programs have been excluded from the small and rural districts, since these schools have greater recruiting power and could skew the results.
3. Interviews will be conducted with principals from high schools within the three selected districts.
4. Schools will be selected based on performance on EOC exams in mathematics.
5. Participating schools will have similar socioeconomic backgrounds.
6. Time of the study: January 2017 to March 2018

Definitions

Adequately Prepared Mathematics Teacher: Teacher with a bachelor's degree in field or a minimum of thirty credit hours of calculus or higher, minimum of twenty-four credit hours of pedagogical coursework, minimum of one-year classroom teaching experience, and a valid Florida Professional Certificate.

End-of-Course Exam (EOC): Criterion-referenced assessments that measure Florida Standards for a specific course (Florida Department of Education (FDOE), 2017).

High Performing School: End-of-Course exam scores for Algebra I, Algebra II, and Geometry were utilized to determine achievement status. Percentages of students scoring in level 3 and above on each exam will be combined to reach a total percentage value, with the maximum of 300. Schools with 150 total percentage points or more will be included in the high achieving category.

Highly Qualified Teacher: The State of Florida defines highly qualified teachers as holding an acceptable bachelor's degree or higher and a valid Florida Temporary or Professional Certificate (FDOE, 2015).

Summary

Student performance on high school mathematics assessments is abysmal. Public perception of American education is not much better. Changes must be made for our current system of education to survive, and these changes need to begin in the classroom. Chapter 2 will examine literature that will assist readers in fully understanding the extent of the problem. The literature will cover characteristics of adequately prepared educators, the state of alternative certification, and the need for effective recruiting and retention practices. Information obtained from the literature will also assist in the development of the procedures utilized to complete this research study.

CHAPTER 2: LITERATURE REVIEW

Adequately Prepared Educators

Research has shown that effective teachers share common characteristics, and knowing these characteristics in advance can assist principals during the hiring process. Several notable studies were analyzed, and five characteristics frequently appeared when this researcher examined traits of teachers who increased student achievement: content knowledge, prior teaching experience, pedagogical courses and training, teacher certification, and personal attributes. The importance of a future educator's content knowledge appeared in each study included in this review. Prior teaching experience and pedagogical skills gained from teacher education programs were emphasized in three major studies. Teacher certification was addressed in two of the studies. And lastly, each study included additional personal traits that were identified in highly effective educators.

Content Knowledge

James Hynes, Sam Sullivan, and Hilary Yeager (2011) noted the importance of content knowledge in their mixed methods study designed to identify effective hiring techniques. Their study concentrated on schools in Southeast Texas. The researchers hoped to discover what administrators were looking for when they interview prospective teachers. The study included 12 qualitative contributors and 105 quantitative respondents. It included all levels from kindergarten through high school. The report also included districts of all sizes. The qualitative study consisted of interviews and direct observations, and it focused on attributes that were believed to be important to the principals. Hynes, Sullivan, & Yeager (2011) found that 58 per cent of administrators believed that content knowledge was essential. The researchers noted that content knowledge was considered a benefit because knowledgeable teachers would have the

ability to challenge their co-workers, consequently resulting in improved student achievement. The quantitative portion of the study focused on hiring procedures, ratings of desired qualifications, and ratings of desired personal characteristics. When it came to important qualifications, Hynes, Sullivan, and Yeager (2011) discovered that content knowledge was considered imperative by 91 per cent of respondents.

Stronge (2007) also noted the importance of subject matter knowledge in his book, *Qualities of Effective Teachers, 2nd ed.* The researcher believed extensive content knowledge was necessary for teacher effectiveness. To put it simply, an educator could not teach what he or she did not know. Wenglinsky found this to be especially important in the subjects of mathematics and science at the secondary level (cited in Stronge, 2007). These subjects tended to be inherently sequential; therefore, it was important for teachers to arrange the lessons in a way that observes the proper sequence for complete understanding to occur. It was also beneficial if the teacher incorporated guided practice and hands-on activities to assist in the learning process. This type of lesson planning required more extensive content knowledge (Stronge, 2007). The educators had to know what concepts came before and after each lesson in order to correctly instruct the students. They also had to identify any gaps that existed in their students' background knowledge and include this prior to the new lesson. Wenglinsky was quoted as stating, "Several studies have illustrated that teachers with greater subject-matter knowledge tend to ask higher-level questions, involve students in the lessons, and allow more student-directed activities" (cited in Stronge, 2007, p.11). Stronge (2007) asserted that when hiring new teachers, administrators should pay close attention to the coursework that the applicants completed in their field, especially in the areas of secondary mathematics and science.

Katharine Bourke and Casey Brown (2014) conducted a case study that concentrated on secondary schools. Their research focused on the relationship between an applicants' major field of study and student success and the characteristics principals hoped to find in their prospective teachers. The researchers conducted a qualitative study consisting of personal interviews with thirteen secondary principals from public schools. Bourke and Brown (2014) noted that principals had a common theme when it came to college major: "people trump prerequisites including, but not limited to, college major" (Bourke & Brown, 2014, p. 64). The principals looked for the best fit for their school. Nonetheless, administrators indicated to researchers that fit was determined in many cases by the applicant's knowledge in their subject area. They preferred that new teachers have strong subject mastery and the ability to share their knowledge with students. Bourke and Brown (2014) also indicated that administrators would chose a subject area major over an education major.

Frank Papa, Jr. and Iris Baxter (2008) studied public schools in New York. The results of the study were published in the article "Hiring Teachers in New York's Public Schools: Can the Principal Make a Difference?" (Papa & Baxter, 2008) The study examined the procedures used for hiring purposes, the amount of principal autonomy, and the teacher characteristics that were desired. The study used qualitative and quantitative measures and analyzed responses from 184 principals. Papa and Baxter (2008) identified ability and performance in college coursework as a desired characteristic that emerged during their research. The authors noted that few differences existed in the ranking of qualities between urban and rural, but urban schools ranked the importance of performance in college and in the classroom lower than rural principals. They felt this was not a reflection of the importance of the attribute, but a reflection of limitations beyond a principal's control.

While other researchers explored all characteristics of effective educators, Tchoshanov (2011) completed extensive research that concentrated exclusively on prior content knowledge. The purpose of his study was to assess the cognitive content knowledge of the teachers involved and determine the correlation between this knowledge and student achievement on state tests. Tchoshanov (2011) sampled 102 middle school mathematics teachers and around 2,400 students. The teachers represented twelve individual schools and encompassed three major districts. Tchoshanov's (2011) research design utilized a mixed method study, with a sequential nested component. The first phase employed a quantitative study that consisted of a timed survey designed to ascertain each teacher's level of content knowledge. The survey design specifically measured three types of cognitive knowledge: "knowledge of facts and procedures, knowledge of concepts and connections, and/or knowledge of models and generalizations" (Tchoshanov, 2011, p. 145). This phase also included the collection of student passing rates on standardized assessments. The researcher employed correlation analysis and a test for variance and independence to analyze the results. The second phase of the study was a mixed method component that used a subset of ten from the original population. This phase incorporated classroom observation, examination of lesson plan quality and teacher reflections. Researchers rated lesson design, implementation, and content using a Likert scale for calculation (Tchoshanov, 2011). Tchoshanov's (2011) final phase selected two teachers from phase two and conducted an in-depth case study that evaluated knowledge and comprehension of specific mathematics topics. The teachers who participated in this phase both taught high achieving students, but their level of comprehension of mathematical models and generalizations was noticeably different. After examining the results of each phase of the research, the author found

a “positive correlation between teacher content knowledge and student achievement” (Tchoshanov, 2011, p. 160).

Results of the first phase of Tchoshanov’s (2011) study uncovered a statistically significant relationship between a teacher’s knowledge of concepts and connections and students’ passing rates. The researcher found a slight significance between a teacher’s knowledge of models and generalizations and assessment scores as well. The second phase of the study did not reveal strong correlation, but teachers with strong knowledge of concepts, connections, models, and generalizations showed a propensity to design better lesson plans. The classroom observations also confirmed that the instruction practices of these teachers were considerably different than those who did not have a high level of content knowledge (Tchoshanov, 2011). Results of the third phase were interesting, yet the sample size restricted statistically significant findings. The assessment highlighted the importance of flexibility and reflective thought processes during the instruction of complex mathematical concepts (Tchoshanov, 2011).

Tchoshanov (2011) concluded that “teacher content knowledge of concepts and connections was significantly associated with student achievement and lesson quality in middle grades mathematics” (Tchoshanov, 2011, p. 162). The author also believed that an educator’s knowledge in these areas was a good predictor for success in the teaching profession.

Tchoshanov (2011) pointed out that the results of his research echo those of the National Mathematics Advisory Panel that emphasized teacher content knowledge as a crucial predictor of student success. He suggested that administrators use the findings of this study to make suitable hiring decisions and guide professional development for those already in the classroom (Tchoshanov, 2011).

Teaching Experience

Stronge (2007) addressed the existence of teaching experience in his research. He found that beginning teachers were more inclined to stick to a planned lesson, while teachers with prior classroom experience taught with more flexibility. Their experience allowed them to improvise and capitalize on unplanned events that could result in learning opportunities for students (Stronge, 2007). In addition, the author cited research from several studies that supported his emphasis on teaching experience. Borko and Livingston found that experienced teachers had better planning skills and organization. They also discovered that teachers with classroom experience employed more teaching strategies than novice teachers (cited in Stronge, 2007). Ferguson found that an educator's expertise "accounts for as much as 40 percent of the variation in student achievement" (cited in Stronge, 2007, p. 12). Another study conducted by Betts, Rueben, and Danenberg indicated that schools with more novice teachers were more inclined to have lower student performance (cited in Stronge, 2007). Stronge (2007) noted that classroom experience was a proven benefit, but only up to a certain point. Based on these findings, teaching experience is an area that administrators should take into consideration when evaluating prospective classroom teachers.

The importance of teaching experience emerged in the qualitative and quantitative portions of the study completed by James Hynes, Sam Sullivan, and Hilary Yeager (2011) as well. This attribute was significant to 83 percent of those interviewed during the qualitative portion of the research study. In addition, the quantitative part of the research study found that teaching experience was one of the top five characteristics frequently requested by administrators when interviewing prospective educators.

Lastly, Papa and Baxter (2008) found that principals considered teaching experience and training to be desirable attributes when filling classroom positions. Although administrators found this attribute important, the principals interviewed by the authors felt that guidance could be provided later. When faced with a lack of an experienced candidate, administrators noted that experience would develop over time (Papa & Baxter, 2008). The need for prior teaching experience could be addressed by participation in a teacher education program, and this was the next characteristic that was highlighted in the research.

Teacher Education Program/Pedagogical Training

Stronge's (2007) research revealed that educational coursework was another area to be considered when selecting highly effective teachers. Educational coursework "has traditionally included a series of courses focusing on child development, instructional and assessment techniques, and methods and materials related to specific content areas" (Stronge, 2007, p. 5). Some states, such as Florida, introduced alternative paths for those who wished to become educators. These alternative routes to certification contained condensed versions of some of the typical education courses. Controversy has surrounded the effectiveness of alternative routes among educators who completed the traditional education programs. Stronge (2007) stated that insufficient research existed regarding long-term effects of the nontraditional routes, but he found that teachers with traditional training were better at deducing student learning modalities and meeting those needs through instructional practices. These teachers were also more capable in the area of classroom management. His research cited findings from Johnson, Birkeland, and Peske which indicated that teachers who took the nontraditional route often expressed the need for more instruction in their content area and additional experience in the classroom (cited in Stronge, 2007). Studies that were available on the impact of teacher training on student

achievement showed a positive relationship in the areas of math, science, and reading (Stronge, 2007). Formal pedagogical training has proven to be a positive resource for educators and should be considered during the hiring process.

The importance of educational coursework and classroom management materialized in the quantitative and qualitative sections of research done by Hynes, Sullivan, and Yeager (2011). In the qualitative study, classroom management was important to 58 percent of the principals interviewed. Successful participation in a teacher education program was also in the top five characteristics noted in the quantitative section of the study. Administrators valued classroom management skills and interest in professional growth. Hynes, Sullivan, and Yeager (2011) felt that it was worth mentioning that their research uncovered a correlation between the length of time in administration and the emphasis on teacher education programs. An emphasis on educational training and classroom performance was also noted by Papa and Baxter (2008) when the researchers interviewed 184 principals. The researchers found that principals considered both to be desirable attributes when filling teaching vacancies.

Teacher Certification

The importance of teacher certification emerged in two of the research studies, most notably research completed by Stronge (2007). The author discovered that each state had different requirements for teacher certification, but they generally included pedagogy and content- specific course requirements along with appropriate test scores. The No Child Left Behind Act (2001) insisted on “highly qualified teachers.” It required teachers in every state to have full certification. Stronge (2007) was troubled by his findings in this area.

- The number of well-qualified, certified teachers within a state was a consistent and significant predictor of that state's student achievement in math and reading (Stronge, 2007, p. 8).
- Darling-Hammond and Stykes concluded that uncertified teachers and out-of-field teachers achieved far less with students than did teachers with proper, in-field certification (cited in Stronge, 2007, p. 8).
- One of the best predictors of low student performance in individual schools was the number of uncertified teachers in the building (Stronge, 2007, p. 8).
- More than half of the schools in the United States had certified teachers who were teaching in content areas in which they were not certified (Stronge, 2007, p. 8).
- One study, completed by Ingersoll, indicated that the practice of out-of-field teaching harmed the teacher as well as the students (cited in Stronge, 2007, p. 8).

Stronge (2007) concluded that administrators should insist on full certification for those applying for teaching positions within their district. Hynes, Sullivan, and Yeager (2011) took the research one step further and compared traditional certification to alternative certification. The researchers discovered that 50 percent of the administrators preferred teachers who held traditional certification instead of alternative certification. Both studies pointed out that in-field certification is needed to ensure that a district is hiring effective teachers.

Personal Attributes

Several personal attributes appeared in studies focused on ascertaining qualities of effective educators. Bourke and Brown (2014) found that principals involved in the study noted the existence of more male educators at the secondary level than the elementary level and admitted they would like to achieve an equitable balance. Yet those interviewed stated that an

applicant was ultimately chosen based on their qualifications above gender preference. The researchers also noted that the administrators would like to hire more minorities, but they were not willing to do so at the expense of hiring a more qualified candidate. Principals insisted that they wanted to hire the best applicants that fit the open positions (Bourke & Brown, 2014).

Bourke and Brown (2014) also examined desired applicant traits in their study. Secondary school administrators looked for the "three C's: character, competence, and chemistry" (Bourke & Brown, 2014, p. 66). The most frequent quality that surfaced was chemistry. Administrators searched for teachers who would fit in with their co-workers and the overall school climate. Administrators also noted that they would not hire applicants who seemed indifferent, indolent, inert, or inept.

Hynes, Sullivan, and Yeager (2011) reported four additional personality traits valued by administrators: teamwork, passion for teaching, strong first impression, and faculty mirroring the student body demographically. The most significant finding was the importance of teamwork. One hundred percent of the respondents valued teamwork in the qualitative study, and teamwork and positive attitude were deemed most important by 99 percent of those surveyed during the quantitative study. Passion for teaching was important to 75 percent of the respondents interviewed, and being student centered and possessing a passion for teaching were emphasized by 98% of respondents in the quantitative study. Hynes, Sullivan, and Yeager (2011) stated a strong first impression emerged in 66 percent of the interviews, but the characteristic was not mentioned in the quantitative portion of the study. Lastly, the researchers reported that faculty mirroring the student body appeared in both parts of the mixed methods study. This attribute was important to 58 percent of respondents in the qualitative study, but it was the least important in the quantitative study.

The last noteworthy personal trait revealed by the research process was the importance of verbal ability in a prospective educator. Teachers spend their day communicating with their students; therefore, it was no surprise that a teacher's verbal ability was an indicator of effective teaching. Stronge (2007) discovered that educators who exhibit a higher verbal ability had higher student achievement. "Thus, a discernable link exists between effective teachers' vocabulary and verbal skills and student academic success, as well as teacher performance" (Stronge, 2007, p. 4). The research supported what educational professionals intuitively knew. Knowing how to find a derivative in calculus and being able to share this knowledge in a manner that a student could understand were two very different skills. The best teachers were those who could break down a concept and teach it in a way that students could understand, replicate, and apply to future problems.

The research on characteristics of adequately prepared educators yielded many interesting traits to look for during the hiring process, and the importance of this process must not be underestimated. Bourke and Brown (2014) ended their report by quoting the National Commission on Teaching and America's Future. This commission stated that the "first premise is one that virtually every parent understands and a large body of research confirms: What teachers know and do is the most important influence on what students learn. Competent and caring teaching should be a student right" (Bourke & Brown, 2014, p. 67). The researchers stressed that we must hire educators who nurture students by cultivating a positive educational relationship. Principals involved in these studies understood this importance. Those interviewed stated that they would "choose an excellent teacher for just two years over a mediocre teacher for ten years" (Hynes, Sullivan, & Yeager, 2011, p. 58).

Alternative Certification

Certification was considered a necessary characteristic of effective teachers, but this characteristic was debated the most in literature pertaining to qualities of valuable educators. Researchers pointed out that increasing enrollment, teacher retirement, and the high number of teachers leaving the profession all made it difficult to improve teacher quality (Boyd, Goldhaber, Lankford, & Wyckoff, 2007). They also noted the additional problems faced by urban and rural schools:

Many difficult-to-staff urban and rural schools, unable to hire enough teachers from traditional preparation programs, especially in subject areas such as math, science, and special education, are forced to hire uncertified teachers, who thus become concentrated in schools with the lowest-performing students. (Boyd et al., 2007, p. 47)

Some states strengthened their certification requirements to improve teacher quality, while others that were experiencing extreme shortages reduced their requirements and created numerous alternative certification paths (Boyd et al., 2007). The same researchers observed that the requisites for “highly qualified” were not considerably rigorous, yet they still impeded many school administrators who were looking for certified recruits. Boyd et al. (2007) found that alternative certification was crucial in order to fill vacant positions, but the authors experienced difficulty when attempting to compare alternative and traditional routes. The researchers contended the lack of consistency among states and limited data collection hindered comparisons.

History

To understand how current certification policies evolved, a look at certification from a historical perspective is necessary. Preparation constraints of educators in the United States were

determined by the demand at any given time (Dial & Stevens, 1993). Dial and Stevens (1993) traced the roots of traditional teacher certification and explained that certification began in the 19th century after the creation of teacher training institutions called “normal” schools. Normal schools resulted from the need for more teachers as free public education grew rapidly. In the middle of the 19th century, states created certification boards to oversee the process, and by the beginning of the 20th century, these boards required passing scores on examinations and a normal diploma/pedagogical training (Dial & Stevens, 1993). As teachers organized, standards rose and tenure laws were passed (Dial & Stevens, 1993). These policies often influenced negative public opinion of the education profession. Dial and Stevens (1993) noted that in 1953 Bestor and Lynd published articles disputing the adequate preparation of teachers, much like protests heard today. In addition, the researchers pointed out that reforms were initiated in the 1960’s, but little consistency existed among the states.

Traditional teacher education and certification failed to keep up with increasing demand due to a rise in the number of students and teacher retirement rates (Ludlow, 2013). The shortage of teachers led to an increase in the use of out-of-field exemptions. One of the most comprehensive works on this topic was written by R. M. Ingersoll in 2001. Though the article is not recent, it explained the transition from traditional certification to alternative certification. Ingersoll (2001) began by contending the most important challenge in American education was the failure to guarantee that each classroom be taught by a highly-qualified teacher. The researcher explained that reformers have advocated for tougher standards for certification and created initiatives such as alternative certification programs to attract professionals, but these measures did not address the main causes of the need for out-of-field teaching assignments. The author asserted that many highly-qualified teachers were assigned “to teach subjects that do not

match their training or education” (Ingersoll, 2001, p. 28). Ingersoll (2001) proclaimed that out-of-field assignments could harm highly qualified teachers when they were asked to teach courses for which they lacked content knowledge and preparation. A lack of data prevented the issue from achieving national recognition and prompted eight years of research to identify the depth of the problem (Ingersoll, 2001).

Before Ingersoll (2001) investigated the extent of the misuse of out-of-field teaching, he had to determine a definition for the term “qualified” teacher. He found little agreement, so for the purpose of his research, he determined that to be qualified, a teacher must at least possess a college minor in each subject he/she is responsible for teaching. Using this definition, Ingersoll (2001) noted a startling level of misplacement. At the time of this study, “one-third of all secondary school math teachers had neither a major nor a minor in math” or associated disciplines (Ingersoll, 2001, p. 29). Furthermore, almost 25 percent of English teachers lacked a degree in their field or related fields, and more than 50 percent of physical science and history classes were instructed by teachers without relevant degrees or coursework (Ingersoll, 2001).

The research study revealed that out-of-field assignments were more common in certain circumstances and environments. New hires were more likely to be teaching out-of-field, and a higher concentration of out-of-field assignments existed at low income schools and smaller schools (Ingersoll, 2001). When considering student age, Ingersoll (2001) stated that middle school courses were more likely to be taught by out-of-field teachers than high school courses. The researcher also explained that lower level classes had a greater percentage of teachers without relevant coursework than higher achieving classes.

Ingersoll (2001) reported that out-of-field teaching occurred in more than 50 percent of all secondary institutions every year. When the definition of qualified was raised to “include

only those who earned *both* a college major and a teaching certificate in the field, ... only 65 percent of those teaching 7-12 math met this criteria” (Ingersoll, 2001, p. 30). In addition, only 41 percent of physical science students were instructed by a teacher meeting these criteria. Ingersoll (2001) asserted that the extent of out-of-field teaching was alarming.

Ingersoll (2001) concluded that the problem of under-qualified educators was a result of poor school management. He reported that state regulations were weak and often not enforced. The author also asserted that many states “allow local school administrators to bypass even the limited requirements that do exist” (cited in Ingersoll, 2001). Ingersoll (2001) explained that several states report instructors as out-of-field only if they were assigned that way for an excess of 50 percent of their day. The author also speculated that administrators often overlooked a highly qualified candidate to hire a candidate who might be able to perform extracurricular duties.

Alternative certification originally began in the 70’s as a solution to the problems created by out-of-field teachers, but this period was characterized by a lack of pupils, money, and confidence in the system. The lack of demand caused a reduction in education-focused graduates, and alternative certification did not endure due to the abundance of qualified teachers (Dial & Stevens, 1993). However, policy changes in the 80’s brought renewed focus on alternative certification. Certification routes were designed to attract unconventional applicants who are specialists in the discipline they choose to teach (Pazyura, 2015). In 1984 Feistritzer reported “[m]ore women than men are now going to college, and the best and brightest of them are getting degrees in fields other than teaching” (cited in Dial & Stevens, 1993, p. 10). At the same time, Goodlad advised principals to “dwell on quality regardless of the supply and demand at any given time, because quality should be the first order. In bringing quality to the profession,

he suggested higher salaries and a ranked pay scale” (cited in Dial & Stevens, 1993, p. 10). Dial and Stevens (1993) noted that the publication of *A Nation at Risk* (1983) had a distinct effect on education policy, and this report inspired New Jersey to create an alternative certification system that gained national acclaim. Around the same time, the U.S. Secretary of Education stated his lack of faith in pedagogical training and began urging states to remove this requirement from their certification process (Ludlow, 2013). Pazyura (2015) revealed that William Bennett, the Secretary of Education in 1986, requested that the legislators eliminate pedagogical requirements for certification. Bennett called them “thoughtless papers,” as they were of little importance to those who had extensive knowledge in their field. This thought was echoed by President George Bush when he instituted “Program 2000” (Pazyura, 2015). It was noted that Bush supported the bill for its attempt to found a national model of alternative certification based on the successful program in the state of New Jersey (cited in Pazyura, 2015). The New Jersey model required potential educators to have a baccalaureate degree in their subject, pass an exam in that field, and complete eighty hours of training prior to entering the classroom. An additional 120 hours of training was mandatory during their initial year in the classroom, as well as an assigned mentor and support group (Pazyura, 2015). Dial and Stevens (1993) reported that *A Nation Prepared: Teachers for the 21st Century* (1986) also influenced teacher preparation. The authors stated that as of 1989, at least twenty-five teacher preparation reforms had been passed in the previous fifty years. Dial and Stevens (1993) asserted that rising demand for highly qualified teachers and the negative public opinion about traditionally trained teachers fueled the rise of alternative certification. The authors noted several opposing studies addressing the quality and commitment of alternatively certified teachers. One consensus among the studies was that teachers who chose the alternative certification route “tend to be older, have more work experience, are more likely

to be ethnic minorities, more likely to be bilingual, and more likely to prefer teaching in inner-city schools” (Dial & Stevens, 1993, p. 15). In conclusion, the authors contended alternative certification was a feasible solution to the nation’s teacher shortage, particularly in inner-city schools.

Traditional Certification vs. Alternative Certification

Now that the history of certification progression has been described, focus is shifted to the differences among the certification processes. Boyd, Goldhaber, Lankford, and Wyckoff (2007) researched the differences in certification and gave a comprehensive description. The first type of certification the authors reviewed was traditional certification. Curricula for traditional teacher preparation programs must be approved by the state. Traditional programs reviewed consisted of foundation courses, pedagogical courses, subject area courses, and field experience (Boyd et al., 2007). When content knowledge was considered, researchers found that “twenty-five states require high school teachers both to have a major in their subject area and to pass a content-knowledge exam” (Boyd et al., 2007, p. 48). The remainder of the states required either a major in their field or a content-specific exam. Lastly, student teaching requirements varied considerably, but thirty-eight states mandated field experience. Educators who graduated from a state approved program receive certification upon satisfactory completion of required exams (Boyd et al., 2007).

Next, Boyd et al. (2007) examined alternative routes to certification. The authors noted that these programs vary tremendously among states. The programs allowed educators to “enter the classroom by postponing or bypassing many of the criteria required by traditional teacher preparation programs” (Boyd et al., 2007, p. 51). The researchers shared that forty-six states had at least one form of alternative certification and all of them required a bachelor’s degree. In

addition, 80 percent mandated coursework or an exam in relevant subject matter. Boyd et al. (2007) observed that more than one third of the alternative certification programs as of 2007 had been initiated within the previous six years. Several states greatly relied on alternative certification to fill classroom vacancies as they moved away from temporary and emergency certification (Boyd et al., 2007). Boyd et al. (2007) revealed that preservice training could range from two weeks to twelve, and less than 50 percent of the states mandated student teaching or fieldwork. The authors also reported that some states offered as many as one hundred different programs, including some that were entirely online. Prospective teachers enrolled in these programs must hold a bachelor's degree before acceptance, but the applicants were often given two years to attain minimum scores on certification tests (Boyd et al., 2007).

Alternative Certification Comparisons by State

Ludlow (2013) also reported an increase in alternative certification between 1983 and 2003. Alternative certification programs increased from being offered in eight states to being offered in forty-six states, with 144 diverse versions of the process available (Ludlow, 2013). Ludlow (2013) reported that 485 different models were in use by 2007, and by 2009 one third of the nation's new teachers were certified via an alternative method. Research presented opposing views on the quality, effectiveness, and commitment of alternatively certified teachers. The author emphasized that research consistently showed an increase in minority teachers utilizing alternative certification. Additionally, participants' abilities were affected by coursework in their content and relevant pedagogy. Ludlow (2013) concluded that each state had diverse pathways to alternative certification and the extent of their effectiveness at producing high quality educators was inconclusive. She explained that states command the authority to define conditions of licensure. Each state enabled legislatures and appointed boards of education to set

the requirements for certification based on their particular needs. The author pointed out that this practice led to inconsistency in the “amount and substance of coursework requisites, quantity of field experience obligations, and length of time spent student teaching” (Ludlow, 2013, p. 441). Ludlow (2013) added that the inconsistency was apparent when focusing on teacher certification exams. She reported that the exams were so inconsistent that the “National Research Council could not generalize to any specific knowledge or skills required of prospective teachers” (Ludlow, 2013, p. 441). The author believed this was due to lack of federal participation in the process. Ludlow (2013) noted that federal commitment to teacher quality and certification was noteworthy when they passed the No Child Left Behind Act in 2001, which required all teachers to be highly qualified. She emphasized the following:

According to the U.S. Department of Education, highly qualified teachers must possess a bachelor’s degree, full certification or licensure, and prove competency in the subject area or grade level in which they teach by passing a standardized content area test (Ludlow, 2013, p. 441).

While all states followed the same mandate, the lack of consistency in their alternative certification programs was addressed by all authors included in the literature review.

Several researchers compared alternative certification programs between states and within an individual state. Lindon Ratliff (2008) examined routes to certification in Mississippi. He explained that an expanding population, low salaries, and the No Child Left Behind legislation have left the state of Mississippi dealing with a crisis when attempting to fill vacant positions with highly qualified educators. The author believed this has led to an increase in alternative certification and emergency licenses in the state. Ratliff’s (2008) study researched several alternative certification programs and the loopholes that existed in state policy. He found

the need for adequate alternative certification was great, asserting traditional routes could not keep up with demand. Forty percent of the state's education graduates left the state for higher paying positions. Of the 60 percent who stayed, half would leave the profession within their first five years (Ratliff, 2008). This made alternative certification a necessity.

Ratliff (2008) detailed problems with the design of two alternative certification programs. The first, Mississippi Adequate Path for Quality Teachers (MAPQT), was the weakest program. MAPQT allowed prospective teachers who failed part of the state certification exam to receive temporary certification and continue in the program for up to three years (Ratliff, 2008). Ratliff (2008) predicted that this equated to ten percent of active special education teachers being allowed to teach special needs students without passing the certification examination. The author explained that these educators received a provisional license and were paid the same as traditionally certified teachers. He also stated that once the teachers passed both parts of the certification exam, they could receive a standard five-year license after completing coursework that was equivalent to only twenty-four days in class. In addition, the MAPQT program relied on applicants self-reporting any character issues such as addiction and relied on hiring districts to complete any background checks (Ratliff, 2008). The second program the author examined was the American Board for Certification of Teacher Excellence Passport to Teaching. Ratliff (2008) explained that a loophole in this program allowed the students to bypass certification exams and report directly to ABCTE. According to the author, the agency relied on its own tests, which lacked validity. This type of alternative certification was also accepted in Florida (Ratliff, 2008). Ratliff (2008) believed the ABCTE certification tests were not consistent with state-mandated tests.

Ratliff (2008) also revealed problems with emergency certificates that were on the rise. He explained that this temporary certification path contained more loopholes than the alternative route. These loopholes could allow the educator to continue for three to five years without certification in their field (Ratliff, 2008). Ratliff (2008) pointed out that schools were now required to notify parents when their child's teacher held an emergency certificate, but schools had found a loophole to avoid this process as well.

As a result of his research, Ratliff (2008) recommended that Mississippi discontinue the MAPQT and ABCTE programs for alternative certification. The author suggested that the remaining routes be aligned to meet uniform requirements. Furthermore, Ratliff (2008) declared that emergency certification should be discontinued. He held that no district should choose to employ a person who could not meet the minimum requirements. Lastly, the author called for a competitive pay scale to make education more attractive to college graduates. Ratliff (2008) concluded that educators would not be valued in Mississippi as long as classrooms were staffed with teachers who had little or no training.

After deriding current research that ignored substantial fundamental differences between the multitude of alternative certification models, Scribner and Heinen (2009) chose to conduct extensive research on alternative certification routes in the state of Missouri. Scribner and Heinen (2009) noted that Missouri required candidates to hold a bachelor's degree in a subject relevant to the one they intend to teach and have at least a 2.5 grade point average. After completing initial training, the applicants received a two-year provisional certificate to teach (Scribner & Heinen, 2009). Since the research is focused on one state, the authors pointed out that all programs should follow state guidelines which insisted that new teachers do the following:

1. be assigned a mentor from the same subject area and approximately the same grade level during the teachers' first two years
2. receive ongoing professional education from their ATCP's during their first year
3. participate in the district's professional development program, and
4. participate in the Missouri Performance-Based Teacher Evaluation program. (Scribner & Heinen, 2009, p. 181)

The authors observed that Missouri had two different categories of alternative certification programs. One required coursework be completed before entering the classroom, and the second placed educators into the classroom following a short training session. The researchers also asserted that the study did not include information on educators who entered the field through Missouri's emergency certification route. These teachers needed only a bachelor's degree and proof of a job offer (Scribner & Heinen, 2009).

Scribner and Heinen (2009) utilized program theory evaluation to identify important elements of Missouri's complex alternative certification policy. The study included data from personal interviews, classroom observations, and document reviews. The authors reported data from five different alternative certification programs and used the constant comparative method to analyze their findings. The researchers labeled the programs A through E for reporting purposes. These findings revealed significant differences between the programs.

Scribner and Heinen (2009) first detailed findings on the only internal integration model, Program C. The authors reported this program focused on math and science in order to concentrate their focus and improve the accuracy of the results. The researchers explained that Program C upheld high standards for admittance, provided stipends funded by an external source, and resulted in a Master of Arts degree in teaching. The candidates could complete

coursework first and then enter the classroom, or they could choose to complete coursework while teaching (Scribner & Heinen, 2009). The authors noted, “The field experience component in Program C was highly structured and supervised, and mentoring was an integral piece of the program. Program C provided mentor support directly, in the form of on-site supervision of participating teachers” (Scribner & Heinen, 2009, p. 187). The successful mentoring component set this model apart from the others.

Scribner and Heinen (2009) discussed Programs A and D, which were external adaptation models that served multiple clients. The authors reported that these models served an urban district and had a philanthropic funder. Scribner and Heinen (2009) noted the flexible programs offered a variety of entry points and completion schedules that “blurred the lines between three non-traditional routes to teacher certification” (Scribner & Heinen, 2009, p. 187). The researchers admitted this flexibility made comparisons difficult. Participants described difficulties adequately staffing courses, managing articulation, differentiating instruction, and providing suitable mentoring experiences (Scribner & Heinen, 2009). The researchers revealed that program administrators claimed mentoring was the responsibility of the district, and this confusion led to inadequate supervision and field experience.

Lastly, Scribner and Heinen (2009) revealed findings from Programs B and E. These programs represented external adaptation models with a single client. The authors noted that third party financial contributors played an active part in the programs, which resulted in a lack of autonomy and political pressure. Scribner and Heinen (2009) pointed out that the politics of the district influenced selection of candidates, coursework, and placement. The researchers claimed that teacher candidates were placed in “rough, dead-end” schools that historically lose new teachers. The authors also revealed that participants were given no program-based support

is the classroom. Many of the new teachers in the study reported that they were unable to locate assigned mentors (Scribner & Heinen, 2009).

Baines, McDowell, and Foulk, (2001) were alarmed by the rapid surge in alternative certification and asserted that the new routes to teaching could harm American students. The researchers chose to investigate alternative certification programs in Texas, Georgia, and Florida. Their work seemed somewhat biased, but it included several unique perspectives. The authors began by introducing Emily, a Georgia school bus driver who had taken two college-level English courses while completing her business degree. Baines et al. (2001) explained that Emily would complete a four-week summer class and begin teaching secondary English students in the fall. The authors emphasized that Emily would be given two years to pass an exam that would allow her to be fully certified to continue in the classroom. Baines et al. (2001) argued that this scenario is all too common in Florida, Georgia, and Texas due to weak guidelines for certification in those states. The researchers asserted that “to be a teacher in Georgia, Texas, or Florida, one needs only a bachelor’s degree and a 2.5 overall grade point average. No previous experience with children or demonstrated expertise teaching is necessary” (Baines et al., 2001, p. 32). The authors felt that the availability of qualified teachers was not as extensive as politicians suggested. It was reported that 30 percent of Florida’s recently certified educators chose not to teach, though they did admit that the teacher shortage might be real in rural and high poverty areas. Ludlow (2013) also expressed her concern that the shortages differed based on socioeconomic status of each school and its geographic location. She contended that high-poverty and high-minority districts had more difficulty hiring and retaining highly qualified teachers. After questioning the necessity of alternative routes, Baines et al. (2001) investigated requirements by state.

Baines et al. (2001) reported that Texas required alternative certification candidates to hold any degree, spend two weeks in training during the summer, begin teaching in the fall, and complete two courses during their first year of teaching. The state did not require any specific content-related courses or field experience, yet the same state required university education programs to provide at least three years of coursework (Baines et al., 2001). Georgia adopted a similar plan, but extended the summer course to four weeks. Baines et al. (2001) stated that “by fulfilling only these three requirements (bachelor’s degree, fingerprinting, and a job offer) an individual may teach school in Florida for up to three years” (p. 36). The authors pointed out that the educator must pass certain exams to subsequently receive a five-year certificate. Baines et al. (2001) determined that none of these programs could appropriately prepare an individual for the classroom in the minimal time given, especially in the absence of hands-on classroom experience. The authors concluded by expressing the opinion that such programs “devalue the art and science of teaching at a time when the need for experienced, knowledgeable teachers has never been greater” (Baines et al., 2001, p. 37).

National Alternative Certification Programs

A couple of researchers compared alternative certification programs that were nationally recognized. Melanie Shaw (2008) researched several programs in an effort to determine their necessity and impact on today’s educational climate. Educational data from Utah, Pennsylvania, New Hampshire, Idaho, and Florida were included in her study. The author attributed the need for alternative routes for educators to increases in retirement, college tuition, and turnover rates. Shaw (2008) emphasized that teaching salaries are also to blame, since they were generally not high enough to help repay student loans. In addition, the author credited policy changes such as No Child Left Behind (2001) which called for “highly qualified” teachers in every classroom.

This legislation posed difficulties for schools who did not meet the requirement (Shaw, 2008). The researcher contended that before NCLB many teachers in critical shortage areas such as math and science were not even certified. When faced with replacing these teachers and the loss of 50 percent of new teachers within their first five years, states recruited teachers in an alternative way (Shaw, 2008). Alternative certification programs were “inexpensive, short-term, and allow teachers to move directly into the classroom” (Shaw, 2008, p. 90). Many educators who chose this path came from underrepresented ethnic groups and women attracted to the professions in order to have more time with their children. As found in other research, the author reported many variations in current alternative certification programs on the district, state, and national level. Shaw (2008) studied three national programs: Troops to Teachers, Teach for America, and American Board for Certification of Teacher Excellence. The author stated, “to call them alternative certification programs is a misnomer as none of the three programs can issue a state teaching certificate as required by all states. Instead, these programs serve as recruitment programs” (Shaw, 2008, p. 92). Research showed that teachers with alternative certification were filling critical shortage vacancies at a higher rate than traditionally certified educators (Shaw, 2008). Shaw (2008) stated that evaluating all available alternative certification avenues was difficult due to the striking differences that existed between them. Even those programs within an individual state had little consistency. In some states teachers were allowed to teach out of their area of certification for half of their contracted hours (Shaw, 2008). The author also explained that each state “collects and maintains data on alternative teacher certification in different ways” (Shaw, 2008, p. 94). In addition, there was a lack of agreement on how to report temporary and emergency certificates (Shaw, 2008). Shaw (2008) concluded by asserting that alternative certification did indeed help recruit teachers in critical shortage

areas, but the article did not present any in-depth analysis of the overall effectiveness of the individual programs due to the lack of consistency in alternative certification routes available.

On the opposite side of the spectrum, Boyd et al. (2007) described highly selective programs that required content area coursework, intensive training, mentoring sessions, specialty exams, and acceptance into an approved master's level program. One such program was the Teaching Fellows Program in New York. The authors explained that the test scores and college ranking of educators in this program exceeded those of traditional teacher candidates. In addition, the group tended to be more diverse than traditionally trained teachers, as well as more willing to teach in hard-to-staff schools (Boyd et al., 2007).

Alternative Certification in STEM Fields

The noted lack of emphasis on content knowledge in alternative certification programs can have a devastating impact in the STEM fields. Lederman, Lederman, and Abd-El-Khalick (2006) considered the study of science, mathematics, and technology crucial for the success of our nation. Lederman et al. (2006) emphasized this need:

Among these priorities is the preparation of qualified science and mathematics teachers who are capable of addressing the needs of an increasingly diverse student population; developing curricular materials that focus on depth of exploration and conceptual understanding rather than breadth of coverage and rote memorization. (Lederman et al., 2006, p. 258)

The authors contended that the best predictor of student achievement in these fields was a teacher with a major and full certification in the instructor's assigned subject area. It was also noted that research suggested 61 percent of high schools have trouble finding highly qualified science teachers. The researchers reported that the shortages are prominent in rural and urban

areas. This shortage based on geographic location appeared in much of the documented research on alternative certification.

Lederman et al. (2006) emphasized that the current teacher shortage could be ameliorated by the use of alternative routes to certification. The authors found that there were many diverse forms of alternative certification, which was consistent with the findings of other research included in this review. The most common forms offered “boot-camp-type” training that consisted of a two or three-week training session prior to the start of fall classes. The researchers warned that administrators should be more concerned about the qualifications of these new teachers than the number of classrooms they could fill. Lederman et al. (2006) asserted that “major reform documents in precollege science and mathematics education articulated images of teaching that place great demands on teachers’ content knowledge and pedagogical expertise” (Lederman et al., 2006, p. 261). The authors warned that new educators would be responsible for developing appropriate curricula and engaging lessons while managing classrooms with no prior experience. This could be a daunting task for traditionally trained educators who have had the benefit of extensive coursework, preparation, and internships. As with previous studies, Lederman et al. (2006) uncovered research supporting the success of alternative certifications as well as research pointing to its negative impact on achievement. The diversity among the programs, once again, seemed to be the driving reason for this disparity. The authors’ research did confirm previous studies that stated teachers who chose the alternative path tended to be more ethnically diverse and more willing to teach students in lower socioeconomic schools.

While Lederman et al. (2006) found primarily discouraging examples of alternative certification in the STEM fields, Evans (2010) examined the Teaching Fellows Program in New York, which was considered an exemplary program in previous literature included in this review.

Evans (2010) concentrated on secondary mathematics after noting that much of the existing data dealt with elementary schools instead of secondary schools. The study examined two alternative certification levels created in New York City in response to teacher shortages. These paths to certification enabled working adults to change careers. First, Mathematics Immersion focused on individuals who lacked thirty credit hours in mathematics. Those who enrolled on this path were given three years to complete the necessary coursework after they began teaching. The second level Evans (2010) detailed was that of Mathematics Teaching Fellows. These individuals already had the thirty required credit hours in mathematics. Both groups were required to pass the Liberal Arts and Sciences Test and the Content Specialty Test in mathematics before becoming fully certified in the state of New York. Evans (2010) compared these requirements with recommendations from the National Council of Teachers of Mathematics. They suggested the following:

NCTM recommends that high school mathematics teachers have the equivalent of a major in mathematics, commonly understood in New York to be at least 30 credits of calculus and higher. For middle school teachers NCTM recommends that mathematics teachers have at least the equivalent of a minor in mathematics (Evans, 2010, p. 25).

It was noted that New York's alternative certification required both middle and high school teachers to have a minimum of 30 credits of calculus and higher. The author cited research stating that thorough content knowledge in mathematics was necessary for quality instruction (Evans, 2010; Stronge, 2007).

Research concentrated on the areas of "content knowledge, attitudes toward mathematics, and teacher efficacy" (Evans, 2010, p. 25). While all of these factors influenced student learning, little previous research had studied the relationship between content knowledge in

mathematics and teacher efficacy. Evans (2010) insisted the research was necessary to improve the ability to select quality educators from those who hold alternative certifications, since these teachers tended to serve students who were “high-need.” The research study investigated a convenience sample of forty-two new teachers. Thirty teachers in the study were classified as Mathematics Immersion, and the remainder were Mathematics Teaching Fellows (Evans, 2010). Each participant completed two questionnaires and a mathematical content knowledge test at the beginning and end of the semester. The first questionnaire was devised to measure attitudes about mathematics utilizing forty Likert-style questions. The second questionnaire measured teacher efficacy using twenty-one Likert-style questions (Evans, 2010). The researcher employed independent *t*-tests, one-way ANOVA, and Pearson correlations using SPSS statistical software. Evans (2010) reported a statistically significant difference between high school teachers and middle school teachers in the area of content knowledge. He also reported a statistically significant difference in content knowledge between Immersion and Fellows teachers. Evans (2010) did not report a difference between these groups when he examined attitudes toward mathematics and teacher efficacy. It was noted that science and mathematics majors had a significantly higher knowledge in STEM areas than the teachers who were business or liberal arts majors. Surprisingly, the study did not reveal a difference in attitude or teacher efficacy between the previous groups. The researcher found the difference in content knowledge to be troublesome since advanced mathematical knowledge is crucial for quality mathematics education (Evans, 2010; Stronge, 2007). Based on the findings of his research, Evans (2010) recommended that middle school educators who received alternative certification be provided intense professional development opportunities in their content. He also suggested further research that included student achievement as a variable. Evans (2010) insisted that further

research was necessary due to the rapid growth of alternative certification. He stated that 25 percent of the mathematics teachers in New York were alternatively certified in 2008, and the trend was increasing. Further investigation would assist administrators and policy makers in providing highly effective educators in each mathematics classroom (Evans, 2010).

Recommendations

In an effort to provide highly qualified educators for our public schools, states have mandated stricter requirements for teacher education programs. On the other hand, to address teacher shortages, the states have created alternative certification programs that provide a shortcut to temporary certification (Brewer, 2006). Rod Paige (US Department of Education, 2002) called “current certification systems outdated and entry requirements rigid...and maintained that they dissuade many academically accomplished persons from teaching, whereas the system allows certification to those whose content knowledge is weak” (Brewer, 2006, p. 270). Brewer (2006) stated that Paige proposed raising standards for educators using the traditional route to certification and remove barriers for those choosing the alternative route. Paige obviously assumed that the alternative route would be used by individuals with a great deal of content knowledge in their field. However, Florida’s alternative certification program permits individual districts to develop their own programs to meet district needs, and this individualization has created numerous pathways with little consistency or oversight (Brewer, 2006). To resolve this dilemma, Brewer (2006) proposed that federal authorities deregulate public education and provide teachers with more autonomy. Scribner and Heinen (2009) recommended that alternative certification programs be insulated from the pressures of funding and politics as well. Brewer (2006) encouraged state-level policymakers to work with institutions of higher education rather than avoiding their expertise. The author emphasized that

teachers who are better prepared are more likely to remain in the field of education. Brewer (2006) also encouraged public schools to work with colleges in order to attract more qualified applicants. The author hoped that these changes would attract highly qualified educators who are truly interested in educating our youth, not just “stopgap” employment. Brewer (2006) encouraged districts to find a way to address the teacher shortage without “flinging the back door to alternative certification wide open” (Brewer, 2006, p. 382).

Researchers also recommended an emphasis on content knowledge when selecting and creating alternative certification programs. This is not surprising in view of the correlation reported by Boyd et al. (2007). This research noted a correlation that appeared in several studies: “achievement in high school math is greater for students whose teacher has a graduate degree in mathematics than for students whose teacher either has no graduate degree or a degree in another subject” (Boyd et al., 2007, p. 57). Stanley and Martin (2009) discussed content knowledge at length. They asserted that effective teachers need strong knowledge of their content and successful methods of pedagogy. The authors stated, “Highly qualified teachers have content majors or the equivalent and are certified in their areas” (Stanley & Martin, 2009, p. 102). Stanley and Martin (2009) also noted the Holmes Group, National Board for Professional Teacher Standards, Carnegie Forum Task Force, Interstate New Teacher Assessment Support, and National Council for Accreditation for Teacher Education all insisted that highly qualified teachers must possess extensive knowledge of their content. The authors commented that this is especially important in mathematics. Their research found that “teachers with competent subject matter knowledge in mathematics were able to produce better achievement levels of at-risk students” (Stanley & Martin, 2009, p. 102). Stanley and Martin (2009) believed that valuable alternative certification programs must be selective and choose students with high content

knowledge. Lederman et al. (2006) also recommended extensive prior coursework in relevant content be considered when evaluating an applicant who is alternatively certified.

The next recommendation found in the research was that of content-specific pedagogical training. Boyd et al. (2007) uncovered a correlation between mathematics content-specific classes in pedagogy and student achievement gains (Boyd et al., 2007). This finding highlighted the importance of pedagogy training. Lederman et al. (2006) recommended curricula in classroom management and applicable teaching methods. Stanley and Martin (2009) also believed that successful alternative certification candidates should complete required pedagogical training.

The need for a successful mentoring relationship was also recommended consistently. A quality program should contain a “structured, well-supervised induction period with close supervision and guidance by an experienced mentor for at least one year, along with ongoing professional development and post-internship training” (Stanley & Martin, 2009, p. 104). Scribner and Heinen (2009) also pointed out the necessity of consistent on-site mentoring support for alternatively certified candidates. And lastly, Lederman et al. (2006) reported that successful alternative certification programs were characterized by strong supervision during the first year.

None of these recommendations were revolutionary ideas. They have all been proposed previously, but ignored by those in charge. Pazyura (2015) reported the requirements defined by the American Association of Pedagogical Colleges and Association of Educators for Teachers. They requested that “candidates must have baccalaureate in the subject he/she wants to teach; before the beginning of teaching activity a candidate must get sound theoretical pedagogical training; a candidate is to get the help and support of a mentor” (Pazyura, 2015, p. 37). The

research validated the recommendations of colleges of education and classroom teachers already in the field.

The last recommendation worth noting was one that pertained to interviewing strategies. One research study examined this extensively. Sawyer and Gimbert (2008) examined interview strategies that could assist program administrators in selecting the best candidates. The authors noted that almost one third of educators as of 2006 entered through an alternative route. The researchers posed the question “How does an employer identify those qualifications and behaviors of an alternatively certified applicant that will allow that person to be an effective teacher while learning how to teach?” (Sawyer & Gimbert, 2008, p. 10).

Sawyer and Gimbert (2008) believed the lack of prior experience in the classroom made predicting the effectiveness of alternatively certified applicants difficult. The researchers implied that it was the moral duty of “school administrators to develop a selection process that will ultimately benefit students, while remaining impartial and fair to all teacher applicants” (Sawyer & Gimbert, 2008, p. 13). In addition, they emphasized that staff selection was one of the most significant choices an administrator would make, due to its large impact on school effectiveness.

Sawyer and Gimbert (2008) recommended using a structured interview protocol during the hiring process, and the researchers detailed three different instruments that could assist the interview team during the selection process. Sawyer & Gimbert (2008) recommended the Star Teacher Selection Interview because this method was specifically designed to identify the best candidates for alternative certification educators in at-risk schools. The method consisted of fourteen scenario-based questions that were designed to measure “persistence, protection of learning and learner’s freedom to learn, ability to move from theory to practice (generalization),

a viable approach to at-risk students, a personal and professional orientation to students that is child-centered, a healthy response to bureaucracy and burnout, and a tolerance for fallibility” (Sawyer & Gimbert, 2008, p. 18). The researchers noted that the goal of these questions was to select educators who could function in a classroom while learning to teach. The instrument took thirty-five minutes to complete, and reported a 95 percent success rate in identifying educators who were more likely to stay in the field and succeed (Sawyer & Gimbert, 2008). The authors did admit there are additional mixed reviews on the success of the instrument, but many reviews acknowledged the instrument identifies candidates with a strong sense of moral and ethical commitment. Sawyer and Gimbert (2008) encouraged the use of interview protocol measures to ensure the selection of candidates of the highest quality and best fit. The researchers concluded by pointing out that teacher selection was the most important factor influencing student achievement.

Recruitment and Retention

Recruitment

Recruiting effective mathematics and science teachers has proven to be difficult in rural areas. To understand the struggle, one must first understand the communities themselves. Monk (2007) completed extensive research on rural areas and identified features that he felt were intrinsic in rural communities. He listed characteristics such as small size, limited choices for consumers, sparse settlements, dependence on agriculture for income, and distance from larger populations. Monk (2007) pointed out that the economic foundations of rural communities have a tendency to be place-bound. These foundations included industries such as agriculture that made use of low-skilled employees and often hired seasonal workers. Monk (2007) also stated that many rural areas were extremely impoverished. His research cited Malhoit, who revealed

that “[a]mong the 250 poorest counties in the United States, 244 are rural, and out of the 8 million children attending public schools in rural areas, 2.5 million live in poverty” (cited in Monk, 2007, p. 156). The researcher maintained that one of the crucial challenges faced by rural communities was retaining its younger generation.

After he defined the characteristics of rural communities, Monk (2007) concentrated his research on three factors that he felt impacted recruitment and retention of qualified teachers. He first addressed the characteristics of rural teachers. He noted that smaller rural schools had a higher concentration of inexperienced teachers. These teachers tended to be non-Hispanic white educators. The smaller schools included in the study also had fewer highly trained teachers than those in larger areas, and these small schools were less likely to insist on passing scores for required certification tests. Monk (2007) exposed several troubling trends:

- Robert Gibbs stated that teachers in rural areas were only about half as likely to have graduated from top-ranked colleges or universities as their peers in urban areas (cited in Monk, 2007, p. 159).
- Greenberg and Teixeira reported that researchers also consistently found that teachers in rural areas had comparatively low educational attainment, which suggested one reason why rural areas may have been less likely to offer college-preparation programs. For example, ninety-three percent of twelfth graders in urban areas were enrolled in schools that offered calculus, but only sixty-four percent of rural twelfth graders had that opportunity (cited in Monk, 2007, p. 159).
- Carlsen and Monk found that rural science teachers were less likely to have graduate degrees and more likely to have majored in education with less

coursework in science and mathematics than their urban counterparts (cited in Monk, 2007, p. 159).

Monk's research also echoed the fact that rural schools had trouble attracting teachers in common shortage areas such as science, mathematics, and special education. He acknowledged that rural schools have many challenges when hiring qualified personnel.

The second organizational feature that Monk (2007) addressed was that of working conditions for educators in rural areas. He recognized that these conditions may influence the group of new hires applying for jobs. The research revealed disparities in class size and the number of additional course preparations in rural areas compared to other school settings. This was especially prevalent at the secondary level. On a positive note, Monk (2007) found that teachers in rural areas were more satisfied with the atmosphere in which they worked. His research indicated that rural teachers had a greater sense of autonomy and influence, as well as fewer discipline problems. Conversely, the study revealed that smaller student populations led to less specialization among educators, and this made it difficult for teachers to properly address student needs. Monk (2007) stressed that "[s]chools with larger numbers of students tend to enjoy a cushion against change" (p. 161). When student populations are small and mobile in nature, schools proved to be vulnerable to instabilities in data used by government agencies to gauge adequate progress. Many of the influences addressed in this study could lead to a stressful working environment and make rural schools undesirable for prospective teachers.

Next, Monk (2007) considered teacher salaries in rural districts, noting that salaries could be as much as sixteen and one-half percent lower than the national average. The researcher referenced Robert Gibbs, whose research also validated that salaries for beginning urban teachers seemed to be around 21 percent higher than those of beginning rural teachers. Monk (2007)

attributed the lower salaries to many factors. Rural schools often faced higher operational costs. These may have been due to the need for specialized services for disabled students, lower fiscal earning capacity, and the additional transportation expenses associated with the sparsely populated geographic location. In addition, it was noted that rural schools were not as prone to compete when attracting new applicants. Monk (2007) cited Robert Strauss, who found that rural schools tended to hire teachers with local ties. Strauss also asserted that rural schools often hired a local candidate over a candidate with better academic qualifications. The rural districts may have been looking for teachers who were more likely to stay. The training of new hires was an added expense on school districts, and this money was wasted if the teachers transferred outside the district. The lack of competition for beginning teachers from outside the district perpetuated the low salaries.

Suggestions for Recruiting

Several suggestions for successful recruiting appeared in the review of relevant literature. Monk (2007) called for higher wages and benefit incentives to encourage more applicants. Maranto and Shuls (2012) also believed monetary incentives were an important factor for recruitment in rural areas. Their study examined three existing monetary incentive programs aimed at recruiting and retaining highly qualified teachers in the state of Arkansas. The first was the high priority bonus incentive. The authors explained that the state of Arkansas considered a district high priority if it had fewer than one thousand students and at least eighty percent of these students qualified for free or reduced lunches. The bonus allowed teachers who were new to the field and taught in a high priority district to collect three different levels of cash incentives. Initially, they were eligible for a \$5000 bonus at the end of their first year of teaching. These

teachers were also eligible for an additional \$4000 at the end of their second and third year in the same district, and \$3000 for their next two years of employment (Maranto & Shuls, 2012).

The second incentive the researchers mentioned was the Teacher Housing Development Act. This act enabled teachers in high priority areas to apply for housing assistance. These teachers were eligible for low interest conventional mortgages, assistance with a second mortgage, down payment assistance, or rent reduction. Some restrictions applied; the main one was the home itself must be located within thirty miles of the high-priority district. In addition, the teachers had to be considered high performing by the state and teach in the high-priority district. Maranto and Shuls (2012) noted that high priority was identified differently in this act. To qualify for the housing assistance a teacher must work in a district that had difficulty recruiting teachers. The district must have had less than 50 percent of its students scoring in the proficient or advanced range on state exams related to district benchmarks. Additionally, the act defined high performing teachers as those who had taught for three years in such a district (Maranto and Shuls, 2012).

The last incentive Maranto and Shuls (2012) reviewed was the State Teacher Education Program (STEP). The researchers explained that this program was the consolidation of several programs, and it was designed to attract teachers in rural locations and subject shortage areas. The STEP program was a loan forgiveness program that named several shortage areas, including math, science, languages, and special education. The program provided \$3000 per year for up to three years for teaching in a geographical or subject shortage area. The state contributed an additional \$1000 if the teacher was identified as a minority. Maranto and Shuls (2012) pointed out that much of the STEP money went to larger districts instead of to the many rural districts with an extreme shortage of teachers.

At the conclusion of their research, Maranto and Shuls (2012) mentioned that the incentive programs were seldom enough to considerably improve teacher recruitment. They referenced Ingersoll (2003) who stated that “forty to fifty percent of teachers leave the profession within the first five years of teaching” (Maranto & Shuls, 2012, p. 33). The researchers found that the additional monetary incentives were not enough to reach the salary levels associated with larger school districts. They also noted that many educators did not trust state-funded incentive plans. The educators realized that the state would not be able to maintain the funding necessary to continue the incentive program indefinitely.

The next recruiting suggestion that the literature review revealed was the importance of using technology during the recruitment process. Monk (2007) suggested that districts make better use of technology for recruiting purposes. The author provided the research of Ingersoll and Kralik, who reported that Alaska had created a statewide clearinghouse to assist in teacher placement in rural districts (cited in Monk, 2007). He also recommended the use of technology in job posting and timely interview feedback. Maranto and Shuls (2012) recommended that districts pay particular attention to the web page. The authors believed that each district should ensure that it had a high-quality web page listing the available incentive programs and school information in easily accessed areas. They even suggested enlisting state assistance in creating the website if a district had difficulties. Maranto and Shuls (2012) proposed that schools market themselves to prospective teachers and encouraged emphasizing the area’s unique characteristics on the school webpage in order to attract teacher candidates. Lee (2005) also recommended promoting the local community to prospective employees.

The involvement of veteran teachers during the hiring process was also recommended in the literature. Monk (2007) strongly encouraged communication and mentoring during the

hiring process to assist in recruiting and retention of highly qualified teachers. Lee suggested involving veteran teachers in the interviewing process. He stressed the following:

If a value is collegiality and quality of teaching staff, do we involve the best teachers who will enthusiastically sell the values in the process? If so, candidates are likely to conclude that they want to be part of the team (Lee, 2005, p. 266).

Lee (2005) recommended involving faculty in creating the questions to be used during the interview. In addition, he proposed requiring training for the interview committee. This idea was unique, but it seemed to fit his intent for collegiality.

The next recommendation involved feedback from the interview process. Monk (2007) suggested that feedback from the interview committee be provided in a timely manner. Lee (2005) again offered a unique perspective. The researcher suggested that the interview committee solicit feedback from the applicant in the form of a questionnaire or telephone interview. Lee (2005) pointed out the value this information would have in improving the interview process and enabling a constructive hiring experience for the school and the applicant.

Two additional suggestions appeared in the articles reviewed. The first, suggested by Monk (2007), was that rural districts consider partnering with nearby universities to develop their own teacher base from local areas. Previous literature in this review frowned upon dependence on local talent, but small districts understand that current residents are more likely to stay with the district for a longer period of time. The second recommendation that only occurred in one article on recruitment was that the superintendent be highly involved in the interview process. Lee (2005) believed that the first step in the process was to acknowledge that recruiting the best faculty was imperative for a school to run effectively. He felt this importance merited the involvement of the district's highest employee. Most research assigned the hiring of teachers

to the school principal, but Lee (2005) felt the superintendent should discern the district's unique and valuable qualities and sell those to future employees.

Retention

Why pay so much attention to recruitment and retention? Teacher turnover has placed a dangerous economic burden on many school districts. Studies have shown that almost one thousand teachers leave education each year, and a thousand more change schools. These staggering figures have not incorporated retiring teachers (Synar & Maiden, 2012).

Compounding the problem, researchers in some states have discovered that teachers with alternative certification leave the profession at double the rate of educators trained in the traditional method (Stanley & Martin, 2009). The constant demands of hiring new teachers have been a drain on an administrator's time and operating budget. Personnel costs represented up to 80% of a district's budget, and this was not an area where administrators could afford to squander their limited resources (Synar & Maiden, 2012).

The cost to students was also considered in research studies. One article stated, "A highly qualified and committed teacher can substantially enhance a student's learning, while having a series of ineffective teachers can seriously retard that same student's progress" (Synar & Maiden, 2012, p. 131). The researchers also pointed out the significant impact that elevated turnover rates have had on high-poverty and high-minority schools. Some have stated that state accountability measures have drawn effective teachers away from low socioeconomic areas, and "This phenomenon presents a dilemma of academic equity with implications for social justice" (Watlington et al., 2010, p. 25). Synar and Maiden (2012) stressed that all students deserve to learn from highly qualified educators because ineffective teachers could have a negative effect on their future opportunities. The authors contended the dilemma was a moral issue and

maintained that in order to confront the problem intelligently, administrators should try to understand the motives -- monetary and non-monetary -- that lead educators to change professions. Fullan (2001) contended that this was essential for leaders. He stated, "Moral purpose without an understanding of change will lead to moral martyrdom" (Fullan, 2001, p. 5). Synar and Maiden (2012) revealed that the number of teachers leaving for reasons other than retirement was three times larger than the number who were retiring. The authors contended that teacher turnover was costly and that combating it should become a district priority.

To understand why teachers left the profession at an alarming rate, the researchers had to uncover the reasons for their discontent. Synar and Maiden (2012) began with the obvious fact that the teaching profession did not offer attractive salaries or prestige within the community. Monetary concerns included salary, opportunities for advancement, health benefits, and retirement income (Synar & Maiden, 2012). Potential applicants also contemplated nonmonetary characteristics of the job, such as work schedule, work environment, community and administrative support, and adequate resource availability (Synar & Maiden, 2012). These concerns often caused new teachers to consider another profession soon after employment. The authors contended that "[t]he more complex the initial training and the longer one has held a position, the less likely one is to see leaving it as a plausible option" (Synar & Maiden, 2012, p. 133). They emphasized that high mobility among new teachers was often attributed to the unattractive salaries, teaching assignments, and the locations of the jobs available to beginning teachers. The same reasons applied for those who left the profession. The researchers noted that the key to retention was to get new educators invested in their career decision. Administrators could help new educators become invested in the schools by building relationships that promoted

interaction and knowledge sharing, while decreasing problematic feelings of isolation (Fullan, 2001).

Five noteworthy areas were mentioned when examining teacher turnover: “importance of the teacher, exodus of teachers, history of teacher turnover, financial impact of teacher turnover, and measurement of teacher turnover costs” (Synar & Maiden, 2012, p. 133). The authors cited research that asserted the dire need for highly qualified educators in low socioeconomic areas. Synar and Maiden (2012) also cited research that indicated 90 percent of new teachers were hired as replacements. Since personnel costs accounted for a large majority of a district’s operating budget, this was not an area administrators and districts could overlook. In order for the true impact of teacher retention to be calculated, Synar and Maiden (2012) emphasized the need for an accurate method of predicting turnover costs.

For districts to fully understand the dilemma, they must have recognized the fiscal costs associated with teacher turnover. Three models that appeared during the literature review were created to accurately estimate the actual cost to current school districts. The first was the STA model developed by Shockley, Guglielmino, and Watlington, which “includes multiple categories within the cost areas of separation, recruitment, hiring, incentives, and new employee induction and professional development” (Watlington et al., 2010, p. 27). Using this model, Broward County reached estimates of \$12,652 per teacher for teacher turnover costs in 2006 (Watlington et al., 2010). The second model the authors described was the TTCC model developed by Barnes, Crowe, and Schaefer. This model “considers only the categories of advertising and hiring incentives within the cost area of recruitment, hiring, incentives, and new employee induction and professional development” (Watlington et al., 2010, p. 27). This model did not estimate separation costs. Separation costs included money for sick leave, vacation pay,

exit interviews, documentation, inputting data and updating files (Watlington et al., 2010). These models could calculate the fiscal costs associated with teacher turnover, but there was no way to put a price on the cost to students whose educations were jeopardized due to persistent teacher shortfalls. The third model, recommended by Synar and Maiden (2012), was the Teacher Turnover Cost Model (TTCM). This model estimated separation costs, hiring costs, training costs, and performance productivity costs (Synar & Maiden, 2012). Synar and Maiden (2012) broke down each category for accurate calculation. The researchers noted separation costs included exit interviews, procedures, and administrative tasks. The authors stated that hiring costs included recruitment and advertising, interviews, reference checks, drug testing, etc. Synar and Maiden (2012) included orientation, training, and mentoring costs in the training category. Lastly, the authors explained that the productivity costs were those associated with the belief that it took five months for a new employee to reach full productivity. The TTCM model included hard costs of separation and hiring and soft costs that included training and productivity. The authors argued that many schools do not realize the impact of soft costs (Synar & Maiden, 2012). Based on their model, the researchers contended that teacher turnover in a large urban district with a turnover rate of 8.06% would cost the district \$3.46 million for the 2008 school year (Synar & Maiden, 2012). The study suggested that this could have a crippling effect on some districts and dramatically affect their capacity to provide students with a quality education.

Suggestions for Retention

Synar and Maiden (2012) recommended educating policymakers on the reasons for teacher turnover, the fiscal cost, and the educational impact to students. This approach was also presented by Gardner (2006). He asserted that logically identifying the reason for change and supporting this agenda with relevant research was necessary to begin the process of change

(Gardner, 2006). The National Education Association uncovered several reasons for teacher dissatisfaction in a 2003 study (Synar & Maiden, 2012). The top three reasons were the following: being overwhelmed by the day to day functions of the job, unclear job expectations, and isolation with lack of support. The authors also stated, “The teaching profession is a demanding profession, and the increased pressures of laws, bureaucracy, lack of respect, increased at-risk student populations and decreased parental involvement cause teachers to become frustrated, and in some cases, leave the profession” (Synar & Maiden, 2012, p. 141). Synar and Maiden (2012) encouraged districts and administrators to collaborate with political leaders to “improve the nation’s educational system and attract and retain highly qualified teachers by utilizing the research presented here” (Synar & Maiden, 2012, p. 141). Given the high cost of turnover, politicians might be more inclined to make the necessary changes. The impact of teacher turnover to the overall quality of education can no longer be ignored.

Watlington et al. (2010) suggested that schools invest in programs aimed at improving teacher induction and support. They submitted that “[i]nvesting in teachers produces positive and exponential returns” (Watlington et al., 2010, p. 33). The authors contended that school districts would actually be money ahead since teacher turnover would be reduced. The article then gave five policy recommendations:

1. Develop and implement more effective and accurate school and district level data collection.
2. Use available teacher turnover assessment tools.
3. Concentrate on retention of teachers working with disenfranchised populations.
4. Encourage non-punitive accountability.
5. Examine what works (Watlington et al., 2010, p. 34-35).

These valuable suggestions assisted administrators in understanding the true depth of the problem and the causes behind the high rate of teacher turnover.

The first policy recommendation referred to data collected during exit interviews. The exit interviews proposed by the Watlington et al. (2010) could generate useful information that would be utilized when re-culturing the educational environment to encourage educators to remain in the profession. Fullan (2001) also recommended respecting the view of resisters. He believed they often had beneficial ideas that might not have been considered (Fullan, 2001). The data collected could be used when creating recruiting strategies to attract new employees and to assist principals in making strategic hiring decisions (Duncan, 2009). Some exit interviews contained information about leadership styles. Research has shown that leadership styles had the largest influence on teachers' decisions to remain in the field of education (Thibodeaux, Labat, Lee, & Labat, 2015). Teachers who experienced a lack of support from their administration or an unequal distribution of the workload often opted to leave the profession (Thibodeaux et al., 2015). With the data collected from the exit interviews, administrators could identify any weaknesses in leadership styles and make the appropriate adjustments to diminish turnover.

Watlington et al. (2010) emphasized that calculating the true cost of teacher turnover was the only way to get the attention of policymakers. The authors highlighted the cost to students and agreed that this cost was immeasurable. Research showed that one way to make the necessary changes was to understand the reasons behind the high turnover rate. Understanding the problem could lead to solutions in the areas of teacher retention and recruitment. However, the process may be long and cumbersome and will likely be affected by a shortage of applicants and a lack of monetary incentives. These factors are beyond an administrator's control, but must

be dealt with as judiciously as possible. The outcome could be crucial to a school's mission and survival.

CHAPTER 3: METHODOLOGY

Approach

Previous research in the area of student achievement in high school mathematics commonly relies upon educator background data, often self-disclosed, and student standardized test scores. While this data may uncover correlations between student achievement and teacher content knowledge, certification level, degree level, type of degree, etc., it fails to consider why each Florida classroom is not filled with an adequately prepared educator. Quantitative data often cannot tell the whole story. This phenomenological study will attempt to answer the research questions from the viewpoint of the high school principal. While teachers have the most influence on student learning, the principal is responsible for selecting those teachers. The principal's decisions have a powerful impact on the future of a school, yet his or her input is often overlooked in an effort to achieve unbiased facts and figures. This study will explore the essence of administrator's perceptions of recruiting and retaining adequately prepared mathematics teachers. The study will also investigate principals' perceptions of the effects of alternative certification on recruiting and retaining adequately prepared mathematics teacher in Florida's rural districts. Lastly, the research will examine principals' perceptions of the actual effects of various types of certification on school culture. It is the hope of this researcher that the information collected from the shared experiences of high school administrators located in schools that demonstrate high performance in mathematics can be utilized to improve mathematics programs in rural districts of Florida.

Researcher Role and Assumptions

This research will be completed by a traditionally certified mathematics teacher with over two decades in high school and college classrooms. Many changes and trends have been

observed over the years, but the most alarming is the sudden lack of prospective teachers. This lack of interest in the teaching profession seems to have influenced the number of qualified applicants, especially for STEM related courses. This research is driven by an interest in the quality and availability of mathematics teachers in Florida's rural districts. Personal assumptions will guide the selection of research questions because personal experience has proven that there are many viewpoints to any potential problem.

Participant Selection

This study will be conducted using criterion sampling of rural Florida high schools that have the highest achievement scores in mathematics and student bodies with a similar socioeconomic status. End-of-Course exam scores for Algebra I, Algebra II, and Geometry will be utilized to determine achievement status. Percentages of students scoring in level 3 and above on each exam will be combined to reach a total percentage value, with the maximum of 300. Since the combined state average for the Spring administration in 2017 was 165, schools with 165 total percentage points or more will be included in the highest achieving category. The Florida Department of Education rate of free and reduced lunches will be used to determine socioeconomic status. Schools that are in the highest achieving category and have a free and reduced lunch rate of .70 or higher will be considered for the study. The goal is to include principals who have been high school administrators for at least three years.

The population of the study will include principals employed at high schools that are a part of Florida's Institute for Small and Rural Districts (ISRD). Florida Virtual School and schools associated directly with university programs have been excluded from the small and rural districts, since these schools have greater recruiting power and could skew the results. A sample of at least three principals whose schools meet the above criteria will be randomly

selected for the interview process. Principals will be contacted by phone and asked if they are willing to participate. The study will be described and the conditions for their selection will be explained. Subjects will be asked to participate in two interview sessions, and each session should last about an hour. Interview transcripts will be emailed to each subject to check for accuracy.

Data Gathering Technique

Participation in the study is voluntary. Participants will be informed of the purpose of the study and the interview questions in advance. The data gathering process will consist of two semi-structured interviews with each principal, and participants will choose the time and place for each interview. The second interview may be completed via email or telephone if the principal prefers. Interviews will be completed by August 2018. While a prepared list of questions will guide the first interview, questions for the second interview will be based on themes that surface during the initial interview and gaps in the research. All follow-up questions will be limited to the scope of the initial research study. Interviews will be recorded on a Sony ICD-PX440 Stereo IC digital voice recorder. Interviews will then be transcribed by CastingWords.com. No other artifacts will be used to complete the study, due to employee privacy laws.

Data Analysis Technique

Each interview will be recorded and transcribed. Transcripts will be printed then read several times to identify key concepts and ideas. Techniques described by Seidman (2013) will be used to analyze the transcripts. First each interview will be reduced by bracketing interesting passages that answer the research questions. In order to interpret the data, individual passages will be labeled with descriptive words that can then be grouped into categories. Seidman (2013)

referred to this process as coding. The resulting categories will be studied for “thematic connections within and among them” (Seidman, 2013, p. 121). Next, categories and themes from individual interviews will be compared. Connections between the interviews as well as connections to information collected during the literature review will be examined (Seidman, 2013). “The repetition of an aspect of experience that was already mentioned in other passages takes on weight and calls attention to itself” (Seidman, 2013, p. 129). The purpose of this process is to “build detailed descriptions, develop themes or dimensions, and provide an interpretation” of the phenomenon (Creswell, 2013, p. 184). Key concepts from each interview will be provided to individual principals for verification before the final coding process is completed.

Interpretation of the final coding process will be accomplished by looking for commonalities among the interviews and literature, and attempting to explain these connections (Seidman, 2013). Unique ideas, common themes, and concepts that were consistent with reported research will be presented in hopes that these ideas can be applied in other schools. It is anticipated that by examining the phenomena and gathering ideas, this researcher can provide Florida principals with additional ways to improve their methods of recruitment, retention, and utilization of adequately prepared mathematics teachers.

Ethical Considerations

It is imperative that each principal’s identity be concealed during the research process. Without this assurance, a principal might not be as forthcoming with his or her responses. Hiring decisions can have many ethical implications for the principal, district, student, and employees; therefore, all identifying factors will be excluded from the published data. In addition, all state data used in the study will be edited to replace names with numbers. Selection of participants

that meet the criteria for the research study will be done randomly to assist in maintaining confidentiality. To preserve the confidentiality of the data collected, this researcher will save interview recordings and transcripts on a password-protected computer. And lastly, all associated files will be deleted at the completion of the research study.

Proposed Interview Questions

1. What practices do high school principals at the highest achieving schools in Florida's rural districts use to recruit and retain adequately prepared applicants for mathematics teaching positions?
 - a. How would you define *adequately prepared*?
 - b. What recruiting techniques have been successful?
 - c. What retention techniques have been successful?
2. How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts?
 - a. What difficulties have been encountered when filling mathematics classroom vacancies?
 - b. What are the implications of alternative certification?
 - c. What strategies are employed to increase retention of alternatively certified mathematics teachers?
3. What strategies do principals use to maximize the instructional effectiveness of mathematics teachers who have diverse levels of certification?
 - a. What are the types of instructional certification among mathematics teachers on campus?

- b. How do these variations impact instructional scheduling?
- c. How do these variations affect school culture (ex: faculty development, mentoring, student achievement, etc.)?

CHAPTER 4: RESULTS

Introduction

This study was conducted to explore phenomena relating to the declining number of qualified applicants for high school mathematics teaching positions and their possible connection to disappointing passing rates on End-of-Course (EOC) exams for high school mathematics in the state of Florida. Inadequate passing rates have had a negative impact on society's perception of public education. To assist administrators in achieving higher test scores and regaining public trust, this study examined the qualities of exceptional teachers, as well as techniques for recruitment and retention. The study also explored the implications of alternative certification, due to its rise in popularity. Lastly, the study investigated varying levels of mathematics certification in the state of Florida and how these differences affect instructional scheduling and school culture. The research study was completed with the hope of identifying best practices when hiring, recruiting, and retaining adequately prepared mathematics teachers. In doing so, the following research questions directed the dissertation:

1. What practices do high school principals at highest achieving schools in Florida's rural districts use to recruit and retain adequately prepared applicants for mathematics teaching positions?
2. How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts?
3. What strategies do principals use to maximize the instructional effectiveness of mathematics teachers who have diverse levels of certification?

Research data were collected through interviews. Data were later transcribed and analyzed based on a qualitative design used to investigate phenomenological studies.

This chapter contains sections devoted to a description of the participants of the study, an explanation of data analysis techniques, a rationale for the use of interviews, a description of the results of data analysis, and a synthesis of this information.

Description of Participants

The participants of this study were randomly selected high school principals who met the following criteria:

1. The participant's district was a member of Florida's Institute for Small and Rural Districts.
2. The participant's school had a combined score for students scoring level three or above on the Spring 2017 End-of-Course exams in Algebra I, Algebra II, and Geometry that met or exceeded the state average of 165.
3. The participant's school population had a free and reduced lunch rate of .70 or higher.
4. The participant had been in the principal position at the school for a minimum of three years.

Three principals from this group were initially contacted about participation in this research study, and all three agreed to contribute. The participants had a combined twenty-one years of experience as principals in rural Florida high schools. Each principal involved in the study had a minimum of five years of experience in the position. Interviews were conducted during the fall semester of the 2017-2018 school year, and each initial interview lasted between sixty and ninety minutes. Participants were enthusiastic with their responses and gracious with

their time. Each principal willingly shared experiences and insights in an effort to assist other districts with similar demographics. (Specific descriptive data are included in Table 1.)

Table 1. *Participant Descriptive Data*

Participant	Years in Administration at Current School	Combined School Mathematics Score on EOC Exams	Free & Reduced Lunch Rate
Principal A	5	173	Above .80
Principal B	11	171	Above .90
Principal C	5	199	Above .70

Data Analysis

Participants were provided with an informal email which included the study's purpose and the interview questions in advance. The interviews were recorded with consent on a Sony ICD-PX440 Stereo IC digital voice recorder and were later transcribed by CastingWords.com. The initial interviews were conducted face to face in each principal's office at a time chosen by the interviewee. The dialogue was semi-structured due to the prepared list of interview questions that were furnished in advance, but it did not necessarily follow the order of the original questions. Interview questions were answered in great depth, and the principals shared many personal stories that accounted for their knowledge. Due to extensive travel time necessary for face-to-face interviews, the initial interviews were followed by email correspondence that consisted of any necessary follow-up questions, clarifications, and verification of the original transcripts for contextual accuracy.

Transcripts for each interview were read several times to identify key concepts and ideas. Each transcript was then reprinted in a different color to improve the analysis process. The three research questions and their three sub-questions were placed on a large table. Using techniques described by Seidman (2013), each transcript was reduced by cutting out key passages and placing these passages under the research question that they addressed. Each principal's responses were then considered individually. Applying Seidman's (2013) coding process, descriptive words were underlined on each response and then grouped into categories. The categories were studied for themes and connections. After the individual interviews were consolidated into themes, the interviews were compared with each other. Common themes among the interviews, as well as unique ideas, were examined to build a repertoire of best practices. The interviews were examined for connections to practices and ideas revealed during the literature review process.

Interview Data

The task of identifying why some schools performed successfully on mathematics achievement exams while others failed involved extensive examination. Examining student achievement data aided in pinpointing which schools had the highest achievement scores. Researching student population characteristics, such as location and socioeconomic data, provided some insight into the student body. Investigating the characteristics of principals at successful schools also added additional pieces to the picture. These types of data were readily available, but they failed to answer the "How" and the "Why." While quantitative data painted a picture of successful schools, they failed to reveal exemplary practices that could be shared among administrators in search of elusive passing scores on state-mandated exams. To get to the bottom of this phenomenon, in-depth interviews were essential. As Seidman (2013) stated, "At

the root of in-depth interviewing is an interest in understanding the lived experience of other people and the meaning they make of that experience” (p. 9). Understanding and analyzing the “lived” experiences of successful administrators were crucial for compiling a list of exemplary practices that might assist other administrators who hope to improve their achievement data.

Results

Research Question 1: What practices do high school principals at the highest achieving schools in Florida’s rural districts use to recruit and retain adequately prepared applicants for mathematics teaching positions?

Themes That Emerged from Research Question 1, Part A: How would you define adequately prepared?

One major theme was emphasized by all three participants in the study. All three looked for applicants who had a passion to perform their absolute best because of their devotion to the students. While this personal attribute was not something that future educators could be taught, it was a professional strength that was valued by administrators who participated in the study. They explained that this passion led to a nurturing relationship that encouraged students to do their best. Principal A stated, “First of all, I want them to like children. That is our goal in the district, working on relationships and accountable talk.” This sentiment was echoed by Principal C when she stated, “If you can’t get along with the kids, if they don’t know you care, they’re not working for you, and you might as well hang it up.” She continued by stressing, “If you’ve got a good relationship with them, they’ll know how much you care ... Even if they can’t get it, they’re going to try to get it just for you.” Principal B took it one step further when he acknowledged that he looks for “[s]omeone who has a heart and a passion for being the best teacher and example they can be for kids.” He explained that “if I find that person, I’ve got

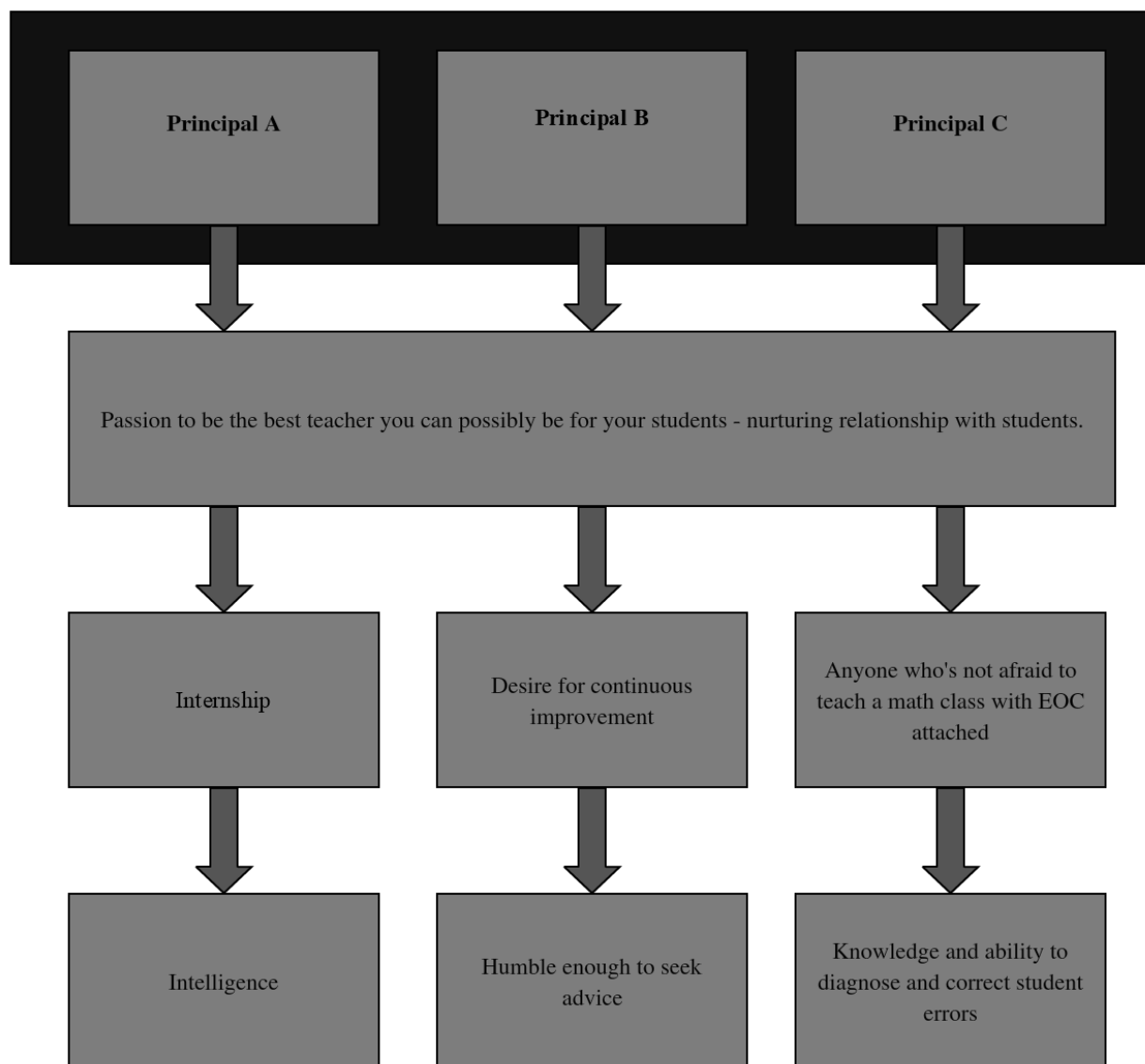
enough good role models on this campus to mold that person to be a good teacher.” All three agreed that an adequately prepared teacher had to love kids and want to help them be successful.

Six minor themes emerged during the interviews. Principal A was unique in looking for a candidate who had completed an internship. She also stressed the importance of applicants’ intelligence and knowledge of the subject matter. Principal B believed the most critical quality to search for in a person was an attitude affirming that “I want to be great ... I’m going to continue to get better whether I’m in year one or whether I’m in year five.” In order to achieve this, Principal B believed that applicants needed to “be willing and humble enough to seek out and sometimes ask questions.” He called this the “internal fortitude to be good and, really, to have the confidence that they’re willing to ask questions, and that they know they don’t know what they don’t know.” Principal C addressed certification when she defined *adequately prepared*. She explained, “If you want to talk about adequate, I defined it as not just being certified, but somebody who’s brave enough to teach math courses with an End-of-Course exam.” She clarified, “Even if they’re certified, you can’t find those that want to teach in EOC areas.” Principal C acknowledged that being certified in mathematics does not always mean the individual can adequately teach the subject. She desired teachers who not only knew the subject matter, but also had the ability to diagnose student mistakes and correct them in a way that the student could comprehend. Each principal contributed several characteristics of adequately prepared mathematics teachers that they considered necessary for academic success. These characteristics are charted in Figure 1.

Figure 1. Qualities of Adequately Prepared Educators

What practices do high school principals at the highest achieving schools in Florida's rural districts use to recruit and retain adequately prepared applicants for mathematics positions?

How would you define adequately prepared?



Themes That Emerged from Research Question 1, Part B: *What recruiting techniques have been successful?*

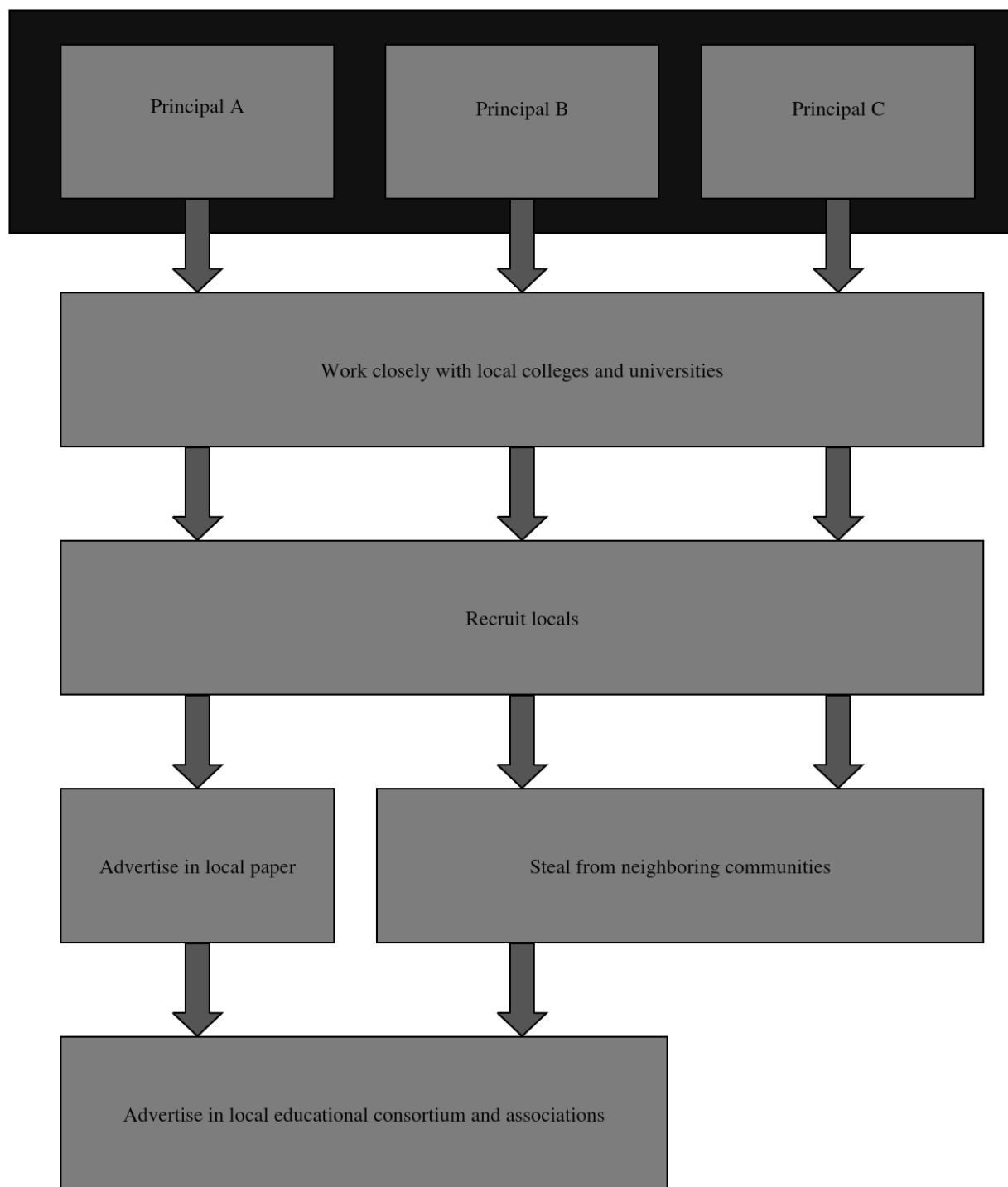
Two major themes arose in the responses to this question. The first theme all three principals mentioned was their reliance on local universities and colleges. When looking to fill positions, the principals who participated in this research study all contacted any university or college near them that might have students or recent graduates searching for a job. The principals knew which programs were offered in the nearby universities and whom to contact to arrange for possible interns at their school. Principal C stated, “Instead of them doing an internship, they can come work for me if they’ve got pretty good classroom management. It’s just on-the-job training. I can use them as a long-term sub until they can get through their degree.” While all principals indicated that they had a good relationship with these universities and colleges, they admitted that the schools often had no students to fill empty positions. Principal A remarked that “some of their programs, they’re looking at closing because they don’t have enough students to do it.” She noted the declining enrollment in education degree programs.

The second major theme that emerged during all interviews was the reliance on local applicants. Principal C summed up the reason for this reliance when she noted, “Nobody’s flocking here!” She looked to her community for applicants and encouraged those she thought could succeed. Principal B used the same recruiting techniques. He shared, “One thing we try to do is, our kids that have left here, there are some kids that have left here that have gone on and gotten their degrees.” He discussed several instances where he had recruited local kids to come back and teach. He disclosed that he keeps the line of communication open with a standing job offer if they eventually move back home. Principal A admitted that “[m]ost of the teachers have

been here for most of their career. Like I said, a lot of them graduated from here.” She also stated that she had lost an excellent teacher recently and “talked her into coming back this year.” All three principals valued their local community members and recruited them openly.

Three other themes surfaced during the responses to this question. Two of the principals admitted that stealing from neighboring schools was a common practice. They both knew of excellent educators in their field, and each admitted to enticing these educators to join their faculty as soon as a position opened. Principals sought these educators because of their willingness to go the extra mile to provide the best education possible to their students. The other two themes that emerged dealt with advertising open positions. One principal used the local newspaper. She and another principal also mentioned advertising with local consortiums and educational associations. All major and minor themes that appeared in response to this question are charted in Figure 2.

Figure 2. Recruiting Techniques - *What practices do high school principals at the highest achieving schools in Florida's rural districts use to recruit and retain adequately prepared applicants for mathematics positions? What recruiting techniques have been successful?*



Themes That Emerged from Research Question 1, Part C: *What retention techniques have been successful?*

This question resulted in a rather large number of responses to code. Most of the responses fell into the category of proactive instructional support. The category was labeled *proactive* because it was obvious that none of the administrators who were interviewed let their new employees flounder without support. As Principal B noted, “We’re going to try to do the best job we can in being proactive with you, so we’re not waiting around for you to ask us a question.” Each principal had the same attitude. All three mentioned mentors frequently. Principal A stated, “We try to look at who’s going to be the best fit and who will be available the most.” The mentors attended meetings with new teachers prior to entering the classroom, and often observed them once school began. As Principal B explained, “You pour a lot of effort into that person hoping that, really, by year four or five they’re better, and by year ten they’re better. Then they can mentor other teachers.” The principals also mentioned the importance of utilizing instructional coaches and assistant principals to support and nurture new employees. Veteran teachers were used to co-teach and help when possible. In addition, each school worked with local consortiums to provide workshops, observations, and demonstrations to support new employees during their first years. Principal B believed these workshops provided opportunities for collaboration and gave new teachers necessary tools for success. He emphasized that one should begin with classroom management and dependability; then “you just make sure that you’re putting more and more tools in their toolbox to where they’re releasing the ownership of that education to the kids.” Proactive instructional support was evident in all principals’ responses to this research question.

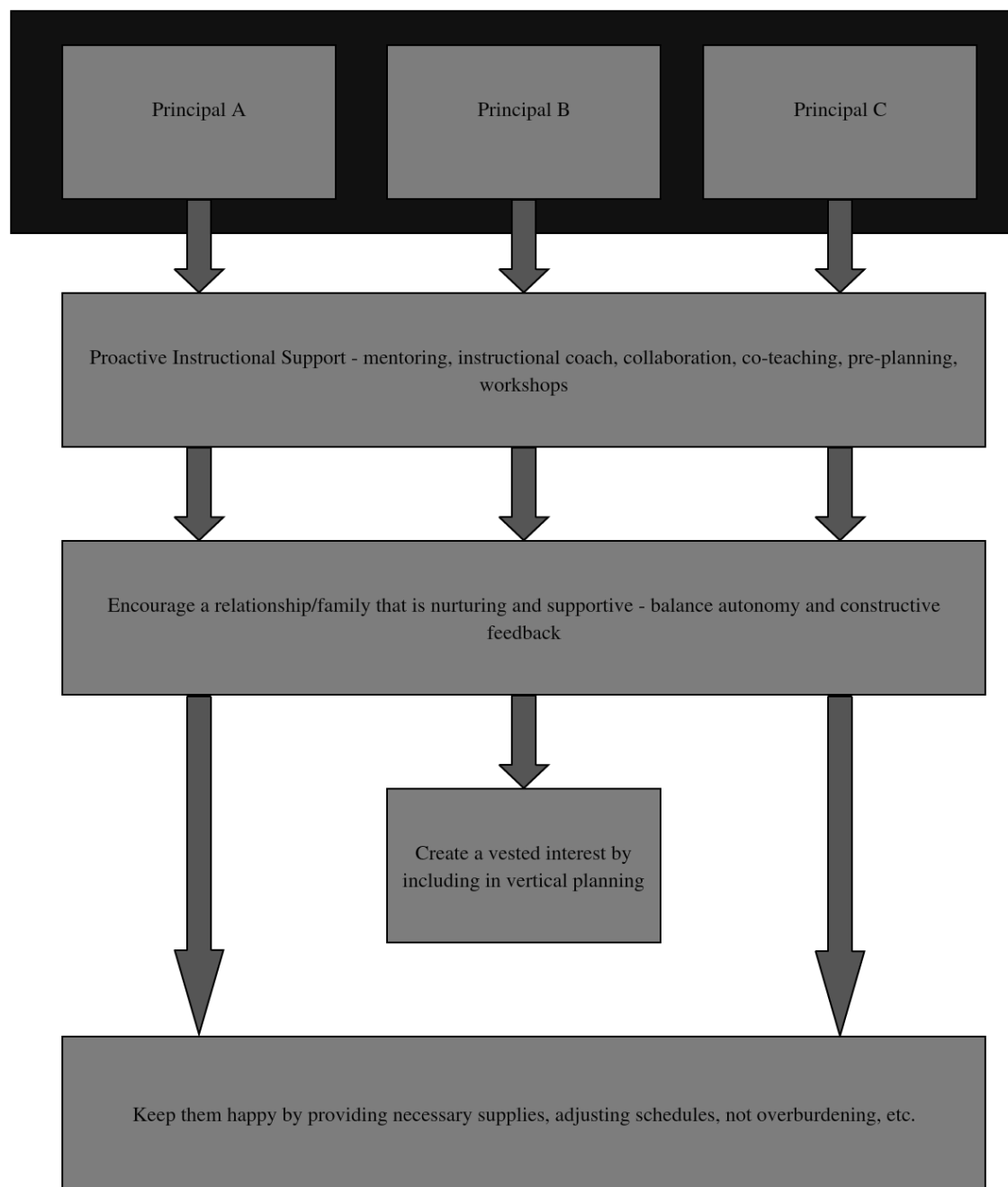
The next major theme mentioned by all administrators was that of encouraging a supportive family relationship among their new faculty. Principal A believed that a relationship with other faculty members was as important as the relationship with students. She stated, “I try to do things as a faculty ... We have monthly socials where we get together and it’s no work involved.” Principal B expressed the belief that this relationship could build respect and trust. He described it as an atmosphere that allowed autonomy yet encouraged teachers to “seek out how they can be better.” And Principal C described it as “trying to have a school culture where they know everybody’s supportive and nobody’s out to get you.” Each administrator believed in creating a nurturing relationship among faculty.

The theme of keeping teachers happy with their work environment arose in two of the interviews. This included providing necessary supplies, rearranging schedules, and not overburdening. Principal C was a firm believer in “treating them right.” She explained that “if they needed supplies, if they needed resources, I’m the kind I don’t want to work where I don’t have what I need, and I want two or three in case I run out.” She expressed the desire to ensure that her teachers had what they needed to be successful in the classroom. She relayed a situation where her teachers wanted old technology that was hard to find. She prioritized locating the technology. She wanted them to have anything that she could reasonable furnish to promote success. Principal A and C also admitted that they were willing to change schedules to help keep employees happy if they had reasonable requests.

The last theme that surfaced was that of creating a vested interest for new teachers by including them in vertical planning within the district and the consortium. This idea was presented by Principal B as a way to give teachers a voice in planning and provide them with beneficial knowledge to prevent them from feeling isolated. In addition, he felt this practice

helped new employees meet additional mentors who might be able to assist them. All of these techniques are presented in Figure 3.

Figure 3. Retention Techniques – *What practices do high school principals at the highest achieving schools in Florida’s rural districts use to recruit and retain adequately prepared applicants for mathematics positions? What retention techniques have been successful?*



Research Question 2: How do principals perceive alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts?

Themes That Emerged from Research Question 2, Part A: What difficulties have been encountered when filling mathematics classroom vacancies?

Two major themes appeared during the research on this question. The first was the lack of applicants for vacant positions, especially in math and science. This theme came up in response to many of the research questions. Principal A even pointed out the drastic decline in the number of applicants in recent years. She stated, "I have hired because it was the only choice I had." She was not alone. Principal B echoed this concern:

I wish I had the luxury to say, "I want someone to have a master's degree in this," or

"I'm only hiring people who went to school to be a teacher." That's simply not the case.

If I was waiting to do that, I'd have a lot of positions up here that aren't being filled ...

When I have a position that is available, I don't have ten or fifteen people to choose from.

For whatever reason, because there's not a lot of other industry in our county, people

aren't going to be willing to move here when you're getting someone right out of college.

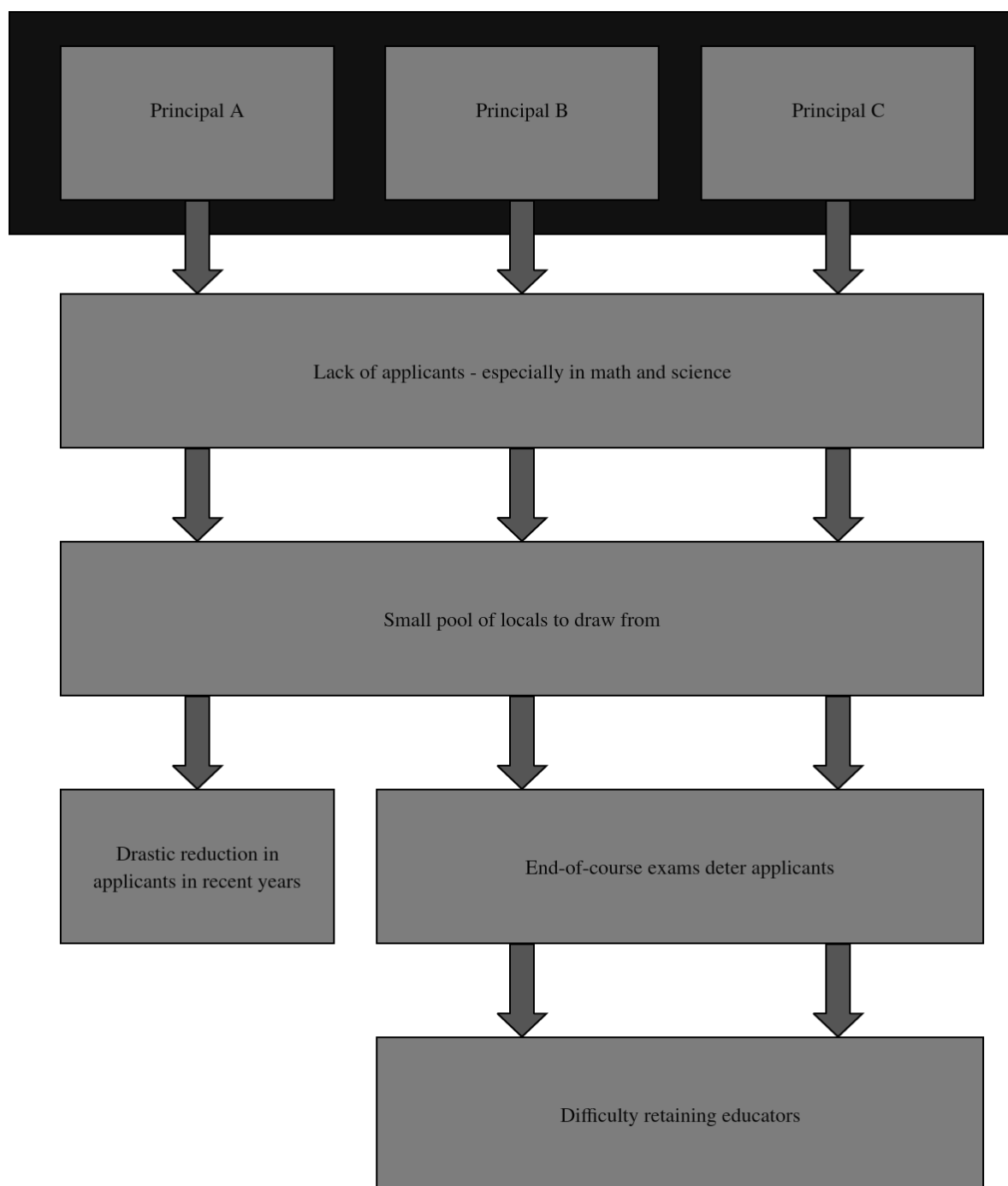
He went on to point out that this lack of applicants meant principals did not have the luxury of comparing candidates' college transcripts to help determine the best person for the job. Principal C agreed, explaining that "nobody is certified in these things. If you do find one, I can't get him ... If they're certified, that's right, I'm looking at them. I'm not going back looking at their transcripts." The number of applicants at all three schools were declining and sometimes nonexistent.

The second major theme was a parallel to the first. The schools all had a small pool of local applicants. Principal A indicated that “[n]ot a lot of outsiders come in. When they do, you’re like, ‘How did they find us?’” Principal B agreed, declaring that “[t]here’s only one time I’ve ever hired anybody that really wasn’t from the area ... they’re either from the area or they married somebody in the area.” All the principals explained that after candidates are brought down for a visit, they often decide the location is not what they had in mind, or that they can make more money elsewhere.

One minor theme that arose from two administrators was the fact that mathematics courses with mandated End-of-Course exams often scare applicants away. Principal C declared, “The EOC’s are not good for us.” She also added, “You’ve got a lot of math-certified teachers who’ve left because of the tests.” Principal C blamed the stress of the testing environment for the loss of applicants and teachers alike.

The last minor theme to appear was the difficulty retaining new hires. Principal B shared the story of an applicant from another state who lasted about four years. Principal C discussed one employee who panicked and left the job two weeks into the school year, and this applicant was a local. While all three principals provided some great recruiting techniques, they each had difficulties attracting enough qualified people to fill vacant positions. Principal C summarized her responses to this question when she declared, “I’ve got a former reading teacher teaching math and a paraprofessional teaching math. Do you get it?” The difficulties encountered by the three administrators are charted in Figure 4.

Figure 4. Hiring Difficulties - *How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts? What difficulties have been encountered when filling mathematics classroom vacancies?*

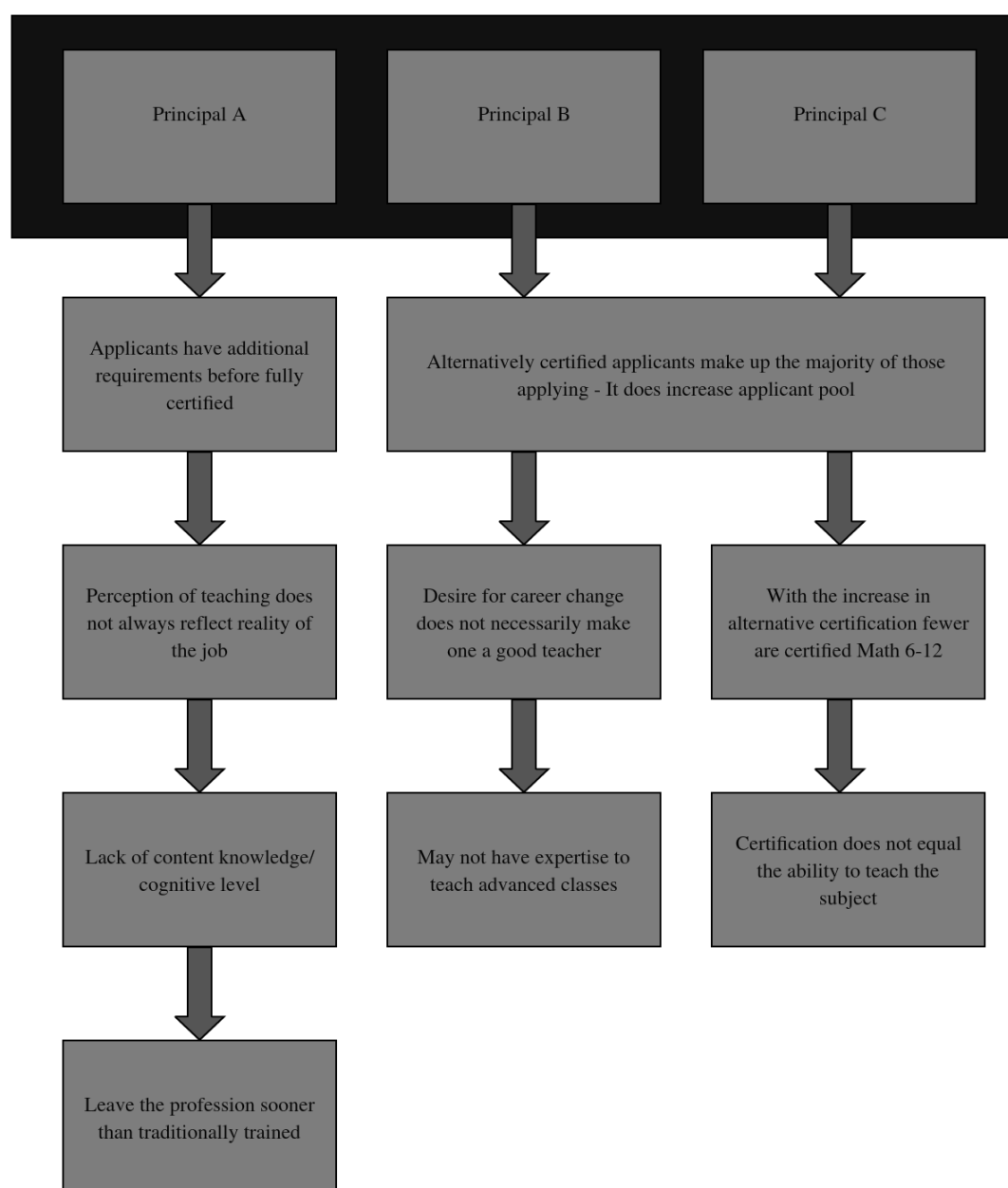


Themes That Emerged from Research Question 2, Part B: *What are the implications of alternative certification?*

No major themes appeared when discussing the implications of alternative certification, but many of the minor themes were closely related. In two of the schools, alternatively certified applicants made up the majority of those applying, and the necessity of these applicants was emphasized. It was also noted by one principal that with the increase in alternative certification, fewer candidates were certified Mathematics 6-12. The majority were certified Mathematics 5-9 and could not be utilized for all high school mathematics vacancies. Additionally, the principals mentioned some difficulties that accompanied new teachers who came in with alternative certification. One was that these candidates often faced further requirements before becoming fully certified. Another difficulty raised was the importance of the applicant's content knowledge. Principal A found that alternatively certified applicants sometimes lacked the content knowledge and cognitive level to teach the subject. Principal B agreed, saying "I could see where there's a big difference when it comes to the expertise of a person when being able to teach algebra or eighth grade math versus AP Calculus, AP Biology, or things like that." And, Principal C stressed, "You may be qualified on paper, but you can get in there and the rubber doesn't meet the road for you ... there's a big difference between knowing and teaching." The last set of difficulties that were expressed revolved around the perception of the teaching profession. Principal A mentioned that the perception of classroom teaching does not always reflect the reality of the job. She noted that this disconnect was the reason a recently hired alternatively certified educator only made it through one semester. These complications were echoed by Principal B, who mentioned that the desire for a career change does not necessarily

make one a good teacher. Figure 5 charts the minor themes discovered during the discussion about the implications of alternative certification.

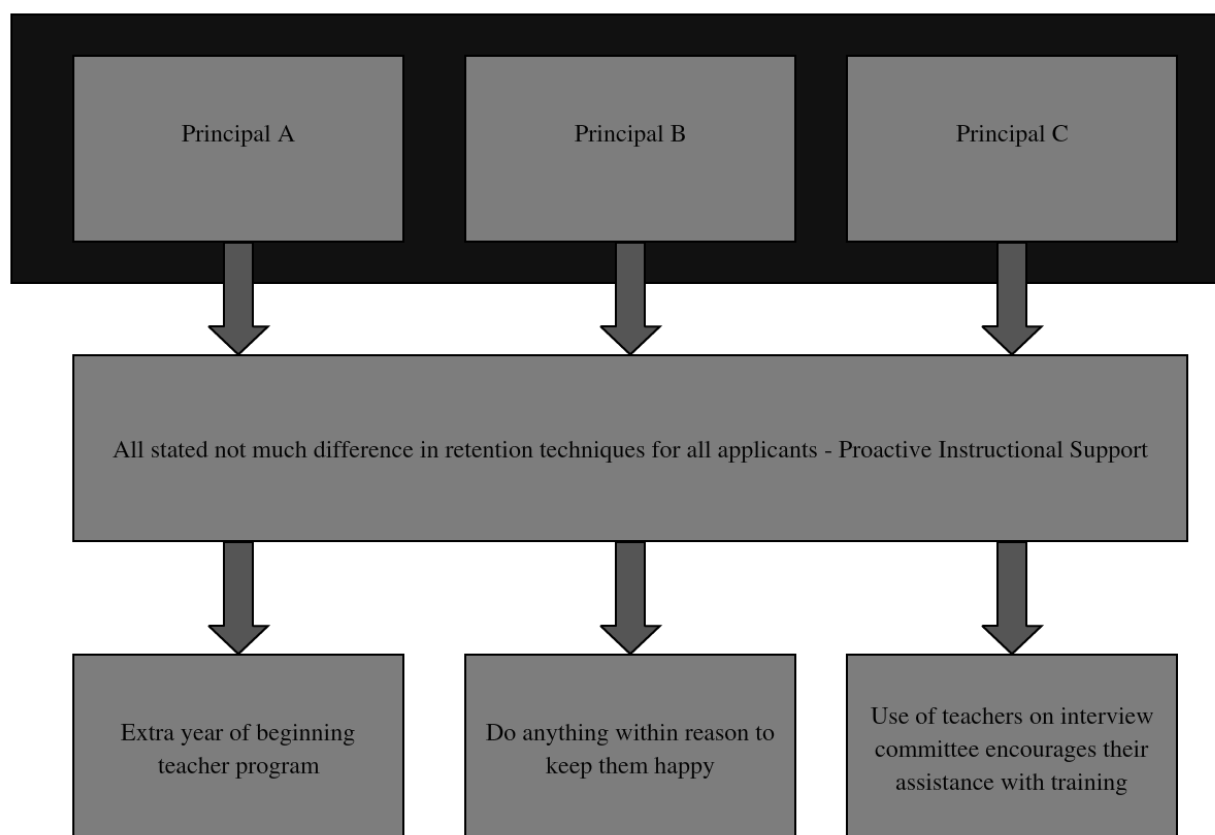
Figure 5. Implications of Alternative Certification - *How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts? What are the implications of alternative certification?*



Themes That Emerged from Research Question 2, Part C: *What strategies are employed to increase the retention of alternatively certified mathematics teachers?*

All principals explained that their techniques and strategies for retaining alternatively certified applicants differed little from their approach with traditionally certified applicants. Principal A mentioned that alternatively certified educators had to spend an additional year in the beginning teachers program. Principal B reemphasized keeping teachers happy and not overburdening them. And, lastly, Principal C mentioned the use of veteran teachers on interview committees. She explained that her teachers were more likely to mentor applicants when they had a say in the hiring process. In summary, each school used the methods of proactive instructional support that were mentioned earlier in this chapter. They actively attempted to retain all applicants, regardless of their form of certification. Figure 6 charts the strategies employed.

Figure 6. Retention Strategies for Alternatively Certified - *How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts? What strategies are employed to increase retention of alternatively certified mathematics teachers?*



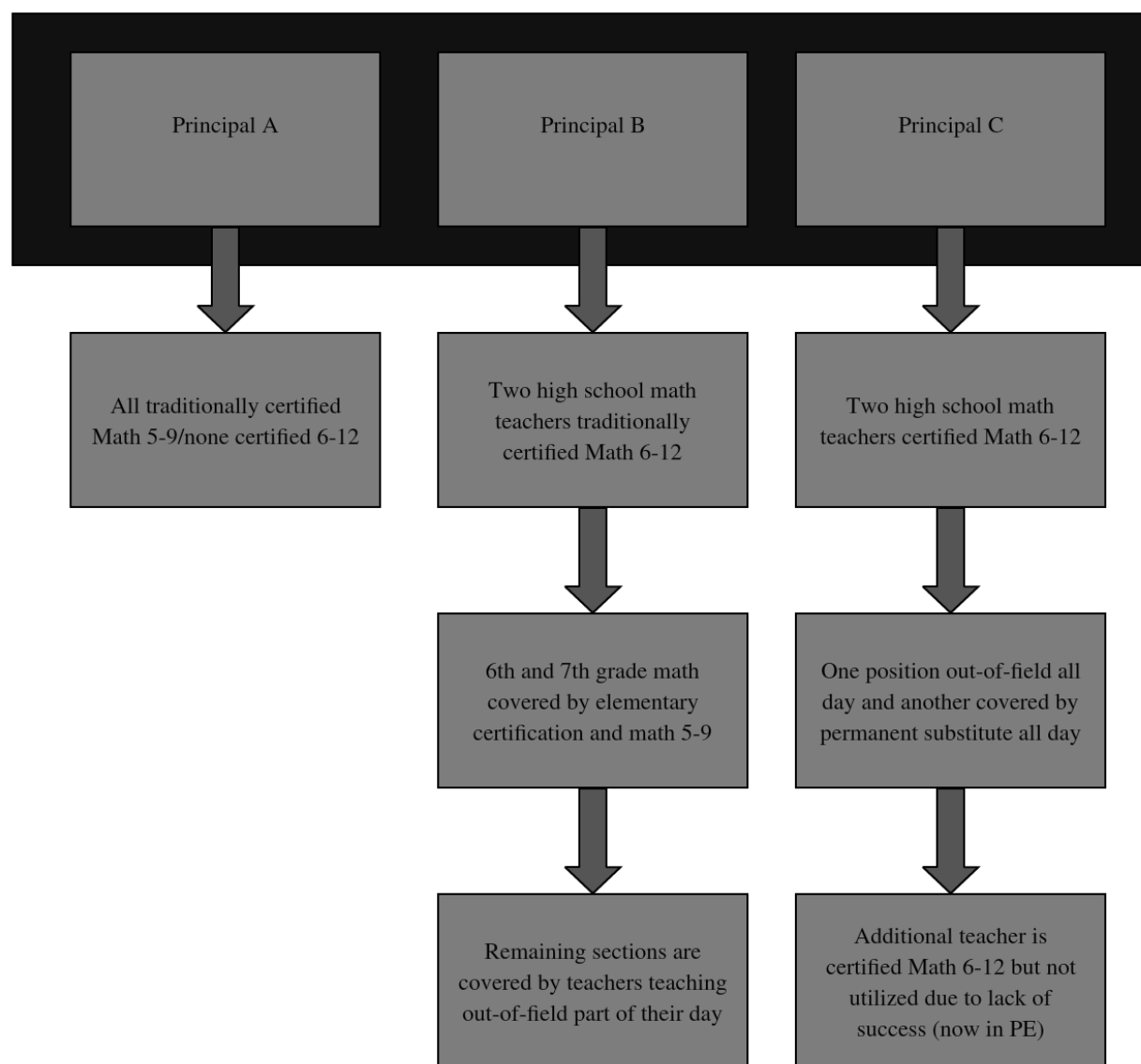
Research Question 3: What strategies do principals use to maximize the instructional effectiveness of mathematics teachers who have diverse levels of certification?

Themes That Emerged from Research Question 3, Part A: *What are the types of instructional certification among mathematics teachers on campus?*

Each school had a unique situation, so responses were reported individually. School A consisted entirely of traditionally certified mathematics teachers, but all were certified Mathematics 5-9. There were no teachers certified to teach upper level mathematics courses.

This was the only school with a Title I distinction. School B had two mathematics educators who were traditionally certified Mathematics 6-12. The sixth and seventh grade classes were covered by teachers with elementary certification and Mathematics 5-9. High school math sections that could not be covered by those with Mathematics 6-12 certification were covered by teachers who were considered out-of-field for part of their day. Lastly, School C also had two high school mathematics teachers who were traditionally certified Mathematics 6-12. The remaining courses at School C were covered by teachers certified Mathematics 5-9 and teachers who were out-of-field. One position was covered by an educator who was out-of-field all day, and another was covered by a paraprofessional who was reported as a permanent substitute all day. There were teachers on campus who had Mathematics 6-12 certification who were not utilized in mathematics classrooms due to unsatisfactory performance in that area. The certification levels for each school are charted in Figure 7.

Figure 7. Certification Types on Sampled Campuses - *How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts? What are the types of instructional certification among mathematics teachers on campus?*



Themes That Emerged from Research Question 3, Part B: *How do these variations impact instructional scheduling?*

This question also resulted in a large number of responses. Three major themes appeared in all interviews. The first one was an overwhelming sense from each principal's responses that every decision was based on what's best for the students. Decisions were not driven by the school grade assigned by the state or the fact that teachers may or may not be certified in the field in which they were asked to teach. Each principal considered the big picture, and that meant focusing on the students. Principal A admitted, "It's a lot of pressure ... I'm trying to look at putting people in the right place so that we'll do well ... It's a huge puzzle." Principal B explained his idea of the big picture when he acknowledged that "I'm always having to try to find that balance between putting that teacher in the most vital position. Sometimes the most vital position is the foundation that they're laying for those kids later on because, again, they're our kids." Lastly, Principal C shared the importance of math being taught across the curriculum, not just in mathematics classrooms. She believed in utilizing every class possible as an opportunity to teach math skills. In all principals' cases, their decisions were based upon the best interest of the students they were responsible for and the community that they served.

The second major theme that arose was the necessity of out-of-field teachers. Out-of-field teachers existed in mathematics classrooms at all three schools. In order to cover her mathematics classes, Principal A chose to divide higher level math course sections up among teachers who were certified Mathematics 5-9 and report those teachers as out-of-field for a portion of the day. This often required several days to coordinate since it involved multiple schedules. Principal B stressed that he used out-of-field teachers when he felt they were the best fit. He stated that he never looks at the master schedule and says, "No, I can't have this person

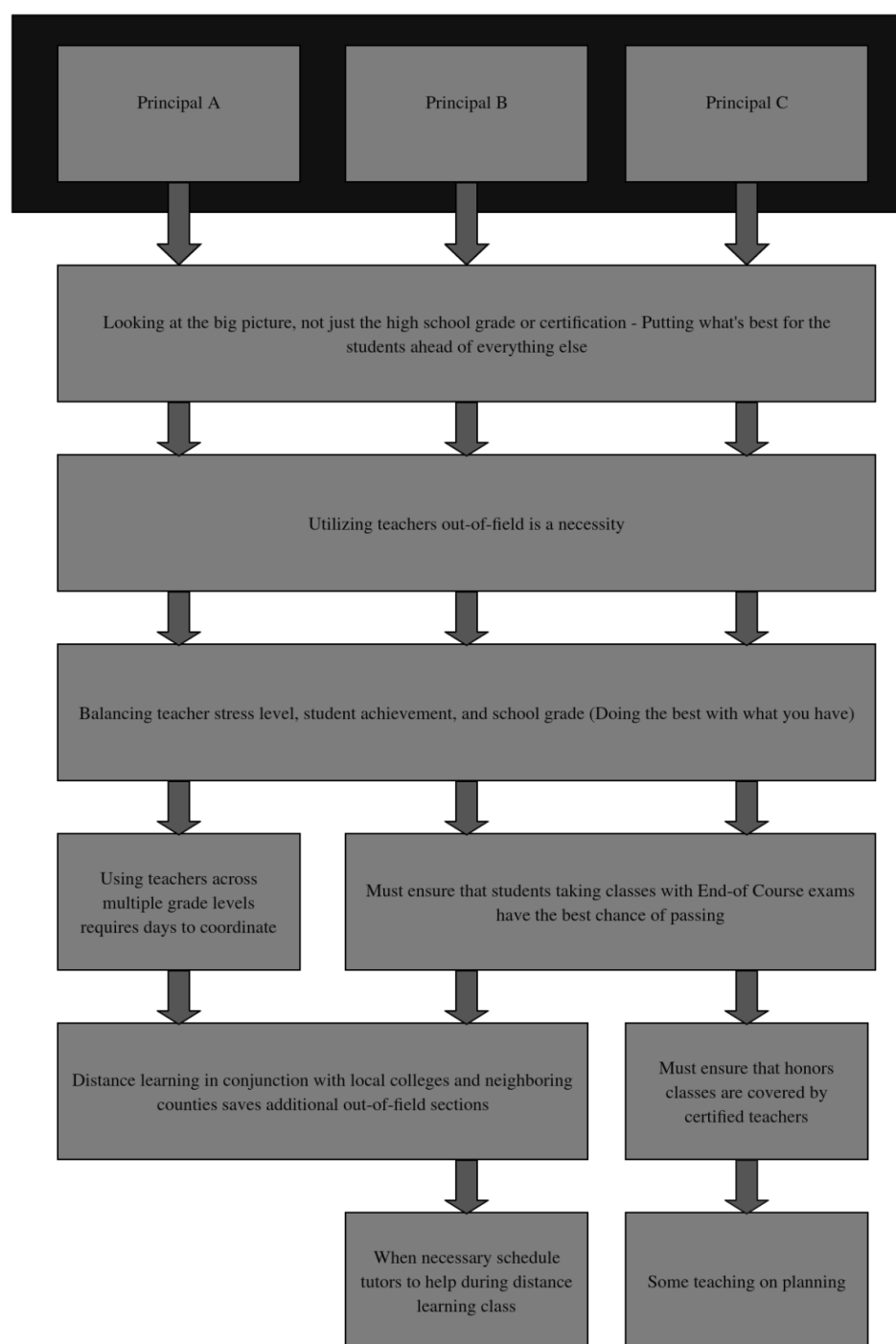
teach this because they don't have the certification. If I feel that they can handle that and I feel that they're the best person to do that..." Additionally, Principal C acknowledged that she utilized a certified reading teacher and a paraprofessional to fill mathematics vacancies because she felt they could do the best job. She moved a mathematics teacher with 6-12 certification to a physical education classroom because she was not performing well with the math curriculum. Each principal stressed the important role that out-of-field teaching played in providing educators to fill mathematics classes.

The third major theme that surfaced during the interviews was the importance of doing the best with existing personnel while balancing factors such as teacher stress level, student achievement, and school grade. Each principal mentioned incidents when teachers asked that their schedules be changed to alleviate some of the pressures of standardized testing. The principals interviewed recognized the importance of adjusting schedules when possible. Principal C admitted that some teachers were teaching during their planning periods to meet student need, but this was not done without employee consent. Providing adequate coverage for all math classes was a priority, but employee satisfaction was not overlooked. This proved to be difficult at each location.

A few minor themes also appeared. The importance of ensuring that students in classes with End-of-Course exams had the best possible chance of learning the necessary material was one minor theme. Principals tried to place teachers who had the content knowledge and could get results from students in these key positions. The administrators also tried to place competent educators in the honors level courses. A couple admitted that the parents of honors students were more likely to complain, so it was important to fill these classes with knowledgeable teachers to prevent issues within the community.

The use of innovative scheduling to provide students with higher level courses also emerged as a theme. Principal A utilized distance learning and online course technology to meet her students' needs. Principal B also provided for his students with unique scheduling practices. His school used distance learning lab equipment to Skype classes taught at the local community college. The school chose dual enrollment over advanced placement because the passing rate among their students was better. General education courses were available for students, and tutors were scheduled to assist with student questions. He pointed out that these courses benefit the students and the school: "I have three, four sections that I've been able to save in my teachers by what we're doing in our distance learning lab. That works out really well." Both principals expressed positive results from the use of technology and distance learning. The variations in instructional scheduling are detailed in Figure 8.

Figure 8. Impact of Certification on Scheduling - *How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts? How do these variations impact instructional scheduling?*

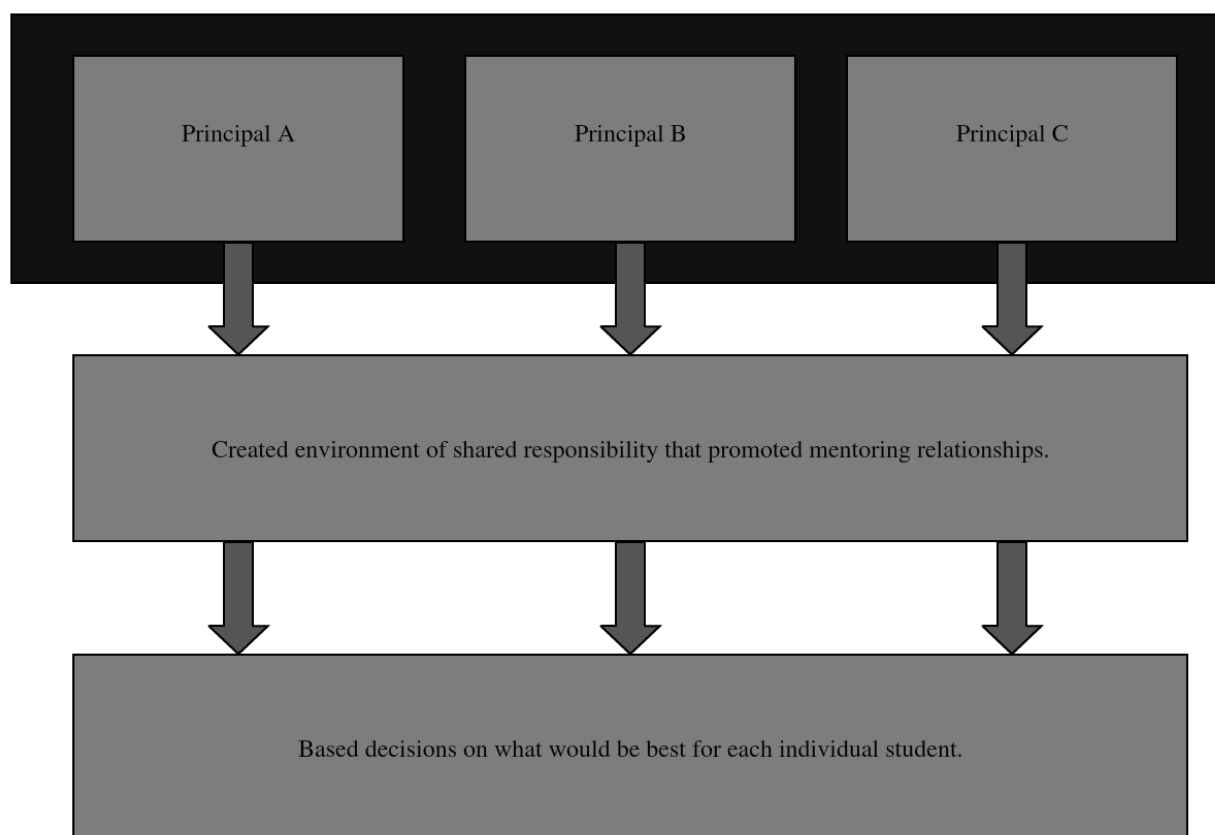


Themes That Emerged from Research Question 3, Part C: *How do these variations affect school culture (ex: faculty development, mentoring, student achievement, etc.)?*

Two major themes surfaced during the discussion about school culture. First, all principals created an atmosphere of shared responsibility within their faculty. Principal B explained, “Somehow you have to get all of your teachers to realize we’re all reading teachers, we’re all math teachers.” He emphasized the importance of “trying to make sure your social studies teachers and those other teachers are sharing in some of that responsibility and sharing in some of that when it comes to test scores.” Principal A made sure that all teachers participated when focusing on accountability talk and student relationships. Principal C went to great lengths to assure that each new teacher had an effective mentoring relationship with several veteran educators. As a result, each school represented in this study was filled with teachers and administrators who worked as a team.

The second theme that arose was the importance of decisions based on each individual student’s needs. Student and community needs were a priority in each school, especially when principals considered opportunities for higher level courses and the scheduling challenges that make these courses a possibility. With many students unable to travel, Principal B worked with local colleges to bring dual enrollment courses to his campus. He explained that before the new agreement existed and students were travelling to college locations, “the disadvantage of that is sometimes your better kids that you want to be on your campus aren’t there.” He also stated, “They didn’t want to drive all the way there, because they were also playing football, or baseball, or in the band.” All principals gave examples of innovative scheduling practices that provided opportunities for all students, while doing the best with the faculty that existed. Figure 9 charts the themes that arose when school culture was examined.

Figure 9. Effects of Certification on School Culture - *How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts? How do these variations affect school culture (ex: faculty development, mentoring, student achievement, etc.)?*



Summary

This study was conducted to identify best practices used by principals in lower socioeconomic rural schools who exhibit higher achievement on Florida's state-mandated End-of-Course exams in the high school mathematics courses Algebra I, Geometry, and Algebra II. A qualitative study was performed to examine this phenomenon and identify common themes communicated by three randomly selected high school principals whose schools fit this criterion. Interviews were conducted and transcribed. These transcripts were analyzed and coded in an

attempt to ascertain strategies, techniques, and methods that could assist administrators with hiring, recruiting, and retaining adequately qualified mathematics teachers. Results of the analysis synthesized qualities to look for to identify adequately prepared mathematics teachers, techniques to recruit these educators, and methods to retain the new teachers once they are hired. The analysis also delved into the effects of alternative certification on the recruitment and retention of adequately prepared mathematics educators. Participants discussed difficulties filling mathematics vacancies and offered suggestions for assisting and retaining applicants who enter the profession through alternative certification. And, lastly, the analysis of the interviews identified techniques and practices that might assist administrators who are attempting to maximize the instructional effectiveness of mathematics teachers with diverse levels of certification, or perhaps no certification. The results of the analysis included tips for creating a school culture that promotes employee satisfaction in conjunction with student achievement.

CHAPTER 5: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The National Commission on Teaching and America's Future stated that the "first premise is one that virtually every parent understands and a large body of research confirms: What teachers know and do is the most important influence on what students learn. Competent and caring teaching should be a student right" (Bourke & Brown, 2014, p. 67). This chapter contains information and ideas that were collected in a phenomenological study conducted to assist administrators in Florida's rural districts with recruitment, retention, and utilization of adequately prepared mathematics teachers. The first section provides a summary of the qualitative study and includes an overview of the purpose of the study, the significance of the study, the research questions, and the methodology used to complete the study. The second section reports the findings, the findings in relation to the literature, the surprises discovered during the research, and conclusions ascertained as a result of the literature review and the findings of this research study. The third section contains the implications for action. The fourth section suggests ideas for future research. And, lastly, the conclusion sums up the research project.

Summary of the Study

The purpose of this study was to investigate recruitment, retention, and utilization of adequately prepared high school mathematics teachers in Florida's rural districts. This research was prompted by public concern regarding low passing rates on End-of-Course exams in the secondary mathematics classes of Algebra I, Algebra II, and Geometry. Because of the fear that this problem might be the result of inadequately prepared mathematics teachers, the study investigated methods for recruiting and retaining well-qualified educators in rural areas with low

socioeconomic student populations. Studies have shown that the lack of qualified teachers can negatively impact student achievement; therefore, finding methods for identifying quality educators was a focus of this research (Ludlow, 2013). Due to the lack of consistency in government regulation and the low minimum criteria set by the state of Florida, identifying adequately prepared educators has been a difficult task for administrators. This problem has been even more difficult in critical shortage areas like mathematics and science where successful educators must possess substantial content knowledge. Hiring policies such as alternative certification and out-of-field emergency certification have created a larger and more diverse applicant pool for vacant teaching positions, yet concern about the sizable number of alternative hiring programs and the variation among those programs has created an ethical dilemma for those in charge of the hiring and placement of new instructors. This study was designed to identify methods of recruitment, retention, and utilization that could assist districts in filling mathematics classrooms with competent educators.

In an effort to identify effective practices, the study concentrated on principals at rural Florida high schools that had the highest achievement scores in mathematics and student bodies with a similar socioeconomic status. The research explored the principals' perceptions of recruiting and retaining adequately prepared mathematics teachers, as well as the effects principals perceived that alternative certification had on recruitment and retention. This focus was essential based on the recent increase in the use of alternative certification as a pathway to teaching high school mathematics. Lastly, the research examined principals' perceptions of the actual effects of various types of certification on school culture. It is the hope of this researcher that the information collected from the shared experiences of high school administrators located

in Florida's rural schools that demonstrate the highest performance in mathematics can be utilized to improve mathematics programs throughout the state.

Previous research on student achievement in high school mathematics relied mainly on educator background data, often self-disclosed, and student standardized test scores. While this data uncovered correlations between student achievement and teacher content knowledge, certification level, degree level, type of degree, etc., it failed to consider why Florida classrooms were not always filled with qualified teachers. This phenomenological study answered the following research questions from the viewpoint of the high school principal:

1. What practices do high school principals at the highest achieving schools in Florida's rural districts use to recruit and retain adequately prepared applicants for mathematics positions?
 - a. How would you define *adequately prepared*?
 - b. What recruiting techniques have been successful?
 - c. What retention techniques have been successful?
2. How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts?
 - a. What difficulties have been encountered when filling mathematics classroom vacancies?
 - b. What are the implications of alternative certification?
 - c. What strategies are employed to increase retention of alternatively certified mathematics teachers?

3. What strategies do principals use to maximize the instructional effectiveness of mathematics teachers who have diverse levels of certification?
 - a. What are the types of instructional certification among mathematics teachers on campus?
 - b. How do these variations impact instructional scheduling?
 - c. How do these variations affect school culture (ex: faculty development, mentoring, student achievement, etc.)?

While it has been said that teachers have the most influence on student learning, principals are responsible for hiring effective educators (Leithwood & Louis, 2012). Hiring decisions have a powerful impact on the future of a school, yet the input of administrators has often been overlooked in an effort to achieve unbiased facts and figures. This study was conducted to give principals a chance to share best practices that cannot be thoroughly evaluated with a quantitative research design.

This study was conducted using criterion sampling of rural Florida high schools that had the highest achievement scores in mathematics and student bodies with a similar socioeconomic status. End-of-Course exam scores for Algebra I, Algebra II, and Geometry were utilized to determine achievement status. Percentages of students scoring in level 3 and above on each exam were combined to reach a total percentage value, with the maximum of 300. Since the combined state average for the Spring administration in 2017 was 165, schools with 165 total percentage points or more were included in the highest achieving category. Florida Department of Education's rate of free and reduced lunches was used to determine socioeconomic status. Schools that met or exceeded the percentage points goal of 165 and had a free and reduced lunch rate of .70 or higher were considered for the study.

Three randomly selected principals were included in the study. All principals had at least five years of experience in their current position and were employed at a high school that was a member of Florida's Institute for Small and Rural Districts (ISRD). Principals were contacted by phone and asked if they were willing to participate. The participants were informed of the purpose of the study and the interview questions in advance. The data gathering process consisted of two semi-structured interviews with each principal. The first interview was completed in the principal's office at a time of their choosing. Due to extensive travel time necessary for face-to-face interviews, the initial interviews were followed by email correspondence that consisted of any necessary follow-up questions, clarifications, and verification of the original transcripts for contextual accuracy. Initial interviews were completed in the fall of 2017 and email correspondence was completed in the spring of 2018. A prepared list of questions guided the first interview. All follow-up questions were limited to the scope of the initial research study, and no other artifacts were used due to employee privacy laws.

Transcripts for each interview were read several times to identify key concepts and ideas. All transcripts were then reprinted in a different color to improve the analysis process. The three research questions, and the three sub-questions associated with each, were placed on a large table. Using techniques described by Seidman (2013), each transcript was reduced by cutting out key passages and placing these passages under the research question that they addressed. Each principal's responses were then considered individually. Applying Seidman's (2013) coding process, descriptive words were underlined on each response and then grouped into categories. The categories were then studied for themes and connections. After the individual interviews were consolidated into themes, the interviews were then compared with each other. Common themes between the interviews, as well as unique ideas, were examined to build a

repertoire of best practices. The interviews were also examined for connections to practices and insights revealed during the literature review process.

Summary of Findings

The findings presented here are the compilation of the major and minor themes that appeared during this qualitative phenomenological study that addressed recruitment, retention, and utilization of adequately prepared mathematics teachers in the state of Florida. Comparisons and contrasts with the literature review were also covered in this section, when applicable. In addition, this section described any surprises that became evident as the major and minor themes were formed during the analysis phase of the research study.

Research Question 1: What practices do high school principals at the highest achieving schools in Florida's rural districts use to recruit and retain adequately prepared applicants for mathematics positions?

Findings of Research Question 1, Part A: How would you define *adequately prepared*?

One major theme was emphasized by all three participants in the study. All three looked for applicants who had passion to perform their absolute best because of their devotion to the students. While this personal attribute was not something that future educators could be taught, it was a professional strength that was valued by administrators who participated in the study. They explained that this passion led to a nurturing relationship that encouraged students to do their best. The following comments were made during the discussion of this question:

- First of all, I want them to like children. That is our goal in the district, working on relationships and accountable talk.
- If you can't get along with the kids, if they don't know you care, they're not working for you, and you might as well hang it up.

- If you've got a good relationship with them, they'll know how much you care ...
Even if they can't get it, they're going to try to get it just for you.
- Someone who has a heart and a passion for being the best teacher and example they can be for kids. If I find that person, I've got enough good role models on this campus to mold that person to be a good teacher.

All three principals agreed that an adequately prepared teacher had to love kids and want to help them be successful. These personal qualities were first on their list.

Six minor themes emerged during the interviews. One principal looked for a candidate who was intelligent and had completed an internship. Another administrator believed the most critical quality to search for in a person was a desire for continuous improvement. He also wanted the candidate to be humble enough to seek advice when it was needed. The principal called this the "internal fortitude to be good and, really, to have the confidence that they're willing to ask questions, and that they know they don't know what they don't know." The third administrator addressed certification when she defined adequately prepared. She explained, "If you want to talk about adequate, I defined it as not just being certified, but somebody who's brave enough to teach math courses with an End-of-Course exam." This administrator acknowledged that being certified in mathematics did not always mean the individual could adequately teach the subject matter. She desired teachers who not only knew the subject matter, but had the ability to diagnose student mistakes and correct them in a way that the student could comprehend. The principals interviewed emphasized that they looked for these qualities first when interviewing prospective educators.

Findings in relation to the literature. The literature review identified five qualities found in teachers who are adequately prepared: extensive content knowledge, prior teaching experience, pedagogical training, certification, and personal attributes that contributed to success with students. The qualities that emerged most often during the interviews were personal attributes that led to success with students. All principals interviewed agreed with existing literature that personal attributes such as chemistry, teamwork, and passion for teaching were extremely important. The administrators also looked for appropriate certification. Previous studies have indicated that “[t]he number of well-qualified, certified teachers within a state was a consistent and significant predictor of that state’s student achievement in math and reading” (Stronge, 2007, p. 8). Some studies went even further: “One of the best predictors of low student performance in individual schools was the number of uncertified teachers in the building” (Stronge, 2007, p. 8). The administrators who participated in the study agreed with this sentiment and did their best to provide certified educators for their students, although some admitted that Florida’s certification requirements did not guarantee that a teacher would be successful in teaching mathematics. A desire for an ability to diagnose student difficulties was also mentioned during the interviews, and this paralleled the mention of pedagogical training that was found in relevant literature. Stronge (2007) found that teachers with traditional training were better at deducing student learning modalities and meeting those needs through instructional practices. While the principals interviewed did emphasize diagnostic abilities, they did not necessarily check for formal pedagogical training. The same could be said for prior teaching experience. Only one principal prioritized prior teaching experience, even though previous studies revealed that beginning teachers were more inclined to stick to a planned lesson while teachers with prior classroom experience taught with more flexibility (Stronge, 2007). The

remaining quality found in the literature was that of extensive content knowledge. The biggest surprise uncovered during this research study was that not one principal looked at an applicant's transcripts prior to hiring an individual. The following information was uncovered during the literature review:

- Several studies have illustrated that teachers with greater subject-matter knowledge tend to ask higher-level questions, involve students in the lessons, and allow more student-directed activities (cited in Stronge, 2007, p.11).
- Tchoshanov (2011) found a “positive correlation between teacher content knowledge and student achievement” (p. 160).
- Tchoshanov (2011) stated that the National Mathematics Advisory Panel that emphasized teacher content knowledge as a crucial predictor of student success.

The administrators involved in this research study knew the importance of an applicant's content knowledge, but the low number of certified candidates meant they did not have the luxury of comparing numerous qualified applicants.

Conclusion. Unfortunately, these administrators had a serious lack of applicants to fill vacant classrooms. Finding applicants who were certified in their field was a problem for all of them. While they knew what qualities they wanted to find in their candidates, they were often forced to settle for anyone willing to take the job.

Findings of Research Question 1, Part B: *What recruiting techniques have been successful?*

Two major themes arose in the responses to this question. The first theme all three principals mentioned was their reliance on local universities and colleges. When looking to fill positions, the principals who participated in this research study all contacted any university or college near them that might have students or recent graduates searching for a job. The

principals knew which programs were offered in the nearby universities and who to contact to arrange for possible interns at their school. While all principals indicated that they had a good relationship with these universities and colleges, they admitted that the schools often had no students to fill empty positions. One principal remarked, “Some of their programs, they’re looking at closing because they don’t have enough students to do it.” This principal also noted the declining enrollment in education degree programs.

The second major theme that emerged during all interviews was the reliance on local applicants. One principal summed up the reason for this reliance when she noted, “Nobody’s flocking here!” Another shared several instances where he had recruited local kids to come back and teach. The third administrator added, “Most of the teachers have been here for most of their career. Like I said, a lot of them graduated from here.” All three principals valued their local community members and recruited them openly.

Three other themes surfaced during the responses to this question. Two of the principals admitted that stealing from neighboring schools was a common practice. They both knew of exemplary educators in their field, and each admitted to enticing these educators to join their faculty as soon as a position opened. Principals sought these educators because of their willingness to go the extra mile to provide the best education possible to their students. The other two themes that emerged related to advertising open positions. One principal used the local newspaper. She and another principal also mentioned advertising with local consortiums and educational associations.

Findings in relation to the literature. Monk (2007) suggested that rural districts consider partnering with nearby universities to develop their own teacher base from local areas. All principals interviewed used this type of partnership in an attempt to fill vacant positions.

Monk (2007) believed that recruitment was difficult in rural areas due to their small size, limited choices for consumers, sparse settlements, dependence on agriculture for income, and distance from larger populations. Monk (2007) also pointed out that the economic foundations of rural communities have a tendency to be place-bound. These factors were evident in the areas that were the focus of this research study. Therefore, it is no surprise that the administrators recruited locals when possible. Research on the topic of recruitment also recommended making the best use of technology. All principals advertised in many locations and attended recruiting fairs when possible in an attempt to attract qualified applicants.

Conclusion. All principals actively recruited educators throughout the school year. They used every resource available to them, but they shared that it was difficult to encourage non-locals to travel or move to a small rural community. Few teachers fresh out of college wanted to move to an area that provided little entertainment, and couples seeking a slower pace for their children had trouble finding work for both spouses. Researchers such as Monk (2007) and Maranot and Shuls (2012) have often suggested that higher wages and monetary incentives would help principals such as these to encourage qualified educators to work in their area. Administrators in small and rural districts will continue to have difficulties if they are forced to rely solely on a small local pool of applicants.

Findings of Research Question 1, Part C: *What retention techniques have been successful?*

This question resulted in a rather large number of responses to code. Most of the responses fell into the category of proactive instructional support. The category was labeled *proactive* because it was obvious that none of the administrators who were interviewed let their new employees flounder without support. One principal noted, “We’re going to try to do the best job we can in being proactive with you, so we’re not waiting around for you to ask us a

question.” All principals had the same attitude. The three administrators mentioned mentors frequently. The principals also mentioned the importance of utilizing instructional coaches and assistant principals to support and nurture new employees. Veteran teachers were used to co-teach and help when possible, and each school worked with local consortiums to provide workshops, observations, and demonstrations to support new employees during their first years.

The next major theme that was mentioned by all administrators was that of encouraging a supportive family relationship among their new faculty. One administrator believed that a relationship with other faculty members was as important as the relationship with students. She stated, “I try to do things as a faculty ... We have monthly socials where we get together and it’s no work involved.” Another administrator described it as atmosphere that allowed autonomy yet encouraged teachers to “seek out how they can be better.” And, lastly, the third principal described it as “trying to have a school culture where they know everybody’s supportive and nobody’s out to get you.” All administrators believed in creating a nurturing relationship among faculty.

The theme of teachers’ satisfaction with their work environment arose in two of the interviews. This included providing necessary supplies, rearranging schedules, and not overburdening new educators. One administrator was a firm believer in “treating them right.” She expressed the desire to ensure that her teachers had what they needed to be successful in the classroom. Lastly, both principals admitted that they were willing to change schedules to help keep employees happy if they had reasonable requests.

The last theme that surfaced was that of creating a vested interest for new teachers by including them in vertical planning within the district and the consortium. This idea was presented by an administrator as a way to give teachers a voice in planning and provide them

with beneficial knowledge to prevent them from feeling isolated. In addition, he felt this practice helped new employees meet additional mentors who might be able to assist them.

Findings in relation to the literature. Studies have shown that almost one thousand teachers leave education each year, and a thousand more change schools. These staggering figures have not incorporated retiring teachers (Synar & Maiden, 2012). It has also been noted that “[a] highly qualified and committed teacher can substantially enhance a student’s learning, while having a series of ineffective teachers can seriously retard that same student’s progress” (Synar & Maiden, 2012, p. 131). The administrators interviewed during this research study understood the importance of retention. These principals also understood the reasons for discontent and did everything within their power to avoid the loss of qualified educators. The National Education Association uncovered several reasons for teacher dissatisfaction in a 2003 study (Synar & Maiden, 2012). Three major reasons were identified: being overwhelmed by the day-to-day functions of the job, unclear job expectations, and isolation with lack of support. All principals proactively supported their teachers in an effort to avoid these three reasons for discontent.

Conclusion. The principals who participated in this research study did not wait for new employees to flounder and ask for help. They proactively aided and encouraged new faculty members. None of the administrators were reactive in nature, which led to a supportive environment within each school. The principals were proud of the nurturing family relationships that existed in their schools, and each believed these relationships would encourage faculty to remain at the school. It was obvious during the interviews that the principals loved and encouraged their students, community, and faculty. It was no surprise that retention was a priority for all.

Research Question 2: How do principals perceive that alternative certification has affected recruitment and retention of adequately prepared applicants for high school mathematics positions in Florida's rural districts?

Findings of Research Question 2, Part A: *What difficulties have been encountered when filling mathematics classroom vacancies?*

Two major themes appeared during the research on this question. The first was the lack of applicants for vacant positions, especially in math and science. This theme came up in response to many of the research questions. One principal pointed out the drastic reduction in applicants in recent years stating, "I have hired because it was the only choice I had." Another principal echoed this concern:

I wish I had the luxury to say, "I want someone to have a master's degree in this," or "I'm only hiring people who went to school to be a teacher." That's simply not the case. If I was waiting to do that, I'd have a lot of positions up here that aren't being filled ...

When I have a position that is available, I don't have ten or fifteen people to choose from. He went on to point out that this lack of applicants meant principals did not have the luxury of comparing candidates' college transcripts to help determine the best person for the job. The third principal agreed, explaining, "Nobody is certified in these things. If you do find one, I can't get him ... If they're certified, that's right, I'm looking at them. I'm not going back looking at their transcripts." The number of applicants at all three schools were declining and sometimes nonexistent. The second major theme paralleled the first. The schools all had a small pool of local applicants. All the principals explained that after the candidates come down for a visit, they often decide the location is not what they had in mind, or that they can make more money elsewhere.

Two minor themes arose from two administrators. The first was the fact that mathematics courses with mandated End-of-Course exams often scare applicants away. One administrator declared, “The EOC’s are not good for us.” She also added, “You’ve got a lot of math-certified teachers who’ve left because of the tests.” This principal blamed the stress of the testing environment for the loss of applicants and teachers alike. The second minor theme to appear was the difficulty retaining new hires. One administrator shared a story of a new teacher who left after just two weeks on the job. While all three principals provided some great recruiting techniques, they each had difficulties attracting enough qualified people to fill vacant positions. One principal summarized her responses to this question when she declared, “I’ve got a former reading teacher teaching math and a paraprofessional teaching math. Do you get it?”

Findings in relation to the literature. Researchers have predicted a shortage of highly qualified mathematics teachers for years. Ludlow (2013) acknowledged that traditional teacher education and certification failed to keep up with increasing demand due to a rise in the number of students and teacher retirement rates Boyd et al. (2007) pointed out that increasing enrollment, teacher retirement, and the high number of teachers leaving the profession all made it difficult to improve teacher quality. The researchers also found that while some states strengthened their certification requirements to improve teacher quality, others who were experiencing extreme shortages reduced their requirements and created numerous alternative certification paths (Boyd et al., 2007).

Reduced requirements offered opportunities for poorly qualified individuals to enter the classroom, despite relevant research that suggested the importance of content knowledge.

Ferguson found that an educator’s expertise “accounts for as much as 40 percent of the variation in student achievement” (cited in Stronge, 2007, p. 12). Lederman et al. (2006) contended that

the best predictor of student achievement in these fields was a teacher with a major and full certification in the instructors assigned subject area. In addition, the researchers noted that teacher shortages were more prominent in rural areas with lower socioeconomic statuses, as represented by the schools included in this research study (Boyd et al., 2007; Lederman et al., 2006; Ludlow, 2013).

Previous studies also uncovered the negative effects of high stakes accountability measures on teacher retention. Watlington et al. (2010) indicated state accountability measures have drawn effective teachers away from low socioeconomic areas, and that “[t]his phenomenon presents a dilemma of academic equity with implications for social justice” (p. 25). Monk (2007) confirmed when student populations are small and mobile in nature, schools proved to be vulnerable to instabilities in data used by government agencies to gauge adequate progress. These vulnerabilities could discourage qualified applicants from applying for jobs in lower socioeconomic areas.

Conclusion. The lack of qualified applicants encountered by all administrators involved in this study has been predicted and confirmed by previous research studies. The struggles revealed by administrators who were interviewed simply add more credence to the abundance of evidence that a serious problem exists in public education. Declining enrollment in teacher preparation programs and continued state emphasis on high-stakes accountability measures have only exacerbated an already difficult problem.

Findings of Research Question 2, Part B: *What are the implications of alternative certification?*

No major themes appeared when discussing the implications of alternative certification, but many of the minor themes were closely related. In two of the schools, alternatively certified

applicants made up the majority of those applying, and the necessity of these applicants was emphasized. It was also noted by one principal that with the increase in alternative certification, fewer candidates were certified Mathematics 6-12. The majority were certified Mathematics 5-9 and could not be utilized for all high school mathematics vacancies. Additionally, the principals mentioned some difficulties that accompanied new teachers who came in with alternative certification. The administrators noted that these candidates often faced further requirements before becoming fully certified and sometimes lacked sufficient content knowledge. One principal pointed out, “You may be qualified on paper, but you can get in there and the rubber doesn’t meet the road for you ... there’s a big difference between knowing and teaching.” The last set of difficulties that were expressed revolved around the perception of the teaching profession. One administrator remarked that the perception of classroom teaching does not always reflect the reality of the job, causing some alternatively certified educators to leave the profession quickly.

Findings in relation to the literature. Previous research indicated an increase in the use of alternative certification to fill vacant positions. Ludlow (2013) stated that alternative certification programs increased from being offered in eight states to being offered in forty-six states, with 144 diverse versions available. The researcher also emphasized that by 2009, one third of the nation’s new teachers were certified via an alternative method. Boyd et al. (2007) revealed a wide disparity between the amount of student teaching and fieldwork required by the numerous alternative routes, while traditional routes consistently mandated foundation courses, pedagogical courses, subject area courses, and field experience. Previous studies have maintained the importance of this pedagogical and content area training. Boyd et al. (2007) uncovered a correlation between mathematics content-specific classes in pedagogy and student

achievement gains. This research study also noted, “Achievement in high school math is greater for students whose teacher has a graduate degree in mathematics than for student whose teacher either has no graduate degree or a degree in another subject” (Boyd et al., 2007, p. 57). Stronge (2007) agreed, mentioning that studies available on the impact of teacher training on student achievement showed a positive relationship in the areas of math, science, and reading. Brewer (2006) emphasized that teachers who were better prepared had higher student achievement and were also more likely to remain in the field of education.

Conclusion. Alternative certification has been, and will continue to be, necessary to fill vacant mathematics teaching positions. Often these candidates are unprepared for the realities of the job. Given the essential nature of this type of certification, administrators will have to find ways to provide the necessary training to assist alternatively certified educators and promote success in the classroom. One surprise that was uncovered during this portion of the research study was the decrease in applicants who were certified Mathematics 6-12. This led to challenges with student and teacher scheduling, and these challenges were discussed during Research Question Three.

Findings of Research Question 2, Part C: *What strategies are employed to increase the retention of alternatively certified mathematics teachers?*

All principals explained that their techniques and strategies for retaining alternatively certified applicants differed little from their approach with traditionally certified applicants. In one school, applicants who were alternatively certified had to spend an additional year in the beginning teachers program. The administrator at another school reemphasized keeping teachers happy and not overburdening them. And, lastly, one principal mentioned the use of veteran teachers on interview committees. She explained that her teachers were more likely to mentor

applicants when they had a say in the hiring process. In summary, each school used the methods of proactive instructional support that were mentioned earlier in this chapter.

Findings in relation to the literature. Relevant literature indicated that in some states teachers with alternative certification left the profession at double the rate of educators trained in the traditional method (Stanley & Martin, 2009). The financial and academic burden caused by the lack of retention was also discussed. The National Education Association uncovered several reasons for teacher dissatisfaction in a 2003 study (Synar & Maiden, 2012). Three major reasons were identified: being overwhelmed by the day-to-day functions of the job, unclear job expectations, and isolation and lack of support. A couple of recommendations for improved job satisfaction were mentioned in the literature. The first was the need for a successful mentoring relationship (Lederman et al., 2006; Scribner and Heinen, 2009; Stanley & Martin, 2009). The second was the value of involving veteran teachers during the hiring process (Monk, 2007). This encouraged communication and mentoring, which assisted with the recruiting and retention of highly qualified teachers (Lee, 2005).

Conclusion. The administrators involved in this research study insisted that retention was a priority in their schools, regardless of the type of certification a new teacher held. The principals were already using the techniques uncovered during the literature review, yet retention was still difficult. While these techniques were helpful, they did not eliminate the problem.

Research Question 3: What strategies do principals use to maximize the instructional effectiveness of mathematics teachers who have diverse levels of certification?

Findings of Research Question 3, Part A: What are the types of instructional certification among mathematics teachers on campus?

Each school had a unique situation, so responses were reported individually. School A consisted entirely of traditionally certified mathematics teachers, but all were certified Mathematics 5-9. There were no teachers certified to teach upper level mathematics courses. This was the only school with a Title I distinction. School B had two mathematics educators who were traditionally certified Mathematics 6-12. The sixth and seventh grade classes were covered by teachers with elementary certification and Mathematics 5-9. High school math sections that could not be covered by those with Mathematics 6-12 certification were covered by teachers who were considered out-of-field for part of their day. Lastly, School C had two high school mathematics teachers who were traditionally certified Mathematics 6-12. The remaining courses at School C were covered by teachers certified Mathematics 5-9 and teachers who were out-of-field. One position was covered by an educator who was out-of-field all day, and another was covered by a paraprofessional who was reported as a permanent substitute all day. There were teachers on campus who had Mathematics 6-12 certification who were not utilized in mathematics classrooms due to unsatisfactory performance in that area.

Conclusion. It was unfortunate to uncover the persistent use of out-of-field teachers, but the situation at all three schools made this necessary. The findings in relation to the literature review pertaining to out-of-field teaching will be discussed after the next part of Research Question Three. The principals also admitted that most of their traditionally trained teachers,

who happened to be certified Mathematics 6-12, were the older veteran teachers on their staff. This could lead to a crisis when their generation reaches retirement age.

Findings of Research Question 3, Part B: *How do these variations impact instructional scheduling?*

Three major themes appeared in all interviews. The first one was an overwhelming sense from each principal's responses that every decision was based on what's best for the students. Decisions were not driven by the school grade assigned by the state or by the fact that teachers may or may not be certified in the field they were asked to teach. All principals considered the big picture, and that meant focusing on the students and the community that they served. One principal acknowledged, "I'm always having to try to find that balance between putting that teacher in the most vital position. Sometimes the most vital position is the foundation that they're laying for those kids later on because, again, they're our kids."

The second major theme that arose was the necessity of out-of-field teachers. Out-of-field teachers existed in mathematics classrooms at all three schools. One administrator chose to divide higher level math course sections up among teachers who were certified Mathematics 5-9 and report those teachers as out-of-field for a portion of the day. Another administrator used out-of-field teachers when he felt they were the best fit. He stated that he never looks at the master schedule and says, "No, I can't have this person teach this because they don't have the certification. If I feel that they can handle that, and I feel that they're the best person to do that..." Additionally, the last administrator acknowledged that she utilized a certified reading teacher and a paraprofessional to fill mathematics vacancies because she felt they could do the best job. She moved a mathematics teacher with 6-12 certification to a physical education classroom because she was not performing well with the math curriculum. Each principal

stressed the important role that out-of-field teaching played in providing educators to fill mathematics classes.

The third major theme that surfaced during the interviews was the importance of doing the best with existing personnel while balancing things like teacher stress level, student achievement, and school grade. Each principal mentioned incidents when teachers asked that their schedules be changed to alleviate some of the pressures of standardized testing. The principals interviewed recognized the importance of adjusting schedules when possible. Providing adequate coverage for all math classes was a priority, but employee satisfaction was not overlooked.

A few minor themes also appeared. The importance of ensuring that students in classes with End-of-Course exams had the best possible chance of learning the necessary material was one minor theme. The administrators also tried to place competent educators in the honors level courses. The use of innovative scheduling to provide students with higher level courses also emerged as a theme. Two principals utilized distance learning and online course technology to meet their students' needs. One high school used distance learning lab equipment to Skype classes taught at the local community college. General education courses were available for students, and tutors were scheduled to assist with student questions. Both principals expressed positive results from the use of technology and distance learning.

Findings in relation to the literature. Out-of-field teaching was examined in many research studies. Darling-Hammond and Stykes concluded that uncertified teachers and out-of-field teachers achieved far less with students than do teachers with proper, in-field certification (cited in Stronge, 2007, p. 8). Another study completed by Ingersoll, indicated that the practice of out-of-field teaching harmed the teacher as well as the students (cited in Stronge, 2007, p. 8).

Ingersoll (2001) also found new hires were more likely to be teaching out-of-field, and a higher concentration of out-of-field assignments existed at low income schools and smaller schools.

The literature review also touched on the fact that low income and rural schools tend to lack competent educators to teach upper level mathematics courses. Monk (2007) found ninety-three percent of twelfth graders in urban areas were enrolled in schools that offered calculus, but only sixty-four percent of rural twelfth graders had that opportunity (p. 159).

Conclusion. All the administrators interviewed faced an ethical dilemma when trying to give their students the best possible education while dealing with a serious shortage of qualified educators. Their willingness to be creative allowed them to serve their upper level students as well as those who struggle in math. There was a definite concern for finding the best fit for each position rather than placing a teacher in a classroom based only on their certification. The principals were also fast to react. If an individual failed to perform in the classroom, administration made other arrangements that benefitted the students. Student achievement was the top priority at all three schools.

Findings of Research Question 3, Part C: *How do these variations affect school culture (ex: faculty development, mentoring, student achievement, etc.)?*

Two major themes surfaced during the discussion about school culture. First, all principals created an atmosphere of shared responsibility within their faculty. One principal explained, “Somehow you have to get all of your teachers to realize we’re all reading teachers, we’re all math teachers.” He emphasized “trying to make sure your social studies teachers and those other teachers are sharing in some of that responsibility and sharing in some of that when it comes to test scores.” Another principal went to great lengths to assure each new teacher had an

effective mentoring relationship with several veteran educators. As a result, all schools interviewed were filled with teachers and administrators who worked as a team.

The second theme that arose was the importance of decisions based on individual student's needs. Student and community needs were a priority in each school, especially when principals considered opportunities for higher level courses and the scheduling challenges that make these courses a possibility. All principals gave examples of innovative scheduling practices that provided opportunities for all students, while doing the best with the faculty that existed.

Findings in relation to the literature. The importance of a mentoring relationship appeared many times in relevant literature and has been discussed previously in this chapter.

Conclusion. The administrators interviewed during this study were chosen because of their schools' performance on state exams. One of the reasons for this performance was the ability all three principals had to create an atmosphere of shared responsibility. They spoke of their schools with pride and a sense of ownership that seemed to be passed along to their employees. All principals involved veteran teachers in the process of developing new educators. This practice created a family atmosphere that emphasized putting student and community needs first.

Implications for Action

This study was conducted because of the deteriorating opinion of public education in Florida. Those who firmly believed in the importance of public education found it difficult to defend the low achievement scores published by the Department of Education. This was especially true for high school mathematics. The intention of this study was to assist administrators in poor rural counties with recruiting, retaining, and utilizing new mathematics

teachers by studying best practices in schools that beat the state average on Algebra I, Algebra II, and Geometry End-of-Course exams. It was originally believed that giving principals the tools to hire the best person for the job would improve educator quality, thereby improving public opinion. After considerable progress, the focus of this study quickly evolved from choosing the best candidate out of many to finding applicants, keeping the good teachers, and utilizing existing educators to the best of their abilities. The principals involved in this study did share excellent ideas on what to look for in applicants for mathematics positions, but the grim reality was they often had little choice due to the lack of candidates for high school mathematics positions. The most valuable advice these administrators had to offer dealt more with retention and utilization. One principal declared, “In education you learn real quick you better focus on the things you can control and don’t worry about the things you can’t or you’ll drive yourself crazy.” The administrators interviewed during the study excelled at the tasks they could control. They shared their tips and tricks for recruiting. Stealing seemed to be a favorite strategy among the administrators. They gave sage advice on retaining skillful educators. Lastly, they were masters at utilizing existing personnel. Their practices are based on years of experience and should be helpful to administrators in need of some guidance on how to best serve their student populations.

One principal also shared some ideas that might encourage change on a statewide level. He proposed the creation of a scholarship for local students who are interested in teaching mathematics or science in rural areas. He stated:

Those people need specific skills and specific knowledge to be successful. Offer them some type of financial incentive while they’re going to college. Then their responsibility is to come back and teach at your campus, if you have an opening at that time.

He felt this would give him a better chance of recruiting outstanding local talent at an early age. All three schools relied heavily on local talent, so this might be a way to encourage locals to return and support their community. The idea of monetary compensation to attract highly qualified educators to rural areas is not entirely new. Monk (2007) called for higher wages and benefit incentives to encourage more applicants. Maranot and Shuls (2012) also believed monetary incentives -- such as high priority bonus, housing incentives, and loan forgiveness -- could aid administrators with recruiting. Perhaps the suggestions made by administrators during this research study and those presented during previous investigations could be used to encourage state legislatures to grant additional funding for recruitment and retention in rural areas that have lower socioeconomic statuses.

Recommendations for Policymakers

1. Ensure that small and rural districts are relieved from any monetary penalties that may arise due to the lack of qualified applicants. These penalties only exacerbate existing problems associated with inadequate funding. The administrators interviewed often chose methods of creative noncompliance that allowed them to better serve their students. More freedom from monetary penalties might enable additional administrators from small and rural districts to make decisions that are in the best interest of their student population.
2. Provide financial incentives for educators willing to teach in rural areas that consist of students from a lower socioeconomic status, especially those willing to teach in a critical shortage area. These incentives could include housing assistance, bonuses, loan forgiveness programs, etc.

3. Provide scholarships for local students from disadvantaged rural areas who are willing to come back and teach in their hometown for a specified period of time. These students are often place-bound. With the limited number of education programs in areas such as mathematics and science, these students are often forced to live far from home to attend college. They simply cannot afford this without assistance.
4. Utilizing distance learning technology to meet the needs of advanced students can be beneficial for disadvantaged students and the colleges who serve them. Therefore, it is recommended that additional funds be made available for technology and tutors to make these accommodations a successful venture. Distance learning in subject areas such as mathematics can be difficult, but with the right technology and the help of on-site tutors, this type of delivery can produce positive results.

Recommendations for Future Research

1. This study uncovered some negative consequences of End-of-Course exams on teacher recruitment and retention. Further research into this phenomenon might pose some recommendations for ameliorating these consequences.
2. This study concentrated solely on rural schools with a free and reduced lunch rate of .70 or above. Recruitment and retention difficulties are problematic in many other areas as well. Further research into the struggles of schools in larger or more affluent areas might uncover different practices to assist administrators throughout the state.
3. During this research study, an interesting coincidence arose. Most of the schools that existed in the population that fit the requirements of the study were middle-high school combinations. They served grades six through twelve. This did seem to be a factor in the decision-making process when considering course placement based on student needs.

Students in these schools had fewer changes to deal with during the transition from middle to high schools and seemed to avoid the typical dip in achievement scores during this time. Further research into middle-high combination schools might investigate the effects of this type of placement on overall student achievement.

Conclusion

The purpose of this study was to investigate recruitment, retention, and utilization of adequately prepared mathematics teachers in Florida's rural districts. In an effort to ascertain best practices, this research study randomly selected three principals whose schools met the following criteria: members of the ISRD, free and reduced lunch rate of .70 or higher, and highest achievement on mathematics End-of-Course exams for Algebra I, Algebra II, and Geometry. The research examined the essence of principals' perceptions of three key areas:

1. The most successful strategies utilized for recruiting and retaining adequately prepared mathematics teachers.
2. The effects of alternative certification on recruitment and retention of adequately prepared mathematics teachers.
3. The actual effects of various types of certification on school culture.

The administrators shared many of their best practices in an effort to assist other Florida districts that might be experiencing difficulties with recruitment, retention, and appropriate utilization. It is the hope of this researcher that the findings of this study can be used to improve public education, thus mending public opinion of our educational institutions. The interviewees were inspirational as they spoke with pride of the children and communities they loved. They reaffirmed this researcher's belief in the true purpose of public education. It is the ethical duty of

all involved in the educational process to provide each child, regardless of their circumstances, with an excellent public education that gives them the best opportunity for a successful future.

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