ABSTRACT

Title of Document: ASSESSING PRE-SERVICE TEACHERS' KNOWLEDGE OF AND ATTITUDES TOWARDS INCORPORATING SOCIAL JUSTICE EDUCATION IN ELEMENTARY SCHOOL MATHEMATICS CLASSROOMS

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Over the past three decades, there has been growing interest in teaching mathematics in ways that encourage action for social justice. Social Justice Education (SJE) seeks to enable students to study existing forms of social injustices in their lives and to create a sense of social agency in the students. This study sought to understand the attitudes and beliefs of pre-service teachers about principles and examples of mathematics teaching from a social justice perspective. Participants consisted of 148 students at four universities. Participants completed a 49-item Likert-type survey to ascertain attitudes of pre-service teachers toward five descriptions of mathematics lessons - that employed a social justice perspective. Statistical analyses compared the responses of the participants grouped by demographic variables of race, age, socio-economic status, and teacher preparation experiences. Findings indicate that significant differences on survey outcomes

between participants were associated with key preparation experiences, such as whether or not participants had taken mathematics methods courses and diversity courses, as well as the type of university attended. Ten participants subsequently took part in one-on-one audio-taped, semi-structured interviews designed to ascertain the type of circumstances and lived experiences that shaped their attitudes toward teaching mathematics with a social justice perspective. The interviews provided some explanations as to why particular attitudes and beliefs were expressed.

ASSESSING PRE-SERVICE TEACHER'S KNOWLEDGE OF AND ATTITUDES TOWARDS INCORPORATING SOCIAL JUSTICE EDUCATION IN ELEMENTARY SCHOOL MATHEMATICS CLASSROOMS

By

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Dedication

To Donald,
My loving, patient husband,
Your gentle reminders to dissertate kept me moving forward.

To my parents,
Who have gone on before me,
My memories of you inspired me to persist.

To the younger generations in my family,
Know that anything is possible,
No matter how late in life you start,
But know that it is far easier to start early in life.

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Chapter 1

Introduction, Rationale, and Description of Research Goals

Concern about the achievement of elementary, middle, and high school students is a long-standing condition of American education (Covert, 1928; Means, 2010, Office of Education, 1964). For over 50 years, that concern has led to major national initiatives aimed at enhancing the content knowledge and pedagogical skills of teachers as well as improving the quality of curriculum materials and tests that provide direction and support for teaching (Ladner & Lips, 2009). Despite what could be described as a dramatic national investment in those strategies for improving the yield of schooling, current levels of student performance are still judged to be seriously inadequate (Loveless 2011; Ladner & Lips. 2009), and there is little agreement about appropriate directions for next improvement efforts.

Science educators debate the relative effectiveness of inquiry-based and direct instruction approaches (Windschitl, 2006). Reading experts search for the most effective balance of phonics-based and whole language instruction (Moorman, Blanton and McLaughlin, 1994). Mathematics educators debate the balance of attention to direct instruction on basic skills and student-centered investigative work aimed at developing higher level thinking skills (Schoenfeld, 1988). Unfortunately, those spirited debates seldom reflect serious thought about the fundamental purposes of education.

There are several prominent schools of thought about the basic purposes of education. One that seems dominant in the current political arena is the view that schools are designed first and foremost to provide a steady stream of educated people to populate

the American work force and make our country competitive in the world economy (Caldas and Banksto, 2005). Another quite different view submits that the central purpose of schooling is to create an educated populace with a disposition toward continual improvement of our democratic society—to instill a sense of agency in students along with the knowledge and skills required to put that sense of purpose into effective action (Berman, 1997). Proponents of this view of education believe that indeed, "schools are the bulwark of the republic" (Carper & Hunt, 2007), bearing the bulk of the responsibility of educating students in their civic values, knowledge, and obligations towards society.

Regardless of which camp one falls into or how one weighs them differently, the quality of school mathematics is an important factor in the ability of schools to meet their goals. However, the two purposes often lead to quite different views about what mathematics should be taught and how it should be taught. When used to prepare a well-educated work force, curricula and teaching in school mathematics tend to be most strongly influenced by vocational/ technical considerations. Curricula tend to emphasize a view of mathematics as a toolkit of procedural skills, teaching tends to be shaped by a transmission-of-knowledge view of learning, and school systems tend to work hard to achieve a consistently delivered "product" and to measure the success of that product by frequent standardized testing.

Long experience by generations of teachers confirms that students tend to see this sort of mathematics as a set of abstract, unrelated skills to be learned by something close to rote memorization. Several researchers (Boaler, 1997, Schoenfeld, 1988 and Skemp, 1978) point out how traditional methods of teaching mathematical procedures fail to achieve the stated goals of empowering students to recognize the need for these procedures and to use

them in future events. History has shown that this sort of mathematics education provides fragile knowledge that is quickly forgotten and has to be taught over and over, making mathematics a filter that discourages all but an elite few students from the very future opportunities that it offers. In the past it was accepted that math was difficult and only a few could learn it (Boaler, 1997, Holland, Lachiotte, Skinner, & Cain, 1998, and Schoenfeld, 1988).

On the other hand, when the purpose of school is considered to be the education of students with an intent to improve the democratic society (Boaler, 1997, Schoenfeld, 1988), there are persistent suggestions that mathematics education should instill a sense of agency into students by shedding light on social issues that presently and directly affect their lives, by encouraging them to examine the issues from a mathematical point of view, and by urging them to take real actions that aim to improve social conditions. This is the approach taken by Social Justice Education (SJE) in mathematics classrooms.

So, what is SJE, what does it mean to teach for social justice and in particular, what does it mean to teach mathematics while incorporating social justice? As Adams, Bell and Griffin (1997) explain, “Social justice education includes both an interdisciplinary subject matter that analyzes multiple forms of oppression and a set of interactive, experiential pedagogical principles that help students understand the meaning of social difference and oppression in their personal lives and the social system” (p. iv). The editors of Rethinking Schools, a quarterly educational magazine, concur that “Social justice education is about teaching academic skills while also teaching children to question inequality and imagine alternatives (Au et al., 2011, p. 1). Additionally, Cochran-Smith, Barnatt, Lahann, Shakman, and Terrell attest that

> Teaching for social justice takes as a premise that teaching and teacher education are inescapably political and ideological activities and that they inherently have to do with ideas, ideals, power and access to learning and life opportunities. Thus we assume that all teaching and all professional education, including teacher education, are value-laden and ideological rather than neutral and apolitical. The goal of teaching for social justice is that all students—whether or not they have special learning needs, are English learners, are considered "at risk" by the system, or live in poor neighborhoods—have access to rich opportunities to learn basic skills as well as more complex thinking and reasoning skills." (2007, para. 1).

In a society that appears to have grown more callous and more socially and economically polarized (Harvey, 2005), SJE has the potential to prepare citizens who are sophisticated in their understanding of diversity and group interaction, who are able to critically evaluate social institutions, and who are committed to working democratically with diverse groups of people.

When asked for her definition of social justice education, Christensen (Golden, 2008) explained what it means to be a social justice teacher and what it means to create a social justice classroom. First and foremost, she states that social justice is grounded in the lives of the students in that it uses situations straight from their lives as additional texts in the classroom. A social justice classroom is driven by the belief that every child can learn and grow; that skill deficits do not mean that children do not have the ability to improve and thrive in an academically rigorous classroom. Students are partners in education, not recipients of knowledge transfers. The education engages students in their communities in positive ways.

Christensen states that the most important piece of social justice is “the critical piece” (Golden, 2008, p. 60). This is where the students critique society, they critique “privilege and power for few at the expense of many” (p. 60). Social justice classrooms enable students to see how society is, how it got that way, and how they might act to change it. She continues by emphatically stating the importance of enabling students to see how people have worked together to make positive changes in society. In this way students don’t leave with a dismal picture of doom and gloom. Additionally, she emphasized that she wants her students to be able to critique society and above all, “get the sense that they can be empowered to change it” (p. 61).

When mathematics is the subject matter at hand is mathematics, teachers include mathematics-specific goals (Frankenstein, 1989, 1997; Gutstein, 2006) that enable students to use mathematics to study, understand, critically analyze, and possibly improve their world while they also increase and deepen their knowledge of mathematics.

Proponents of SJE argue that teaching in ways that shed light on social issues directly affecting the lives of students will be both educationally effective and important to society (Gutstein, 2006, 2007; Frankenstein, 1998, 2005) They propose that examining critical social issues from a mathematical point of view and translating findings into social action will both help students learn important mathematics and develop a disposition to seek improvement of the social community in which we all live. Because the students would be studying mathematics involved in social issues that impact their lives, the mathematics would be relevant and meaningful to them. Moreover, students would be more engaged with the mathematics (Gutstein 2006, 2007).

Statement of the Problem

The movement to teach mathematics in ways that encourage action for social justice has been around for quite some time now (Frankenstein, 1983). Recently it has again been gaining momentum. Many researchers and practitioners are teaching in this manner and producing research reports as well as supporting curriculum materials to assist others in teaching in this manner (Gutstein & Peterson, 2005). However, if the record of reform efforts in mathematics education is clear about anything, it is that SJE will not make significant impact on school mathematics unless it is informed by the wisdom of practice held by experienced teachers and unless it convinces those teachers that SJE makes sense for them. Thus, it is important to understand the attitudes and beliefs toward SJE among teachers.

At the elementary level, in particular, the high turnover of classroom teachers suggests that work with pre-service teachers is an important strategy for implementation of SJE. Understanding the attitudes and beliefs of pre-service teachers about principles and examples of mathematics teaching from a social justice perspective will be a valuable contribution to the teacher development that is essential for effective application of such a pedagogical and curricular approach. This was the fundamental objective of this study.

Overview of the Research Design

The target population for the study was undergraduate level and master's level education majors who had completed at least one mathematics content course designed for pre-service elementary or middle school teachers. The study applied a mixed methods strategy to document and examine the attitudes and beliefs about curriculum and teaching

that dispose prospective teachers toward mathematics education with a social justice theme as well as the attitudes and beliefs that turned prospective teachers against SJE.

The first stage of the study surveyed the reactions of a large and diverse sample of prospective elementary school teachers to five descriptions of mathematics lessons with Social Justice Education intent and examined the correlations of the expressed attitudes and beliefs with important demographic variables. The second stage of the study identified a small sample of survey respondents who indicated a range of attitudes and beliefs about SJE pedagogy and then conducted personal interviews with the respondents to determine the bases of those beliefs—to understand the circumstances and experiences in prospective teachers' lives that shaped their attitudes toward teaching mathematics with a critical lens.

Rationale

The rationale for this study of attitudes and beliefs about teaching elementary mathematics with a focus on social justice issues was based on two fundamental premises. First is the claim that the critical lens of social justice education holds significant promise for enabling mathematics teachers to make education more meaningful and more beneficial to a larger body of students—especially those students who are typically marginalized by traditional approaches to education. Second is the claim that teachers' classroom practices are guided by their beliefs and dispositions and that no education reform effort succeeds without informed and supportive attitudes by classroom teachers. This research targeted pre-service elementary teachers in part due to Stigler and Hiebert's (1999) research that suggests that teachers will teach the way they have been taught. It follows then that teacher education programs are the ideal sites for learning about SJE. The students in these programs are largely pre-service teachers so it seemed logical to select this group as

participants. The case for those two claims is elaborated in the following portions of this section.

Why Social Justice Education?

The argument for transforming education to focus on teaching through and for concerns about social justice rests on claims with both moral and pragmatic grounding. Some argue that teaching for social justice must be one of the fundamental aims of education (Ayers, Hunt, and Quinn, 1998; hooks, 1994). Others argue that teaching with central concern for social justice issues will be more effective than teaching that does not take advantage of those concerns to actively engage students in learning and help them develop deeply connected knowledge (Darder, 2002).

The Moral Imperative. The rationale for teaching that aims at creating social justice has been expressed eloquently by a wide variety of educators and citizens with concern about the education of young children. For example, in *The Moral Dimensions of Teaching,* Kenneth Sirotnik argued,

> *"America is a collection of multiple communities defined by different interests, races, ethnicities, regions, economic stratifications, religions, and so forth. Celebrating these differences is part of what makes this nation great. But there is a community - a moral community - that transcends the special interests of individuals, families, groups, that stands for what this nation is all about: liberty and justice for all..."* (1990, p. 297)

Among the many other researchers in agreement with Sirotnik are Darling-Hammond, Martin Luther King, Jr., and J. Hunt. Darling-Hammond refers to the liberty and justice for all spoken of by Sirotnik when she speaks of the “compelling promise of

American democracy" (1996, p. 152), a promise that makes the good life accessible to all. She goes on to say that "Public education is central to this vision in two important ways: as a vehicle to the good life for those not born to it by virtue of family wealth and status, and as a foundation for the good society--- one in which "the people" can make sound decisions about how the government will best serve them and the nation's democratic ideals" (p. 153).

As a college student at Morehouse, Martin Luther King, Jr. wrote a paper entitled *The Purpose of Education*. In this paper, he stated that "Education must enable one to sift and weigh evidence, to discern the true from the false, the real from the unreal, and the facts from the fiction" (1947a, p. 1). In still another of his papers he states "Education without morals is like a ship without a compass, merely wandering nowhere. It is not enough to have the power of concentration, but we must have worthy objectives upon which to concentrate. It is not enough to know truth, but we must love truth and sacrifice for it" (1947b, p.1). Therefore, according to Dr. King, the function of education is to teach one to think critically and to use knowledge morally.

Hunt (1998) purports that although teaching for social justice serves as a reminder of the inequities in society; it equally inspires learners to make changes in their world. Hunt further states that "A focus on teaching for social justice reminds us that our children need not only a firm grounding in academics but also practice in how to use those academics to promote a democratic society in which they get to participate fully" (p. xiii). Among the many others who have agreed that the primary purpose of education should be to produce critical, compassionate people who will then aim to impart equity into society at large are

Ladson-Billings (1992), Bigelow, Christensen, Karp, Miner & Peterson (1994), hooks (1994) and Derman-Sparks (1998b).

This view of education for the purpose of improving the society in which one lives is in stark contrast with what many researchers suggest are, today and historically, the central aims of education in the United States. For instance, Bowles and Gintis (1976), Hilliard (1994), Irvine (1990), and Shor (1996) each concluded that schools are perpetuators of the status quo and rarely, if ever, work to change society. In fact, Apple (1982) avows that the "educational system is an exceptionally important element in the maintenance of existing dominance and exploitation" (p. 9) and that a fundamental problem with such systems is that they "persist and reproduce themselves without being consciously recognized by the people involved" (p. 13).

These researchers argue that preserving the status quo means that many students must be educationally prepared to fill jobs that are menial and subservient, the same level of jobs held by generations of their families (Bowles & Gintis, 1976, Nieto, 1992, Wilson, 1987). Of note is the fact that these subservient jobs are rapidly disappearing in today's market (Aronowitz & DiFazio, 2010) and being replaced by ones demanding more math, science and technical knowledge (Microsoft, 2011). As "Mathematics is an integral part of all aspects of technology" (Skovsmose, 2000, p. 4), this further devastates the situation faced by undereducated students. Students in this group are those typically marginalized by the school system and other societal institutions; they are overwhelmingly students from minority cultures and/or the lower socio-economic classes of our society.

With this in mind, let us examine the historic outcomes of education for the purpose of educating the American workforce, enabling the country to compete globally. As it

stands, the education system we have truly works only for some students. A small number of students in this country have been fortunate enough to participate in educational pursuits from Pre-K through the 12th grade that empower them to achieve while thinking critically and creatively (Anyon, 1981). Many of this group complete high school, enroll in and successfully navigate higher education, and subsequently secure profitable careers - careers that enable our country to be economically and politically competitive globally. For this small group, the system seems to work perfectly.

This picture does not apply to the larger body of students. In fact, Shor (1980) submits that "education has been demanded by so many but wound up pleasing so few" (p. 13). Indeed, a large percent of students do not even complete high school. Federal statistics support what Lareau (2003) labels the apparent lopsidedness of educational attainment between the various racial groups in the United States. The 2009 National Center for Education Statistics (NCES) report reveals that in 2001, 3.8 million 16 -24 year olds were not in school and had not completed high school. This figure represented 10.7 percent of the 35.2 million 16 – 24 year olds in the United States that year. The percent of African American dropouts was equal to that of the Caucasian and Asian Pacific Islanders combined; while the percent for Hispanic students was almost triple that of African Americans. NCES (2009a) data for the period of 1972 – 2004 show that the largest percent of dropouts is in families with the lowest income. These statistics point to the less than ideal educational experiences for students in minority cultures and those in the lower socio-economic classes of our society.

In the *Digest of Education Statistics (2009b)*, NCES reported that while the number of dropouts across all races is decreasing, at 8 percent in 2008, the inconsistency in dropout

statistics between the races still exists. Hispanic students lead the dropout rate at 18.3 percent. African American students and Caucasian students follow with 9.9 and 4.8 percent respectively.

Given that success in today's job market requires more education and technological skills (Wilson, 1987, 1997), the employment opportunities for dropouts are extremely limited. Because this growing group of adults will be unable to support themselves, society will do so, in one way or another. The U.S. Government Accountability Office (GAO, 2008) reports that dropouts are more likely than other citizens to draw on welfare and other social programs throughout their lives. Furthermore, the report states that dropouts are more apt to engage in behaviors that are costly to society (early pregnancy, delinquency, crime, violence, alcohol and drug abuse, and suicide).

In addition to dropouts, many high school graduates are undereducated. Wilson (1987) speaks of certain public schools that produce “educational retardation” (p 58). Along this same line of research, Bowles and Gintis (1976) provide some insight into the futures of some students who graduate from particular high schools. The schools in question are generally inner city schools that train minority students to “feel and appear capable of only performing jobs in the low wage sector of job markets” (Bowles and Gintis, 1976, p.127). Seemingly, “consignment to inner city schools helps guarantee economic subordinancy of minority students” (p. 128). Some 31 years later, Cosby and Poussaint (2007) report that still the “worst schools are in neighborhoods where people are poor” (p. 103) and they refer to the products of such schools as “invisible people” (p. 224), the uneducated and the undereducated.

Nieto (1992) declares that schools reproduce the economic and social relations of society by “teaching poor students subservient skills and behaviors to mold them for roles as good workers in society while more affluent children are taught management and control skills.” (p. 235). While some students are being prepared through school to be leaders in the workforce, others are prepared to be the low-level worker. During a tour of an elementary school in a prominent American city, Kozol (1991) discovered practices aimed at training even the young to fit into a low level worker’s role. A growth of unskilled laborers in low-wage jobs also increases the trend toward developing a large American underclass, which, some analysts argue, “threatens the continuing existence of a democratic way of life" (Asche, 1993, p. 13). This threat to the American way of life leads to an argument for education that is attentive to questions of social justice.

The preceding observations about existence of a large group of students who are poorly served by education and consequently marginalized in society provides a different (almost pragmatic) kind of rationale for infusing education with concern for social justice. Clearly, something must be done to turn around the education system in order to protect our cherished democratic way of life. Slater, Fain and Rossatto (2002), in agreement with Freire (1970), submit that society begins to change “through the collective efforts of a literate populace that knows how to read the world” (p. 37), discerning the true from the false as Martin Luther King, Jr. (1947a) put it. Freire advocates “empowering people through active participation rather than submissive, passive acceptance of the current social order” (1996, p. 63). How then, do we build an educated population, able to critically read and improve the world?

Many researchers believe that one way to do so is to make schools the place where students see the world as it is and also as it should be - a more just society. In addition to the belief that light should be shed on the injustices of the world through classroom lessons, researchers believe that it is critical that students are taught that, even at their young age, they can and should do whatever is in their power to begin to correct such injustices. Marion Wright Edelman (1992) advises children to be confident in their ability to make a difference. She further advises that they should not always expect immediate wins and warns that sometimes they may not win at all but they will have made a difference and even small differences are contributions. I firmly believe that Edelman's remark confirms that even the youngest student can make a difference albeit in some small way. Derman-Sparks (1998a) agrees that students should be taught how to challenge unjust aspects of the society because they are citizens of democracy. Surely, the application of thought and the development of agency should be an intrinsic part of any learning environment (Holland, et. al, 1998).

Bigelow et al., (1994, p. 4) argue that "Classrooms should be places of hope, where students and teachers gain glimpses of the kind of society we could live in and where students learn the academic and critical skills needed to make it a reality." These practitioners adamantly demand an activist component in school curricula. Without this activism, Peterson (1994b) believes we doom students to the hopelessness that increasingly envelops generations of children. He states,

> We cut students off from the possibility of social change. We model apathy as a response to the world's problems. Such apathy is not OK. At a time when cynicism and hopelessness increasingly dominate our youth, helping students understand the

> world and their relationship to it by encouraging social action may be one of the few antidotes. Schools are a prime place where this can take place. Teachers are a key element in making it happen. Teaching for social justice is a necessary priority as we approach the new century (p. 38).

Both Newmann (1975) and Comer (2004) assert that Americans are feeling increasingly powerless in reference to citizens' rights. This feeling of powerlessness stems from the pervasive thought that democracy in this country is afforded to an elite few. According to Comer, that powerlessness often leads to apathy and underperformance. He created school activities during which students participated in learning episodes that involved the students in social issues. Among the positive results he noted were that the students began to hope and view themselves as successful. The standardized tests scores for the schools involved increased drastically. Comer states that while he doesn't believe that his activities alone caused the increase in scores, surely involving students in social issues was important.

Advocates of SJE proclaim that it employs a pedagogy that seeks to illuminate the issues and practices that affect social and educational opportunity and equity for students, families, schools and communities. Their belief is that students should be taught in this manner as early as possible and continuing through higher education settings. By ignoring communities and often deplorable conditions and inherent injustices, teachers pass on the unspoken message that social action is not worthy of study, let alone something students should consider a civic responsibility (Peterson, 1994b).

SJE Because It Works. While many proponents of SJE are strongly motivated by moral imperatives, quite another kind of argument can be made for it on grounds that it

reflects best practices in teaching for all students. Several, NCTM publications (1989, 1991, 2000) have proposed the same kinds of curriculum focus and pedagogy that are proposed by advocates of SJE (Bigelow et al.,1994; Gutstein, 2006; Peterson, 1994a). It seems, then, that SJE actually reflects what we have learned about effective mathematics teaching in general.

The NCTM asserts that engaging students in work on real problems with embedded mathematical content provides high motivation for learning, develops important mathematical process skills, and provides meaningful "hooks" that connect abstract mathematical ideas to vivid memories of situations. Thus one should teach in the social justice style simply because it is good mathematics teaching, keeping in mind the additional benefits provided by SJE to students and society.

SJE takes into consideration the emphasis placed on mathematical connections by the NCTM Standards (1989) which indicate that children learn mathematics better when the topic is connected to their lives (Worthwhile Mathematical Tasks). Proponents of SJE argue that their lessons engage students in using significant mathematics to solve problems central to their lives (Gutstein, 2003, 2006; Tate, 1995). Social justice teaching also complies with the recommendations in the NCTM Principles and Standards for School Mathematics [PSSM] (2000) which state that mathematics lessons should bring about student involvement that includes thinking, reasoning, and developing the ability to tackle and solve unfamiliar mathematical problems with creativity, insight, inventiveness, and skill.

Furthermore, the Problem Solving Standard in PSSM states that curricula should "enable students to solve problems that arise in mathematics and in other contexts" (p. 53).

It continues by saying “The contexts of the problems can vary from familiar experiences involving students' lives or the school day to applications involving the sciences or the world of work. Good problems will integrate multiple topics and will involve significant mathematics.” (p. 52)

Because any concept tends to evolve each time it is revisited (Brown, Collins, & Duguid, 1989), the more students encounter a particular mathematics topic while solving problems related to their lives, the more they will come to understand that particular piece of mathematics. Finally, the fact that social justice teaching encourages students to be reflective thinkers (Peterson, 1994a) acts in accordance with what researchers say should be part of the nature of classroom mathematical tasks. In their text, *Making Sense: Teaching and Learning Mathematics with Understanding*, Hiebert et al. (1997), speak to the need for mathematical tasks that encourage reflection and communication.

Taken together, the moral and practical arguments provide a strong argument for approaching mathematics teaching from a social justice perspective. The appeal of this point of view about mathematics education is reflected in the rapid growth in the number of national groups that promote SJE in school (i.e., the New York Collective of Radical Educators, NYCoRE, Radical Math, www.radicalmath.org, Chicago Teachers for Social Justice, and San Francisco Teachers 4 Social Justice).

Why Study Pre-service Teachers? One of the assumptions on which NCTM based its *Professional Standards for Teaching Mathematics* (2000) is that claim that, “ Teachers are key figures in changing the ways in which mathematics is taught and learned in schools” (p. 17). In discussing barriers to changing traditional teaching, Schifter and Fosnot (1993) remark that while teachers are central to making the changes, the changes

they are being asked to make are extremely different from and much harder than what they have been used to doing in their classrooms. These researchers concluded that it takes long-term, well defined professional development to enable in-service teachers to make the kind of changes called for in reformed minded ways of improving education. While Schifter and Fosnot were not speaking of SJE math in particular, it seems to makes sense to present pre-service teachers with this new pedagogy as they won't have years of well-entrenched antiquated ideas about teaching. Sending prospective teachers into the classroom with strong progressive new ideas may make them less susceptible to succumbing to doing things the way they have been done for decades.

Effects of Teacher Attitudes and Beliefs. Research and expository writing on teachers and teaching strongly suggest that acceptance or rejection of a social justice approach to elementary mathematics teaching will depend on how well its tenets resonate with the core attitudes and beliefs of teachers. If teachers find the moral and pragmatic arguments for a social justice approach emotionally appealing and compatible with their educational experiences and beliefs, the innovation has a good chance of implementation. If the basic features of SJE conflict with what teachers feel and believe about mathematics teaching and little is done to alter those beliefs, the innovation has little hope of getting even a serious pilot test.

Research has documented that beliefs evolve over a long period of time (McLeod, 1992), and that because of this, they are deeply held and resistant to change. Mixed research results exist in reference to the effect that a single university course has on one's beliefs. Although some studies report that after one course, beliefs are positively changed; many more report no change (Banks, 1991, Sleeter, 1995).

Green (1971) describes how a person's beliefs can be organized. It seems that there are three dimensions that describe the way one's beliefs are related. The first is that beliefs are not totally independent of all other beliefs. Some beliefs are primary and others are derivatives of them. For instance, one belief may be about the way math should be taught while related ones are about ideas that enable math to be taught in such a manner. Second is the degree with which beliefs are held. Some may be central, meaning strongly held, while others, peripheral ones, are more susceptible to change. Lastly, "beliefs are held in clusters, more or less in isolation from other clusters and protected from any relationship with other sets of beliefs" (p. 48). Such clustering makes it possible to hold conflicting sets of beliefs, thus possibly providing explanations for inconsistencies among any one person's beliefs.

All students, including pre-service teachers, evaluate what they learn in light of their beliefs. Beliefs also interfere with students' and pre-service teachers' willingness to learn some instructional strategies. In fact, pre-service teachers' beliefs may cause him/her to dismiss as irrelevant or to superficially learn some parts of instruction (Anderson & Holt-Reynolds, 1995). If a prospective teacher's beliefs are left intact, they may lead to rejection of what is taught in teacher education programs. It is therefore imperative to determine what beliefs toward SJE are held by pre-service teachers and to understand the origins of those beliefs.

With the spotty effect that research says that one education course has on pre-service teachers' beliefs, teacher educators must seek ways to reverse deeply embedded beliefs. Although things are changing, at this point not every institution of higher education (IHE) even has a course entitled SJE. Pre-service teachers' only inkling of SJE may come

if one of their instructors has such an interest and disposition. The closest second to an instructor with interest in Social Justice Education may be the diversity courses required by many IHEs. Even at that, most universities require only one diversity class, and social justice education may not be a topic of discussion.

One course is unlikely to change a lifetime worth of lived experience. Shirk's study in 1973 demonstrated that a single course was not enough to alter the beliefs of pre-service teachers. Wiedeman (2002) speaks of an escalation in the resistance she receives from pre-service teachers enrolled in courses guided by the social justice approach. Apparently many students are enrolled in the course only because the course is a requirement. Since beliefs are known to be embedded and difficult to reverse, it would be helpful to teacher educators to know what types of activities and or events lead to positive and negative dispositions toward SJE pedagogy among prospective teachers from all walks of life. Providing effective opportunities to study SJE may increase the number of teachers willing to learn more about SJE and to teach in such a manner. Teacher educators could benefit by learning from pre-service teachers who do have a predisposition towards social justice just what kinds of activities and experiences caused that tendency.

Significance of the Study

The significance of this study is that it will provide teacher educators with a look at how pre-service teachers are or are not thinking about teaching mathematics from a critical perspective. It should also provide ideas on what it takes to spark such an interest. The importance of this research lies in the fact that teacher educators interested in promoting teaching for social justice need to know what incoming pre-service teachers already know and feel about social justice education. For the pre-service teachers who are

aware of and in agreement with incorporating social justice into mathematics lessons, teacher educators need to know what kinds of things contributed to that awareness and agreement. For those with neutral or negative beliefs about social justice education, teacher educators then need to begin to figure out what pedagogical moves are likely to alter these beliefs.

Brown (2004) indicates that researchers have to know what the beliefs are and how they develop, before beginning the work necessary to alter them. Anderson & Holt-Reynolds (1995) report that if pre-service teachers' beliefs are left intact, they are likely to reject what is taught in teacher education courses because they will evaluate everything they hear and observe in light of their prior beliefs. Further insight into the types of experiences that lead to a propensity toward critical teaching can inform the development of materials for use in courses designed to promote Social Justice teaching.

The question has been asked, "How are teacher education programs preparing teachers to teach well in increasingly diverse classrooms?" (McDonald, 2005, p. 419). The students who populate these diverse classrooms are likely to come from low income families, the same families that currently perform menial jobs in the workforce; the same level of jobs that schools then prepare the children of these families to perform. Given that the majority of high paying jobs being created in recent decades require a college degree or technology training (Microsoft, 2011) public schools replicate the stratifications found in society, in part, due to the differential educational opportunities available to schools in various parts of society. For instance, Lipman (2004) reports that in one of the country's largest urban school system, during the 1999-2000 school year, less than 10% of the high

school students were enrolled in college preparatory courses. The majority of the students attended schools that focus on vocational training, military preparation or basic skills.

Should we not go a step further and ask how teachers should be prepared to help students overcome policies that promote inequalities? To do so would mean to disrupt the status quo. Social justice teaching attempts to assist students in their ability to do just that, disrupt the status quo by addressing issues central to the current lives of the students and empowering the students to take age appropriate actions against injustices.

Theoretical Perspectives

This study was designed to develop insight into the nature of and the underlying reasons for teacher attitudes and beliefs about a significant proposal for transformation of elementary mathematics teaching. The motivation, focus, and research design of the study are framed by five theoretical perspectives; Critical Theory, Critical Pedagogy, Critical Mathematics, moral and practical teaching, and, finally, teacher attitudes and beliefs. The first part of this section provides a brief discussion of the first three theoretical perspectives and explains their relevance to this research on teacher attitudes and beliefs about SJE. I provide a brief synopsis of the last two perspectives, moral and practical teaching and beliefs and attitudes, in the conclusion of this section.

Critical Theory. In the Stanford Encyclopedia of Philosophy, Bohman (2010) states that a critical theory "must explain what is wrong with current social reality, identify the actors to change it, and provide both clear norms for criticism and achievable practical goals for social transformation" (para. 3). Critical theorists, then, seek to understand the origins and operations of oppressive and repressive social structures (Gordon, 1995) and seek ways to transform society to remove the negative factors. As applied to education,

Critical Theory explores ways to use schools to prepare citizens to positively change the world, not just to transmit knowledge as defined by any dominant group**.**

Critical Pedagogy. Critical Pedagogy (CP) is a term coined by Henry Giroux (1980), whose work is founded on the work of Freire. This term now fuses critical theory with the practice of teaching. "The goal of Critical Pedagogy is social transformation both in schooling and the larger society" (Giroux, 1989, p. 2). This theory takes on tenets from three other theories: (1) Social Reproduction Theory; (2) Cultural Reproduction Theory; and (3) Theories of Resistance (Jennings & Lynn, 2005).

Critical Pedagogy draws from Social Reproduction Theory its commitment to change the nature of schooling. From Cultural Reproduction Theory, CP recognizes how the education system reproduces the dominant cultural norms in schools. Insight into how students can actively resist domination comes from the theories of resistance. These three theories will be discussed in the literature review.

Critical Mathematics Education. Skovsmose (1994b) indicates that education has a responsibility to "fight for human rights" (p. 37) and that responsibility calls for critical education where learning conditions are investigated, social problems are identified and evaluated, and, finally, reactions to social problems take place. He reiterates his stance by stating that for education to be considered critical it must, among other things, "be aware of social problems, inequities, suppression, etc. and it must try to make education an active progressive social force" (p. 37). Furthermore he states that "Not to subscribe to critical education means to either accept the social situation as preferable (not necessary [sic] as perfect), or to maintain that education does not have a role to play as a critical social force"

(p. 38). Among the concerns Skovsmose (2004) identifies as part of mathematics education is a concern for equity and social justice.

Moral and Practical Grounds Involved in Teaching. The focus of the study on SJE in elementary mathematics reflects strong arguments endorsing this approach to teaching on moral and practical grounds. As stated before, many educators have made the case that teaching for social justice should be a fundamental objective of education, so understanding the conditions under which such an approach might actually be pursued in school math offers an important contribution to consideration of the initiative.

Attitudes, Beliefs, and Pre-Service Teachers. Finally, the focus on the attitudes and beliefs of elementary teachers reflects extensive prior research (Anderson & Holt, 1995; Brown, 2004) documenting the critical role that such attitudes have on acceptance or rejection of educational innovation proposals. It is widely acknowledged that teacher response to a reform proposal will be crucial to its implementation. The focus of this study on the attitudes and beliefs of pre-service elementary teachers reflects the premise that such understanding will be helpful in formulating an approach to teacher development in using SJE. Furthermore, due to the current frequent turnover of elementary teachers, changing teacher preparation can have a nearly immediate effect on what happens in schools.

Research Questions

The fundamental aim of this study was to describe and develop an understanding of the attitudes and beliefs of pre-service elementary teachers toward a promising innovation in elementary mathematics teaching. The specific research questions and sub-questions are stated below. The first major question and specific sub-questions will be examined by

quantitative analysis of survey data. The second major question and specific sub-questions will be examined by qualitative analysis of personal interview data.

Research Question 1. What attitudes and beliefs do prospective teachers display towards employing a social justice lens in mathematics teaching?

Sub-question 1.1. How do reported attitudes and beliefs differ among participants by race?

Sub-question 1.2. How do reported attitudes and beliefs differ among participants by age?

Sub-question 1.3. How do reported attitudes and beliefs differ among participants by socioeconomic level?

Sub-question 1.4. How do reported attitudes and beliefs differ as a result of mathematics content and methods course experiences by participants?

Sub-question 1.5. How do reported attitudes and beliefs differ by type of college or university in which participants are being prepared for teaching careers?

Sub-question 1.6. How do reported attitudes and beliefs differ as a result of experience by participants in a diversity course?

Research Question 2. What factors appear to influence pre-service teachers' attitudes and beliefs about social justice education in the mathematics classroom?

Sub-question 2.1. What beliefs and perceptions do pre-service teachers who appear to be least supportive of teaching elementary mathematics with a social justice lens hold related to six relevant themes (current state of education, prior knowledge of SJE, life experiences of pre-service teachers, appropriateness of SJE, neutrality of teachers, and children's knowledge of injustices)?

Sub-question 2.2. What beliefs and perceptions do pre-service teachers who appear to be most supportive of teaching elementary mathematics with a social justice lens hold related

to six relevant themes (current state of education, prior knowledge of SJE, life experiences of pre-service teachers, appropriateness of SJE, neutrality of teachers, and children's knowledge of injustices)?

Sub-question 2.3. What appear to be potential influences on differences in subgroup (race, age, socio-economic class, teacher education experiences, and type of university) support of teaching elementary mathematics with a social justice lens?

Summary

In this study I was interested in determining how and why pre-service elementary and middle school teachers responded to using meaningful social issues as a context to engage in and learn mathematics. The study examined those broad research questions by analysis of data from a survey of pre-service teachers and personal interviews of a sub-sample of the survey respondents. It reveals insight into the receptivity of teachers to proposals for teaching with a social justice lens as well as the kind of professional preparation and in-service development that will make this educational approach attractive and feasible for teachers.

Chapter 2

Literature Review

This investigation of pre-service teacher attitudes and beliefs about incorporating Social Justice Education (SJE) into mathematics lessons was based on prior theoretical and empirical scholarship in five general areas; the status and purpose of education, recent educational reform efforts, critical grounding of SJE, pre-service teachers, and finally, beliefs and attitudes. In this chapter I first discuss existing research concerning the status and the purposes of education, focusing in particular on students who have been underserved by education. Secondly, I present recent educational efforts that have evolved as a result of reactions to the current status of education as well as a result of renewed perspectives on the purpose of education. Next, I focus on the fact that the theoretical framework for SJE draws heavily on work in Critical Theory, Critical Pedagogy and Critical Mathematics. The fourth section discusses how this study was informed in important ways by prior research on the educational development of pre-service teachers. Lastly, because this study focuses on the attitudes and beliefs of pre-service teachers, it was necessary to draw constructs from prior research on the development and effect of those teacher attributes.

Status and Purposes of Education

Much of the rationale for inclusion of Social Justice Education in U. S. schools is driven by concern for that disparity of results between minority and majority groups. Despite continuing efforts to reform mathematics education in the United States, poor children and children of color continue to perform poorly.

> "For over 40 years we have been confronted with an ever-growing body of research documenting that the American educational system is differently effective for students… it has been found in mathematics as well as other subjects. From initial achievement to careers requiring advanced mathematics skills, disparities exist between the numbers of minorities and those from members of the majority groups in America" (Secada, 1992, p. 623).

Additionally, the National Center for Education Statistics reveals that although Hispanic and African American students are showing increases in mathematical achievement, White students are also showing increases, therefore the achievement gaps "have not changed significantly" (NCES, 2009c; NCES, 2011).

Status of Poor and Minority Children. Disparities of huge proportions exist between White students and students of color in mathematics achievement, dropout rates, course failures, SAT and ACT scores, and college admissions and subsequent graduations. These conditions are well documented in the literature (Gutstein et al. 2005; Ladson-Billings, 1995, 1997; Lipka & Adams, 2004). Tate (1995) reported that, in spite of recent improvement by Black students on tests of basic mathematics skills, their scores on advanced mathematics assessments continue to lag far behind the norm.

Collectively, these researchers are among the many who point out that in the midst of the current reform movement in education, many groups of children are still not experiencing success in school mathematics and subsequently, in life. Oakes (1990) argued that the achievement disparities between affluent White students and poor students of color result in part from the unequal and unjust distribution of opportunities to learn mathematics in the American school system.

While it should not matter how many poor students or students of color might be described by Oakes' claim, the numbers are striking. The number of minority school age children in this country is increasing rapidly. Data from the Census Bureau (2009) reveal that approximately 38.5 million foreign-born people lived in the US in 2003. More than 50% of the foreign-born are from Latin American countries and, of this group, about 20% are under the age of 15. Experts predict that by 2020 children of color will make up the majority of America's school-age population (Holcomb-McCoy, 2004). The number of children under 18 in poverty in this country rose from 13.5 million in 2008 to 14.7 million in 2009 (Census Bureau, 2010). The figures show that this group is growing yearly.

Bowles and Gintis (1976), Irvine and Armento (2001), Hilliard (1994) and Banks (1994) are among the researchers who have concluded that schools are perpetuators of the status quo, and rarely, if ever change society. The status quo necessitates that most students are educationally prepared to fill jobs that are menial and subservient, the same jobs held by generations of their families (Bowles & Gintis, 1976). Students in this group are those typically marginalized by the school system; they are students not in the dominant culture, but in minority cultures and the lower socio-economic classes of our society. As it stands, our education system does work very well for some students. However, if we believe that the purpose of schooling is to insure a broadly educated populace, then we need to see that many more students are successful, thereby providing more students with the potential for opening doors traditionally closed to them.

As stated in the previous chapter, the number of students of color who drop out of school is significantly higher than White and Asian students. Without a proper education, what happens to this large group of students? Evidence shows that they become dependent

on society for support (Asche, 1993; GAO, 2002). They become participants in the welfare and/or the criminal justice systems, or they join the ranks of the chronically underpaid, also known as the working poor.

Purpose of Education. As we make decisions about what to teach and how to teach, it seems logical that we consider the purpose of education. Historically, in America and in other countries, formal education has been for the elite. In 1635, America's first school was established. This school, a Latin Grammar School, was "designed for sons of certain social classes who are destined for leadership positions in church, state or the courts" (Sass, 2007, "Timeline", para. 3).

Hilliard similarly asserts that education was initially aimed at free White Americans (1994). Schooling for all came about as the result of many concerns about preserving the American way of life. Some were concerned with problems resulting from too many youth being idle all day, while concern for exploitation of children drove others. Still others felt that immigrants, refugees, and minorities were ignorant of American ways and that school was the place for them to learn where they fit in society and how they should act. Thus schools were eventually opened to everyone.

Just as there have been several main purposes for schooling in general, it appears that, even from its beginnings, mathematics education also had several different purposes. D'Ambrosio (2004) speaks of two branches of mathematics, scholarly mathematics and practical mathematics. The practical mathematics was taught to manual laborers. He further states that when education of the masses began to occur in the 20th century, the question of what mathematics to teach was still prevalent. "The answer has been that it should be a

mathematics that maintains the economic and social structure...and at the same time allows the elite to assume effective management of the productive society" (p. 196).

It is widely believed that American schools perpetuate social injustices in just this manner. By teaching low-level mathematics to the majority of students we are contributing to the assembly line style of rolling out students prepared mostly to fulfill low-level roles in society that have traditionally been held by their parents and grandparents. As a result, many people believe that the class situation in this country will never change. This claim is substantiated by Oakes who reported in 1985 and again in 1990 that the opportunity to learn substantial mathematics still has not materialized for all students. In particular, the opportunities for mathematical achievement at a high level are often not provided for students of color and for low-income students.

Recognizing that schools are under serving a huge portion of society, Bigelow et al. (1994) and others have argued that schools and classrooms should be laboratories for creating a more just society than the one we live in now. Too many schools today fail to confront injustices and inequities woven into our social fabric. There is a growing body of researchers who believe that education should promote the preservation of democracy (Lee, Menkart, & Okazawa-Rey, 1998; Frankenstein, 2005; and Zeichner & Gore, 1995). It is their intention that classrooms become places of hope where students and teachers get a glimpse of the kind of society we could live in and where students learn the academic skills to make it a reality, exactly the scenarios desired by social justice advocators.

Reform Efforts Designed to Provide More Equitable Education

Many reform efforts have been created in an attempt to improve the education for traditionally underserved students. In this section I discuss two particular families of

reform efforts on which SJE builds—Multicultural Education (ME) and Culturally Relevant Teaching (CRT), followed by a discussion of Social Justice Education.

Multicultural Education. Multicultural Education was birthed during the civil rights struggles of the 1960s (Banks, 1989). The overall purpose of ME was to create an avenue for systemic change and to promote equity in all phases of life, starting with the schools. For example, Banks (1991) proposed that multicultural education could enable teachers to infuse data and examples from diverse cultural groups into their work in two principal ways: (1) by emphasizing knowledge construction (whereby students are engaged in the practice of constructing knowledge not merely accepting a body of knowledge without question); and (2) by employing equity pedagogy that enables all children to benefit from instructions.

The initial intention of ME was for students to develop identity and the sense of agency that would lead them to make significant changes in society. Much to the dismay of scholars and researchers, Multicultural Education quickly dissolved into to a cursory study of the arts, foods, and festivals of other peoples (Meyer & Rhoades, 2006). Even this superficial attention to minority cultures is often an add-on to the curriculum, not embedded within the curriculum (Ladson-Billings, 1995).

Culturally Relevant Teaching. In the research on multicultural education, I recognized the tenets of what is today called Culturally Relevant Teaching. Woodson (1933) spoke of the need for a scientific study of the Negro from within, which seems to be synonymous with knowing the culture of the Negro. Culturally Relevant Teaching combines the knowledge of the influence of society and culture into education with a strong commitment to teaching for social justice. The long-term goal of this pedagogy is to help students

develop their innate abilities to take charge of their own as well as their community's future (Gutstein et al., 2005; Ladson-Billings, 1992, 1995, 1997; Tate1995). Some may say that changing society is and has always been an unspoken goal of education, but the fact that it is unspoken has allowed it to get lost somewhere along the way. Change in society has been excruciatingly slow at best. Culturally Relevant Teaching is one pedagogy that makes change a definite part of the curriculum.

All of the reform literature agrees that to reach and motivate students, learning must be meaningful. What better way to motivate students to learn than by infusing aspects of their own lives into school content? Enabling students to recognize how the content and the instruction relate to the structures (not just the surfaces) of the realities (good and bad) of their lives should drive home the relevance of school to their lives. As Ladson-Billings (1992, 1995, 1997) says in her many writings, this should motivate students to choose excellence while maintaining their identities as African Americans. This applies also to other students underserved by the school system. Unlike the inclination of many to turn multiculturalism into a sort of artsy approach to culture, Culturally Relevant Teaching demands that the curriculum pertain to students specifically and in instrumental ways.

Social Justice Education. The literature shows that there is an international focus on SJE. Cochran-Smith, et al., (2007) maintain that in spite of such focus, there are a number of meanings of teacher education for social justice that are found in the multitude of programs that are in this country as well as in other countries.

> "Programs may emphasize teachers' and students' cultural and ethnic identity, teaching prospective teachers how to provide culturally appropriate curriculum and pedagogy and how to build social supports for the learning of all students. Others

> focus on teachers' and students' activism regarding the social, economic, and institutional structures that maintain unearned privilege and disadvantage for particular racial, cultural, language, socioeconomic, and gender groups. Some programs that use the language of social justice emphasize civic education, focusing on teaching teachers how to prepare the future participants of a democratic society to deliberate, disagree and act in ways that are socially responsible. Some programs feature innovative community-based sites where teachers learn alongside community activists and parents, while others focus primarily on changing the curriculum within traditional university programs" (2007, p. 625).

Gutstein (2006) maintains that the fundamental purpose of SJE is the eradication of oppression in society. Social justice education weaves social issues into the learning and understanding of school topics, while impressing upon students their roles in social change. Tenets of Critical Pedagogy and Culturally Relevant Pedagogy are the building stones of Social Justice Education. One component social justice education adds to learning is social agency, the important component that somehow disappeared from multicultural education. SJE requires that students decide what, if anything, they can do to change society based on what they learned. Practitioners of SJE also recognize that in some instances no action is appropriate, that in some cases the development of critical awareness is sufficient (Edelman, 1992; Freire, 1996).

Features of Social Justice Education. According to Osler (2007) SJE has at least two components. First, it incorporates a social justice issue with the learning of a school topic. The lessons and activities are designed to increase the students' understanding of the

social issue and the school topic, while also increasing their problem solving, reasoning, and critical thinking skills. Second, SJE provides a study of “social, political or economic (in)justice” (p. 3) while helping students develop realistic, just, and educationally sound solutions to the issues.

Among the major goals of SJE is to enable students to develop a critical consciousness as they become aware of the sociopolitical aspects of their lives (Freire, 1996). SJE seeks to empower students to develop their voice about major social issues in their lives and to make those voices heard in order to create positive change in their communities and in the world. Bell (1997) asserts that it is this sense of agency that is paramount in the goals of SJE. In addition to aiding students in becoming change agents on their own behalf, SJE promotes social responsibility among students towards others.

One might ask what actions toward social justice exist that can be carried out by elementary children? Sometimes a physical action is not proper. According to Freire (1996), "Action and reflection occur simultaneously. A critical analysis of reality may, however, reveal that a particular form of action is impossible or inappropriate *at the present time.* Those who, through reflection, perceive the infeasibility or inappropriateness of one or another form of action (which should accordingly be postponed or substituted) cannot thereby be accused of inaction. Critical reflection is also action." (p. 109). In this sense, just having young children participate in discussions about injustices, root causes, and possible solutions is sufficient. It is also necessary, for it is at this age that the seeds are to be planted.

The Case for Social Justice Education. “The work of educating educators is at root the work that will enable us to sustain a productive and pluralistic society” (Darling-

Hammond, 1997, p. viii). Many proponents of social justice education assert that if education of teachers continues in its current mode, we will continue to run the risk that education in our schools will be socially reproductive, promoting the status quo.

The rationale for teaching with a social justice lens has many component points. For example, supporters of social justice education have highlighted the appeal of SJE for making students' studies relevant to the lives of students; the motivational aspects of learning through SJE; the increase in problem solving and critical thinking skills developed by SJE activities; and the enhancement in the understanding of school topics that result from SJE studies. This section elaborates on these ideas.

The United States Congress itself declared that schools should ensure that all students learn to use their minds well, so that they may be prepared for "responsible citizenship" (1994, para. 3). Congress further stated that one of the objectives for this goal is that all students will be involved in activities that promote and demonstrate good citizenship, community service, and personal responsibility (1994). This is exactly what the social agency goal of SJE is about. Students display these three characteristics when they take actions based on their own solutions to social injustices they have studied.

Numerous researchers agree that American school systems are currently organized in ways that perpetuate the social and economic inequalities of our society (Bowles & Gintis, 1976; Irvine and Armento, 2001; Hilliard, 1994; Banks, 1994; Goodman, 2001). As a consequence, they argue that Social Justice Education is needed because the pedagogy will help to alleviate inequalities for all. Bell (1997, p. 3) submits that, "Social Justice Education involves social actors who have a sense of their own agency as well as a sense of social responsibility towards and with others and the society as a whole." Parker (1996)

speaks of the positive effect of schooling when students develop democratic knowledge. Others still, applaud the end result of SJE—opportunities for full social participation for everyone (Darling-Hammond, 1994; Goodlad, 1996; and Goodman, 2001).

Many researchers posit that schools are in need of approaches to instruction that will more effectively motivate students to participate in instructional activities and take responsibility for their own learning. One of the ways to do so has proven to be by making education relevant to the students (Ladson-Billings, 1995, 1997, 2001; NCTM PSSM, 2000: Tate, 1995). How can studies be made more relevant than to directly relate the studies to immediately improving the lives and communities of students and their families? Research is beginning to show that students who participate in classes that utilize SJE look within their community to decide which problems they can tackle (Tate, 1995). They then address the problems in light of many school subjects—examining possible solutions, choosing and implementing solution processes, and making their voices heard along the way. To this end, Wiedeman (2002, p. 207) states, “When teachers’ work is linked to social justice, equity, and freedom, students’ needs can be addressed in more authentic ways.”

Social injustices studied in classroom have been shown to provide opportunities that help students develop life skills. "Teaching for social justice arouses students, engages them in a quest to identify obstacles to their full humanity, to their freedom and ends in action to move against those obstacles" (Ayers 1998, p. iv). It is, therefore, within the context of social change and community problem solving that SJE empowers students to learn to communicate and to pose and solve problems. SJE supports national standards that encourage student problem solving, use of critical thinking, communication, justification, analyzing, making connections. This pedagogy aims at teaching excellence. The excellence

refers to both teachers and students—teachers who assume the responsibility of ensuring student success and students who accept the responsibility of learning.

Yet another challenge in contemporary education supports the need for SJE. Goodman (2001) calls attention to the need to challenge the myth that America is filled with opportunities for everyone. All anyone has to do is pull themselves up by their boot strings, which begins by getting a good education. This is a myth of gigantic proportion which ignores the centuries of oppression and inequalities that have occurred in this country, oppressions and inequalities that are being overcome only through struggle. For some it may appear that such oppression is in our past. The truth of the matter is that injustices occur every day in this world. It's just that some people never face injustices, while on the other extreme; many people's entire existence is colored by injustices (Goodman, 2001).

One final justification for incorporating Social Justice Education in schools is the list of potential benefits from SJE described by Peterson (2005). An experienced practitioner of SJE at the elementary school level, Peterson claims that students recognize the power of school topics when they use them as essential tools to understand and potentially change the world, rather than seeing the topics as collections of unrelated rules. He argues that SJE helps students gain a deeper understanding of and appreciation for school topics, while increasing student motivation to learn. Finally, he suggests that experiences in SJE help students begin to understand their own powers as active citizens in building a democratic society.

Social Justice Education in Mathematics. It has been said that mathematics is a gatekeeper school subject. As mathematics is intricately involved in the technology that

currently drives our world, there is a critical need for all students to learn and understand as much mathematics as they can. “Incorporating social justice with mathematics opens gates to advanced math tracks and course offerings that have been historically closed to students of color, women, working-class and low-income and those with perceived disabilities” (Gutstein and Peterson, 2005, p. 3).

Incorporating social justice and mathematics appears to meet the demands of many calls for changes in the way mathematics is taught. For example, one strongly recommended change in mathematics instruction is to engage students in active, purposeful learning—to involve children in doing mathematics for which there is a real purpose (Baroody & Hume, 1991; Curriculum and Evaluation Standards for School Mathematics Standards, NCTM, 1989). The body of SJE research provides a multitude of examples of students actively involved in lessons linking social justice with mathematics—discovering solutions to personal problems that can, in turn, solve community problems (examples of such are provided in the following section). Thus SJE provides students with a purpose for learning particular math topics and engages them actively in classroom work.

One of the fundamental principles of recent recommendations from the National Council of Teachers of Mathematics is to focus instruction on engaging students in work on worthwhile mathematics problems. Unfortunately, responses to this call for authentic problem solving often end up in work on contrived problems with trivial connections to students’ lives by devices like replacing names of people in problems with the names of students in the teachers’ class. These contrived problems and the mathematics involved are often viewed as inconsequential by the students. In contrast, you cannot get more real, personal, and relevant than to use mathematics to solve problems that children encounter in

their own lives. Classes that incorporate social justice with mathematics make the mathematics more lively, accessible, and personally meaningful to children. In turn, this engagement can lead to learning in more depth than traditional instruction yields (Frankenstein, 1998; Gutstein, 2006; Gutstein and Peterson, 2005).

NCTM also espouses instructional approaches that help students develop critical mathematics thinking skills. As stated in the *Curriculum and Evaluation Standards* (NCTM, 1989), mathematics as reasoning requires that students appropriately apply reasoning processes, construct and critique mathematical arguments, and justify their own thinking. In its section on the role of students in discourse, the *Professional Standards for Teaching Mathematics* (NCTM, 1991) promotes activities that engage students in "making and examining conjectures, questioning their peers and teachers, and validating knowledge with mathematical evidence" (p.13). Evidence from the Social Justice Education literature demonstrates ways that students eagerly employ critical thinking towards mathematics when applying the topics as they attempt to deal with obstacles in their immediate lives (Bigelow et al., 1994; Frankenstein, 2005; Gutstein, 2006).

Several significant potential benefits of teaching mathematics with a social justice lens have been proposed by Gutstein and Peterson (2005). They assert that: (1) Students in social justice oriented classrooms recognize the power of mathematics as an essential tool to understand and potentially change the world rather than seeing math as a collection of unrelated rules; (2) Integrating mathematics with other school subjects and social issues helps students realize who and what is counted in the figures reported by officials; (3) Students can connect mathematics with their own cultural and community history, appreciating the contributions of their people; and (4) Students in social justice oriented

classrooms become more motivated to learn important mathematics. In short, using mathematics to improve their community helps students learn the importance of all mathematical topics. Moreover, students engaged in using mathematics to correct injustices begin to understand their own powers as active citizens in building a democratic society.

***Integrating Social Justice into Mathematics Class*.** Osler (2007) provides an overview of strategies for integrating issues of social justice into mathematics classes. Many of his suggestions are reiterated by a number of other social justice proponents (Gutstein, 2006; Peterson, 1994a; Tate, 1995). This overview includes suggestions in five areas: (1) Have student-driven questions; (2) Have a solution –based component; (3) Have students present and share their work; (4) Start small and work towards complexity; and (5) Have assessment.

Student Driven Questions. A number of supporters of SJE agree that, as often as possible, lessons should be developed following a classroom discussion and should be based on students' questions (Peterson, 1994a; Tate, 1995). Teachers should determine, through classroom discussion, what community problems the students are concerned about, what issues are foremost on their minds, and what current events they care about. This ensures student interest in the social issue which demonstrates high levels of relevance to their lives, and motivation to learn the mathematics involved. The most important aspect of the lesson should be the mathematics involved. Therefore the lesson should have a strong mathematical framework and, of course, the mathematics should be a topic that is within the curriculum for the grade level.

Solution–Based. Instead of merely causing or increasing student awareness of local and worldwide problems, teachers should aim to have students choose problems they are

interested in and in which they can effect some change. According to Edelman (1992) change does not always have to be monumental. Small changes are sometimes most appropriate. Also, as stated above, Freire indicates that adequate change can be in the form of creating critical awareness amongst the students (1996).

Care must be taken when shedding light on the many injustices in some communities and in the world at large. Teachers should be careful not to leave students with the impression that all of the world's problems are being laid at their young feet. Students should be encouraged to only tackle situations they think they can handle. Any issues tackled should involve sound mathematics.

Presenting and Sharing Work. Sharing of the student work involves classroom sharing among peers who have also worked on the same problem, but it goes beyond that by advising that students share with others. The sharing could be done with other students in the same grade, older or younger students, school administrators, parents and families, community, media, and local officials. Knowing that they will share with others encourages students to work meticulously; it helps students develop communication skills; and it "empowers students both inside and outside of the classroom" (Osler, 2007 p. 6).

Start Small and Work towards Complexity. Advice for teachers new to incorporating social justice issues in their lessons is the same advice given to teachers who seek to make any changes in their classrooms- start small. It is advised to start with one- or two-day activities. Osler (2007) advises scaffolding students' understanding of the social issues and the mathematics involved. He states that initially students will view the issue in only one of two ways, is it right or wrong? Students should be guided to deeper levels of understanding issues, causes of issues, and ways to correct issues.

Assessment. On a final note, adequate assessment is a must for any program. Assessment following SJE activities should include determining what students have learned mathematically as well as what they have learned about the social justice issue.

***Examples of Integrating Social Justice into Mathematics Class*.** Olser's suggestions are evident in the following examples of examples of social justice education. In this section I report research that looked at professional development for in-service teachers (Bartell, 2011), and pre-service teachers learning to include social justice issues in mathematics lessons (Gonzalez, 2009; de Freitas, 2008; Romano, 2007). I also report instances of incorporating social justice into actual elementary and middle school classrooms (Derman-Sparks, 1998a; Gutstein, 2006; Skovsmose, 1994a; Tate, 1995).

Most of the research on incorporating social justice into mathematics lessons details how lessons play out in the classrooms of young children. Taking another approach, Bartell (2011) looked at the pedagogy through the eyes of in-service teachers learning to teach mathematics in this manner. She conducted a study with eight secondary mathematics teachers who were enrolled in her graduate course that focused on learning to how to teach mathematics with social justice. She required the teachers to engage in a model of lesson study wherein they created, taught, revised and re-taught a mathematics lesson which used social justice ideas. Prior to Bartell's study, these teachers had also participated in sessions entitled Courageous Conversations about Race conducted by their school district. During these sessions, participants discussed intersections between institutional racism and white privilege and teaching. Bartell noted that only 3of the teachers had any prior knowledge of using social justice in the classroom. Mostly this prior knowledge was a result of having read articles about it. All of the teachers were white and taught in predominantly white

schools (although the racial demographics of the students had begun changing recently) for 4 to 17 years.

Bartell reported that her study was designed to determine how mathematics teachers learning to teach for social justice negotiate the goals of mathematics, social justice and social agency in their lessons. Her goal was to determine whether the goals were balanced or one took prominence over the others and how this might change during different lessons. Her intention was both "to reaffirm the complexity, time, and introspection required for teaching mathematics for social justice and to underscore this negotiation as a necessary part of the initial and ongoing learning process" (pg 5).

One thing Bartell discovered was that although the teachers in her group had a solid concept of teaching mathematics for social justice, their lessons separated math from the social justice component. The teachers seemed more intent on making students aware of social issues and learning how to use math to understand social issues than to bring in the social agency aspect wherein students would do something to correct the oppressive social issue. She further states that "teachers were not successful in adequately contextualizing the complex social, political, and historical issues related to their topics and education" (pg. 31).

She concludes with suggestions about the type of experiences needed by mathematics teachers seeking to teach for social justice. Among the suggestions were having the teachers think about "What does it mean to teach mathematics for social justice throughout a school year?" "What might this look like within and across multiple units, or within a single lesson?" and "What would it mean to adequately contextualize this social issue over time?"

Other studied focused on teacher identities. Teacher identity is important because as Holland et al (1998) assert, identities guide behavior. Gonzalez (2009) reports on the development of teacher identities as they engaged in teaching mathematics for social justice and how identities changed during the process. This identity is in part comprised of the teacher's beliefs about teachers' roles, mathematics and teaching/learning mathematics. The teachers reported changes in how they viewed themselves, mathematics and the teaching of mathematics. They became more aware of their own roles as change agents as they realized that the changes they instigated in their students' awareness of social issues could very well lead to changes in society.

Many math teachers see math as neutral thereby failing to see relevance in including social issues in their lessons (de Freitas, 2008). de Freitas contends that teachers' identity can determine whether or not they recognize the political impact of mathematics. In an effort to explore this possible source of resistance to social justice, the researcher conducted an action research project wherein 12 students in her graduate course, pre-service secondary mathematics teachers, participated in a research project that focused on learning to incorporate social justice in their mathematics lessons. One of the data collection sources came from self study narratives. The pre-service teachers were asked to reflect on their own mathematical experiences in a manner designed to illuminate the sociocultural factors that aided their mathematical success. The difficulty in this lies in the fact that most people who are successful in mathematics feel that it is entirely due to intrinsic ability. Not recognizing the possible contributions of sociocultural factors can cause some pre-service teachers to not see relevance in social justice issues, which often leads to the documented resistance to college level diversity courses.

de Freitas used the self-study narratives in hopes of raising critical awareness among her pre-service teachers. She states that the assignment did cause her students to recognize, albeit on a small level, the influence of cultural factors but more needs to be done than can be accomplished in one course. The next stage of her research will follow the students into their field assignments as well as into their first few years as teachers.

Another teacher educator, Romano (2007), had her pre-service teachers engage in dramatization of problems of inequity faced by local middle school students. The pre-services teachers gained insight into the lives of future students by interviewing them about problems they faced or concerns they had about school. With the help of a dramatist, a play was written about the problem. Further insight was gained about the students as the pre-service teachers acted out the play in front of the students. Following the production, the students were allowed to make comments about their response to the play as well as to the problem.

Other researchers and practitioners report on mathematics activities in the elementary and middle school classes. Tate (1995) reported on students who took up the issue of the number of liquor stores between their homes and school. The investigation was sparked by a conversation the students had in class during which they discussed the various problems they faced walking past these stores to get to school. The students studied city laws concerning appropriate proximity of such establishments to schools. As they actually measured the distances from school to the stores, the students deepened their knowledge of linear measurement and measurement tools. Finding that some stores were not in compliance with a number of city ordinances, the students began to write letters to city

officials. This resulted in the closing of a few stores and caused others to become compliant with the laws.

On the first year anniversary of the World Trade Center bombing, Gutstein (2006) led a discussion with his seventh-grade mathematics students. During the class the students and the teacher expressed their views about what happened, why it might have happened and what might happen next. At one point the teacher brought up the fact that in the past, our government helped the country that was accused of bombing the building defeat their enemy in a war. One of the students made a remark about our country's tax dollars being used for such things.

Soon after that day, Gutstein presented the students with one of the real-world mathematics projects he had created for his classes, entitled "The Cost of a B-2 Bomber-Where Do Our Taxes Go?" The students were assigned 5 problems that would lead to determining whether the money spent on one plane could pay for a full four year scholarship to a prestigious out-of-state university for a student. They had to supply detailed answers to how they solved each problem. Additionally the students were to write their feelings about their findings, what they taught should be done about it, and how mathematics helped (or did not) them understand the world.

The students examined Department of the Defense data to determine the cost of one B-2 bomber. They then compared the price to a 4 year full scholarship at the university. The students determined that the cost of just one plane would fund full four year scholarships for, not one student, not just their entire class nor their entire graduating class for that year, but for the entire graduating class for the next 79 years (assuming, of course, constant costs and graduating class size).

Research has also been conducted on the elementary school level. Along with two elementary school teachers, Skovsmose created a real-world project, Economic Relationships in the World of a Child, for 10 to 11 year old children (1994a). He remarked that although the adults decided on the issue and thus the mathematics that students would work on, it did provide the students with the answer to 'Why are we learning this?', which is more than what the texts books do when they dictate what math is to be learned. The project concerned a social issue central to the lives of the children. It placed children at the center by "drawing three 'concentric circles', the first having to do with the child (spending pocket money- an allowance), the second with the child as part of the family (the Child Benefit Money) and the third with the child as part of society (money needed for equipment of a youth club) (p. 63). In Denmark, where the study took place, the Child Benefit Money is a government allowance provided to some families with children below the age of 18 (Nordic Social Insurance Portal, para.1).

The project ran for two months and required children to decide how to spend money in each of the three phases. During the project the students worked on estimation skills, addition and subtraction of whole numbers and rational numbers, keeping totals within particular ranges, graphical representations, and handling huge amounts of data.

Skovsmose (1994a) discussed the importance of and the difficulties of making such projects that offer various entry points for all ability levels thereby providing real engagement for all students. Although children's the ability levels among the children are bound to be evident even in such projects, He indicated that comparisons done by the children were generally on the outcomes of the project and not necessarily on any child's mathematical ability.

In fact, this project increased children's abilities. In particular, the computations included decimal numbers which the school's curriculum had not yet covered but this presented no problem. Without even looking to the teachers for instructions, the children figured out how to add or subtract decimals as needed. Furthermore, because they were working on something closely related to their lives, the children were able to recognize when they had made computational mistakes. Not only did they recognize errors, they were eager to correct them, not waiting to be told that they needed to do it thus an intrinsic desire to be accurate surfaced. Some of the students wrote letters to the principal. The letters however, did not propose any equipment to purchase for a youth club; the students just addressed their enthusiasm for working on the project.

Finally, in her chapter entitled Activism and Preschool Children, Derman-Sparks (1998a) describes ways in which primary elementary school teachers can prepare even younger students to resist oppressive situations. She states " Though activism activities children learn that injustice is not overcome by magic or by wishes, but that people make it happen and that each one of them can make it happen" (p. 188). An activity that grew out of a classroom incident involved "flesh colored" bandages. A 3-year old needed a bandage and was given one from the class supply which happened to be a "flesh colored" bandage.

The teacher made note that the bandage was supposed to match their skin color and decided to have the class investigate. Each child put on one of the bandages and they noticed that the bandages matched the skin color of only some of the children. The bandages did not match dark skin colors. The investigation was repeated the following day with students from another early childhood program. After charting the results they discovered "that the bandage did not match a lot of the children's skin" (p 190). The

children dictated a letter to be sent to the company. The letter explained their experiment. Letters were also sent home to parents. In the response from the company, the class received bandages that were “more flesh colored” according to the company. In fact the bandages were transparent. Although the teacher was not completely satisfied, she decided not to press the issue. The students were pleased that they received the new bandages. In ensuing conversations the children were repeatedly heard to say “This doesn’t match me.”

As asserted by Freire (1996) "Action and reflection occur simultaneously. A critical analysis of reality may, however, reveal that a particular form of action is impossible or inappropriate *at the present time.* Those who, through reflection, perceive the infeasibility or inappropriateness of one or another form of action (which should accordingly be postponed or substituted) cannot thereby be accused of inaction. Critical reflection is also action" (p. 109). In this sense, just having young children participate in discussions about injustices, root causes, and possible solutions is sufficient. Children will also take further action because they will repeat what they learn to family members.

Development of Resources in Social Justice Education. Many resources have emerged in support of social justice education. Rethinking Schools, Ltd. maintains a website, produces quarterly periodicals and numerous books concerned with teaching for social justice. RadicalMath is another website that disseminates SJE information. Annually several conferences are held to share ideas about teaching for social justice. Among the conferences are the Math Education & Social Justice: Creating Balance in an Unjust World conference and NYCORE’s Annual Conference.

Across the country, practicing teachers have organized to create networks to provide support and resources for others. Nationally there are The Network of Teacher

Activist Groups (TAG) and Education for Liberation Network. Both are national coalition of grassroots teachers working for educational justice. Among the TAG network are the Association of Raza Educators in San Diego/Oakland; Teachers for Social Justice in Chicago; Educators' Network for Social Justice in Milwaukee; the Teacher Action Group in Philadelphia; the New York Collective of Radical Educators (NYCoRE) in New York City and Teachers 4 Social Justice in San Francisco.

Critiques of Social Justice Education. While there is a growing body of researchers and educators who extol the virtues of SJE, there are others who are in disagreement (MacDonald, 1998; Wood & Thorne, 2008). Cochran-Smith, et al., (2007) examined four critiques of teaching with a social justice lens. The four critiques are, "the ambiguity critique, the knowledge critique, the ideology critique, and the free speech critique" (p. 625).

The vast variations found among social justice education programs leads to the ambiguity critique which complains that SJE has no clear definition and lacks theoretical grounding. This has been attested to by proponents as well as opponents of SJE. Proponents who use this critique do so in an effort to "push the field forward by demanding clarity, consistency, and incisiveness" (p. 626). On the other hand, Cochran-Smith, et al., claim that many critics who use this critique are using it merely as a cover to complain about larger critiques of policies. An example of such is the attack on NCATE for the use of social justice dispositions as criteria for teachers. "The real issue was not ambiguity, but the particular politics and the larger social movements to which social justice was attached" (p. 627).

The most frequently used critique is the knowledge critique. This critique claims that teaching for social justice allows teachers to focus on being nice to underprivileged students and not on teaching. At the root of this critique are two arguments. The first is that there is too much emphasis on respecting cultural and increasing students' self esteem; the second argument is that SJE does not place enough emphasis on knowledge and basic skills. Consequently the overall accusation is that programs with social justice focuses don't insure that teachers can teach so students can learn; instead they ensure that teachers can connect with students' culture and make the students feel good about themselves. In other words, holders of this belief claim that SJE is not teaching the knowledge that is expected to be taught in school, knowledge that is testable and above all, knowledge that is apolitical. Chief among the assumptions of the knowledge critique is that there is a dichotomous relationship between justice and knowledge; meaning that the pursuit of one prohibits the pursuit of the other.

The ideology critique, the third critique, also assumes that knowledge is apolitical. This critique, however, focuses, not on what happens in classrooms, but on admissions criteria to teacher education. Critics in this category allege that some teacher education programs are being too selective when they list social justice as a desired disposition to be held by persons entering into the program. Such programs, they claim, are being political and trying to control who is allowed to enter into the profession based on their belief or not in a controversial ideology and not on their potential ability to teach.

The fourth critic is the free speech critique. The focal point of this critique is environment on the campuses of institutes that provide teacher education. It is claimed that programs that promote social justice inhibit the freedoms of students on campus who don't

support social justice. On such campuses, these students won't feel free to speak up if they are not supportive of social justice ideas. The claim that the nature of education is apolitical underlies this critique, just as it underlies the knowledge and ideology critiques.

Cochran-Smith, et al., argue that these four critiques "are part of a larger political ideology based on a narrow view of learning, an individualistic notion of freedom, and a market-based perspective on education that substitutes accountability for democracy. What most of the critics want is not a value-free teacher education, but one that matches their values, not an apolitical teacher education, but one with a more hegemonic and therefore invisible politics" (2007, p. 625). I will revisit these critiques in reference to the ten interviewees in the discussion section.

Theoretical Perspectives Embedded in Social Justice Education

Proposals for infusing schools with Social Justice Education are grounded in basic tenets of Critical Theory, Critical Pedagogy, and Critical Mathematics. This section provides a discussion of the three theories and explains their relevance to the proposed research on teacher attitudes and beliefs about SJE.

Critical Theory. Critical theorists seek to understand the origins and operations of oppressive and repressive social structures (Gordon, 1995). In addition to uncovering the structures in oppressive situations, Critical Theory (CT) then seeks ways to transform society to remove the negative factors. Critical theorists are concerned with people being in cultural, economic and political control of their lives. This could only occur through emancipation, whereby the oppressed are empowered to make changes and convert the conditions of life for themselves.

As applied to education, Critical Theory seeks ways to use schools to empower students to use knowledge to transform society, instead of just to transmit information**.** Proponents of CT believe that knowledge is an important social resource and that those who define knowledge also hold the power. Consequently, restriction of knowledge promotes inequalities.

Paulo Freire was one of the first theorists to align critical theory with educational research (Counts, G., 1932; Jennings & Lynn, 2005). He first discussed education as both an oppressive and a liberating force in our society. Freire also first called for developing a sense of critical consciousness and social agency in students. Translating consciousness into agency requires reflection and discussion, and then positive action. (Freire, 1996) This action pattern is at the heart of many formulations of Social Justice Education.

Critical Pedagogy. According to de Freitas (2008), critical pedagogy should examine "the complex ethical dilemmas and power relations inscribed within a given context in order to trigger moral outrage and increase student participation and social action" (p.79). Although mathematics education does not in and of itself inspire such outrage, it does have the ability to provide students with problem solving skills that can be utilized in life, in concrete situations as called for by Freire (1971).

Social Reproduction theorists believe, first and foremost, that schools perpetuate the status quo by providing training that is not designed to lift the receiver from his/her current status in life. According to Bowles and Gintis (1976), this is not done with malice of intent, but the system is just structured to ensure the reproduction of society which is filled with inequalities. They add that while schools are structured to serve the needs of the dominant

class, they also have served needs of the underclass in that schools often become the setting where the social awareness levels of the underclass sometimes emerges.

In education, Cultural Reproduction Theory speaks of the ways in which social inequalities are reproduced through repetitive assertions of certain forms of class-specific knowledge. In particular, this theory looks at "ways in which school norms contribute to the systematic exclusion of ethnic minorities and poor whites from the educational system" (Jennings & Lynn, 2005, pg 3). The theory also looks at ways that schools and the lack of cultural capital systematically exclude minorities and poor Whites from success in the education system.

A Theory of Resistance in education is concerned with the role of the oppressed and how they do or do not respond to the oppressor. Giroux (1989, p. 4) asserts that the oppressed "have a degree of agency that allows them to actively resist and sometimes collude with the structures of domination." With this in mind, in addition to studying how social structures perpetuate inequalities, Resistance Theory also studies how the disenfranchised work in ways that sometimes aid themselves but aid in their own disenfranchisement at other times.

Thus Critical Pedagogy draws from Social Reproduction Theory its commitment to change the nature of schooling. From Cultural Reproduction Theory, CP recognizes how the education system reproduces the dominant cultural norms in schools. Insight into how students can actively resist domination comes from the theories of resistance.

Critical Mathematics. Skovsmose indicates that education has a responsibility to "fight for human rights" (1994b, p 37). That responsibility calls for critical education where learning conditions are investigated, where social problems are identified and

evaluated and finally, where reactions to social problems take place. He reiterates his stance by stating that for education to be considered critical it must, among other things, “be aware of social problems, inequities, suppression, etc., and it must try to make education an active progressive social force” (1994b, p 37).

Further he states that “mathematics can be considered a language that can be used to develop knowledge and interpret social reality” (1994a, p. 4). However, Frankenstein (1983) points out that mathematics falls short of this aspiration. She states that currently **“**mathematics education reinforces hegemonic ideologies” (p 11). Lack of sufficient mathematical knowledge can lead the populace to passively accept possibly inaccurate, biased and/or incomplete mathematical interpretations of social events/issues that are supplied by the powers that be. For instance, she submits that “people’s misconception that statistical knowledge is objective and value-free closes off challenges to such data” (p 11). A way to counteract this concern is to teach mathematics in such a way as to enable students to develop critical understandings of mathematics, which, in turn may lead to critical questionings and actions that might challenge societal inequities. This is an aim of Critical Mathematics.

Indeed, Skovsmove (2000) suggests that students could use mathematics to identify and analyze “critical features of life” (p. 2). Furthermore he states that “Not to subscribe to critical education means to either accept the social situation as preferable (not necessary [sic] as perfect), or to maintain that education does not have a role to play as a critical social force” (1994b, p. 38).

Research on Pre-service Teacher Education

The participants in this study are pre-service teachers. As with any other new approach to teaching, SJE needs to be included in teacher education preparation programs. If not it is likely to be relegated to the already bulging realm of professional development for in-service teachers.

In the National Research Council *Adding it Up* report, Kilpatrick, Swafford and Findell (2001) wrote at length about the status of mathematics in this country. They argue that in order to assist students in becoming mathematically proficient, teachers themselves need to understand and practice new methods for bringing about this level of achievement. They state that, "Our view of proficiency requires teachers to act in new ways and to have understandings that they once were not expected to have. It is far from trivial to acquire such an understanding—and can't be done in one's spare time" (p. 428).

Even though social justice education was not a topic in the *Adding it Up* report, it seems logical that if schools are to infuse mathematics instruction with any new method of teaching, in this case, teaching with a social justice perspective, then teacher education programs should equip prospective teachers with knowledge and experience in teaching mathematics with a social justice lens. Then new teachers will already have the critical understandings and experiences when they embark upon their first assignment.

Goodman (2001), Irvine and Armento (2001) and Jordan (1995) each direct attention to the vast contrast between the backgrounds and experiences of the majority of prospective teachers and that of the students they will be expected to teach. These researchers assert that, in all likelihood, the new teachers will be unfamiliar with the type of lives lived by their charges. Currently, American teacher education programs try to

address the lack of diversity in their students by making just one diversity course a requirement for prospective teachers. The diversity courses are designed in part to help pre-service teachers contend with what Adams (2001, p. 1) labels "societally-endorsed beliefs and stereotypes" about people different from themselves. Adams goes on to say that most students in diversity courses bring with them "their stereotypic and entrenched modes of thinking, and their emotional attachments to thought processes rooted in trusted home, school and religious communities and they affect the diversity classes" (p. 1). Taken together, they suggest a powerful, multidimensional developmental agenda for social diversity and social justice education.

This situation gives rise to another need for the use of SJE and not just one class on diversity. It is highly likely that a large percent of the body of prospective teachers fall into the category that has experienced little to no oppression in their lives and are unaware of its existence in the lives of others, while the students whose lives they will hold in their hands may know injustices all too well. A well planned college SJE course would enlighten prospective teachers to the reality of the lives of their potential charges and prepare them to help students eradicate such injustices. McDonald empathically states that, "programs that integrate a social justice orientation across program settings are likely to fare better the ones that address diversity with add-on or piecemeal approaches" (2005, p. 421).

Development of Attitudes and Beliefs. Brown (2004) posits that to develop advocates of social justice education, one must understand the nature of beliefs, attitudes and values. He expands the notion of awareness by stating that "Respect for diversity entails advocacy, solidarity, an awareness of societal structures of oppression, and critical social consciousness" (p. 333).

Webster's New World Dictionary (1994) states that a belief is something mentally accepted as true. Sigel (1985) expands upon the concept by saying that beliefs are "mental constructions of experience-often condensed and integrated into schemata or concepts" (p. 351) that are held to be true and that guide behavior. A cluster of beliefs around one topic becomes an attitude (Harvey, 1986). It follows that beliefs and attitudes are a result of how one perceives life. One's perception of life, then, is based on his/her own life experiences.

Attitudes and Beliefs about Diversity and Justice. Social justice teaching requires an awareness of issues of diversity and justice. Given that the majority of pre-service teachers are young, White, suburban or rural females, their perceptions of diversity and justice are limited to the diversity and justice they witnessed and/or enacted with while growing up or attending college. Most areas in which this group of pre-service teachers lives lacks a sufficient amount of racial and class diversity that could inform them of the lived experiences of their future charges. In fact, Sleeter (2001) suggests that the emerging body of teachers in this country most likely has little to no knowledge of children that did not grow up with experiences similar to their own.

Pre-service teachers' beliefs and attitudes about diversity are, in part, based on limited interactions with persons outside of their own racial and social-economic groups, interactions which may or may not have been positive (Pattnaik, 1997). Additionally, Giroux (1997) and Howard (1990) assert that many from this group of pre-service teachers' knowledge of others who are different from them is largely based on stereotypes; negative stereotypes generated by the media, by their family, and/or by their friends. On the other hand, Pattnaik (1997) submits that some of these pre-service teachers may not have

negative views of minorities and that positive views of others are often the result of prolonged, positive associations with diverse groups of people.

A person's background also effects his/her beliefs about justice in our society. Pre-service teachers from middle-class or privileged backgrounds may have a tendency to believe that we live in a just society. Furthermore, if they can bring themselves to see injustices in the system, they often are hard pressed to turn their backs on a system that has served them so well (Ryan, 1976).

Research demonstrates that teaching is guided by ones' beliefs and attitudes (Pajares, 1992). Moreover, beliefs about teachers' instructional roles and about student activities guide what prospective teachers learn in college as well as how they will teach. While still students in education courses, prospective teachers evaluate what they learn in light of their beliefs. Long held beliefs may interfere with understanding, acceptance, and willingness to learn some instructional strategies. Beliefs may even cause a pre-service teacher to dismiss as irrelevant parts of instruction or to learn them on a superficial level.

Pryor and Pryor (2005) assert that prospective teachers need to develop attitudes and beliefs that democratic practice is important and fosters fairness and justice. Other researchers attest to the fact that beliefs influence teaching and that they are relatively stable and resistant to change (Higginbotham, 1996; Tattoo 1996). An important goal of teacher education programs ought to be to alter teacher beliefs if necessary (Tattoo, 1996). It is clear that if the beliefs of prospective teachers are not investigated and are left intact, this may lead to rejection of concepts that are taught in teacher education programs. Beliefs must be actively engaged, then confronted and transformed, if necessary.

As previously stated, many teacher education programs require undergraduate education majors to take one diversity course. However, research reports mixed results in reference to changing attitudes and beliefs about diversity after participation in one course on diversity. For instance, Artiles and McClafferty (1998) and Delaney-Barmann & Minner (1997) report a positive change after one diversity course, while Colville-Hall, MacDonald & Smolen (1995) and Haberman & Post (1992) report little to no change.

Higginbotham (1996) feels strongly that some resistance may be due to the way courses are constructed, especially when course materials seek to place blame for the onset of injustices. White students may display resistance because they feel that blame is placed squarely on their shoulders. Students are then encouraged to actively transform society—essentially making them responsible for the ending injustice, thereby further increasing the levels of resistance.

Chizik and Chizik (2002) posit that there are a number of viable methods for changing resistant beliefs. For example, they suggest that diversity course materials should be designed to shed light on various oppressed groups with a focus on understanding the groups and discovering ways to end injustices. Other course activities should focus on the privileged—to encourage students to reflect on their own biases and attitudes and to learn about their own culture and identify their own privileges. Based on ethnic-identity development theory, these activities, “encourage (students) to change their own attitudes and behaviors to effect change in society” (p. 289).

Shaw (1993, p. 22) argues that real growth occurs "when teacher education students engage in powerful experiences which involve the whole person, demand mental and emotional attention and provoke disequilibrium." Knowing that beliefs can change as a

result of experience, as teacher educators, we have to figure out what experiences are most likely to alter beliefs that are opposed to the concepts we are promoting. Examining the origins of existing beliefs can help teacher educators understand better the types of experiences that might help to alter strongly held beliefs. Prospective teachers' beliefs must be elicited and engaged actively through the use of in-class experiences that produce desired changes.

It seems that a logical move would be to begin to document the types of activities and experiences that can be shown to correlate to beliefs that are supportive of our curriculum. We can gather this information directly from prospective teachers—learning as much from pre-service teachers opposed to SJE as from those who are open to and supportive of SJE. Pre-service teachers can assist us by relating experiences that caused them to develop their positive and/or negative beliefs and attitudes. More research on documented methods that have changed the beliefs and attitudes of pre-service teachers is presented in the final chapter of this study.

Variables That Affect Beliefs. Garmon asked if there are "identifiable variables that can be rather consistently associated with courses and experiences that positively affect students' attitudes and beliefs about diversity" (2004, p. 203). Closely working with one pre-service teacher, this researcher identified six factors critical to the development of the students' positive beliefs towards issues of diversity. The six factors fall into two categories, dispositional and experiential.

Dispositions. The first dispositional factor is *openness* which depicts how receptive a person is to the ideas or arguments of others and how open a person is to others who are different than themselves. The pre-service teacher studied by Garmon had no experience

with diversity, yet displayed a tremendous amount of openness which the researcher attributed to an extensive religious upbringing. The next factor, *self-awareness* and/or *self-reflectiveness*, involves being aware of one's own beliefs; being willing and able to think critically about them. The last dispositional factor is a *commitment to social justice*—a commitment to equality for all. Again, in Garmon's study this commitment seemed to be fueled by religious beliefs.

Experiences. In the experiential category are intercultural experiences, educational experiences, and support group experiences. The support group needs to consist of individuals who encourage a person's growth, helping them make sense of information and experiences, challenging or questioning when necessary, causing them to think more deeply, providing needed information when necessary.

By examining prospective teachers at various universities we will be able to determine if there are "lay cultural norms about teaching and learning or if there is a clear recruitment influence from program to program." (Anderson and Holt-Reynolds, 1995, p. 17). Lay cultural norms would be indicated if the beliefs appear to be the same across all of the programs. Discovering that prospective teachers at particular universities have beliefs different from those at the others universities may indicate a recruitment influence.

Finally, the focus on the attitudes and beliefs of elementary teachers reflects extensive prior research documenting the critical role that such attitudes have on acceptance or rejection of educational innovation proposals. It is widely acknowledged that teacher response to a reform proposal will be crucial to its implementation. The focus of this study on the attitudes and beliefs of pre-service elementary teachers reflects the premise that such understanding will be helpful in formulating an approach to teacher

development in using SJE. Furthermore, due to the current frequent turnover of elementary teachers, changing teacher preparation can have a nearly immediate effect on what happens in schools.

Summary

This chapter discussed the literature on issues pertinent to investigating attitudes and beliefs toward Social Justice Education, examining five bodies of literature. The literature on the status and purpose of education attests to the need for changing the way we educate our children. Examining the literature on successful reform efforts to provide more equitable education provided guides for implementing Social Justice Education. Furthermore, I provided examples of existing research on learning to teach mathematics for social justice as well as examples of this manner of teaching in Pre-K-12 classrooms.

The theoretical groundings for this study draws from three theories, Critical Theory, Critical Pedagogy and Critical Mathematics. From Critical Theory we recognize the need to understand repressive social structures. Understanding the roles that schools can and should play in understanding and changing social structures has been aided by the Critical Pedagogy research. Finally, Critical Mathematics details how mathematics can empower and motivate students to understand and alter certain social conditions.

To facilitate the success of any innovative practice in education, it is necessary to have buy-in from teachers. Therefore this study explored the body of research on current teacher preparation practices and subsequent effects on pre-service teachers. Finally, studies on beliefs provided advice on personal resistance to changing beliefs, as well as possible ways to overcome the resistance.

Chapter 3

Methodology

The origin of my social justice education journey was an assignment in one of my last required graduate courses. I was asked to discuss mathematics as it related to one of the courses that I had taken outside of my math education studies program. I immediately thought of a course I had taken that was entitled Urban Education. While completing the research for an assignment in this class, I discovered literature on successful schools in urban areas. The literature discussed the fact that while the vast majority of urban schools were failing a large body of students, there were some that stood out like light beacons. Researchers were beginning to study those schools to see what they had in common.

Out of this research I found literature on Culturally Relevant Teaching and Culturally Relevant Pedagogy which sparked my interest. After further research I came across literature on Social Justice Education. I noticed some similarities between the 2 former methods and Social Justice Education. The part of Social Justice Education that really resonated with me was the social agency portion. There was something about helping children find their voices that grabbed at me.

My initial plan was to spend time in a classroom that employed this method of teaching. I wanted to see what the lessons were like and how students reacted to the lessons and enacted with the math and the issues studied. Unfortunately, this did not pan out but my interest in infusing social justice concepts into math lessons continued.

Something a bit puzzling and disturbing to me was that although Social Justice Education had been a growing field for some years, I had never heard of it before. Throughout my 20 or so years of schooling, I had not heard of it until researching another

progressive method of teaching during this stint of my graduate work. I wondered to what extent other pre-service teachers knew about SJE.

Therefore, I designed this study to, in part, determine if other students seeking to become teachers had prior knowledge of SJE. More importantly, I wanted to determine what might be the pre-service teachers' attitudes towards and beliefs about Social Justice Education and the use of mathematics lessons to create a sense of agency in their elementary students.

The specific research questions and sub-questions are stated below. The two major questions were elaborated by a framework of sub-questions that ask how and why dispositions of pre-service teachers toward teaching mathematics from a social justice perspective differ by race, age, SES, and higher education experiences.

Research Question 1. What attitudes and beliefs do prospective teachers display towards incorporating social justice into mathematics teaching?

Sub-question 1.1. How do reported attitudes and beliefs differ among participants by race?

Sub-question 1.2. How do reported attitudes and beliefs differ among participants by age?

Sub-question 1.3. How do reported attitudes and beliefs differ among participants by socioeconomic level?

Sub-question 1.4. How do reported attitudes and beliefs differ as a result of mathematics content and methods course experiences by participants?

Sub-question 1.5. How do reported attitudes and beliefs differ by type of college or university in which participants are being prepared for teaching careers?

Sub-question 1.6. How do reported attitudes and beliefs differ as a result of experience by participants in a diversity course?

Research Question 2. What factors appear to influence pre-service teachers' attitudes and beliefs about social justice education in the mathematics classroom?

Sub-question 2.1. What beliefs and perceptions do pre-service teachers who appear to be least supportive of teaching elementary mathematics with a social justice lens hold related to six relevant themes (current state of education, prior knowledge of SJE, life experiences of pre-service teachers, appropriateness of SJE, neutrality of teachers, and children's knowledge of injustices)?

Sub-question 2.2. What beliefs and perceptions do pre-service teachers who appear to be most supportive of teaching elementary mathematics with a social justice lens hold related to six relevant themes (current state of education, prior knowledge of SJE, life experiences of pre-service teachers, appropriateness of SJE, neutrality of teachers, and children's knowledge of injustices)?

Sub-question 2.3. What appear to be potential influences on differences in subgroup (race, age, socio-economic class, teacher education experiences, and type of university) support of teaching elementary mathematics with a social justice lens?

The sections of this chapter describe the overall research design of the study, selection of subjects, instruments and data collection strategies, and data analysis plans.

Overall Research Design

This study employed a mixed methods research approach that utilized survey and clinical interview techniques for data collection. Quantitative data was obtained from a survey designed to ascertain attitudes of pre-service teachers toward using a social justice lens while teaching mathematics to elementary students. Statistical analyses compared responses of subjects grouped by teacher preparation experiences, socio-economic status

and by demographic variables including race and age. A rationale for making comparisons between these subgroups is in the following sections. In this study, the socio-economic status of participants was approximated by their receipt or not of the federal Pell grant. "While Pell grant eligibility depends on several factors, researchers often use Pell grants to identify low-income students" (Espenshade, T., Radford, A., and Chung, C., 2009, p. 265). In fact, in 2004, Heller reported that the family income of 75% of Pell recipients at four-year colleges for the school year 1999 – 2000 was less than $32,000. Qualitative data was collected from individuals selected to participate in open-ended interviews designed to determine the origins of their attitudes toward and beliefs about Social Justice Education.

Participant Selection. Subjects of the study were pre-service undergraduate and master's level pre-service elementary teachers who had successfully completed at least one mathematics content course and were currently enrolled in either a mathematics methods or content course. The study participants were enrolled at four quite different institutions of higher education and thus reflected significant diversity of race, SES, age, and teacher preparation experience.

Rationale for Subject Selection Plan. The body of literature on elementary teacher preparation concentrates on White teachers—a fact that is not surprising because the majority of persons entering the field of elementary education are young White females (Sleeter, 1995). However, researchers (Montecinos & Rios, 1999; Sleeter, 1995) have called for more research on the experiences of pre-service teachers with diverse backgrounds. Furthermore, Montecinos and Rios (1999) and Su (1996) have suggested that pre-service teachers of color may have an especially strong commitment to social justice.

Based on these claims in the literature, I incorporated a comparison of pre-service teachers by race in my analysis.

While race and socioeconomic background are plausible determinants of attitudes toward Social Justice Education, it also made sense to ask whether life experiences (reflected in diversity of ages of pre-service teachers) or the institutional setting in which teacher preparation occurs or required courses have influence on attitudes toward education with a social justice perspective.

Research Settings. This research studied the attitudes and beliefs of a diverse sample of pre-service teachers from four east coast universities. Two of the universities are Historically Black Colleges/Universities (HBCU) with student bodies that are majority Black. The population at the other two universities, while diverse, is mostly White (68% and 71.6% White undergraduate students) according to their perspective websites. Examining the views of this cross section of pre-service teachers provides needed research on diverse groups of pre-service teachers. Pre-service teachers, at the undergraduates and master's level, from each university who were currently enrolled in or had already taken at least one of their respective mathematics content and/or methods course were invited to participate.

The four universities are designated, for purposes of anonymity, simply Universities A, B, C, and D. Universities A and B are the HBCUs. University A is located in a large suburb inside an urban area but outside of the central city. University B is located within a large urban area. University C and D are traditionally White universities, both located in suburban areas.

In spite of relatively small distances between the institutions, the four universities vary greatly. Table 1 below shows undergraduate enrollment demographics for each university and the percentage of undergraduates receiving federal Pell grants for low-income students. As is usually the case, the larger number of low income students are found at the two urban institutions, while the vast majority of the students at the suburban institutions appear to be from more affluent families.

Table 1.

University Enrollment Demographics

Student Enrollment Demographics	Univ A	Univ B	Univ C	Univ D
Non Resident Alien	58	197	526	3,197
African American Non-Hispanic	4,653	6,226	1,929	3,764
Hispanic	72	34	358	1,676
Asian / Pacific Islander	90	67	561	4,076
American Indian / Alaskan Native	12	11	40	104
Caucasian Non-Hispanic	453	149	12,819	19,599
Race Unknown	77	207	1,434	2,517
Total	5,415	6,891	17,667	34,933
Percent Pell Grant	36%	50%	16%	17%

Identifying Specific Subjects. I worked with faculty from each university to select one undergraduate mathematics content course and two mathematics methods courses (one undergraduate and the other master's level if applicable) from each university. There were a total of 12 classes selected.

Data Collection Sources

Data collected in this study came from a survey administered to students in the 12 target teacher preparation mathematics and mathematics methods classes and from individual interviews with a sample of participants in those classes.

Survey Instrument. I was unable to locate an existing instrument to assess teacher attitudes and beliefs about social justice education and the prospects for using its curricular and pedagogical principles and practices so I created one. I decided that I would provide my participants with a look at social justice education as it might play out in the classroom. Searching the literature, I selected and/or adapted five classroom activities that had been facilitated or proposed by proponents and practitioners of Social Justice Education in upper elementary or middle school mathematics classes. The mathematics lessons involved a variety of social justice issues and levels of intensity, along with varying intensity levels of student action. The prevailing thought was that some social issues and particular student actions might be accepted by pre-service teachers while others would not, thus providing a measure of a limit beyond which teachers might not be willing to pass.

Each scenario was followed by a consistent set of seven questions that asked respondents to judge the appropriateness of each approach to mathematics teaching. I began each scenario by listing the state curriculum requirements for the math involved in each lesson. On the last page of the survey, the participants are asked to indicate their level of agreement with twelve statements concerning general matters about mathematics and education. I used criticisms of the pedagogy found in the literature to craft each statement. The final two statements on the survey concern prior knowledge of incorporating social justice and whether participants felt it was important that mathematics teachers shed light on social injustices.

The components of the survey were drawn from various resources for social justice teaching in mathematics (Hersh and Peterson, 1994a; Peterson, 1994c, 1998; Sweeney, 2002 and Tate, 1995). For the classroom snapshots, descriptions of five lessons were

selected from articles written by teachers who have integrated Social Justice Education in their mathematics lessons. In determining which lessons to encapsulate, I considered the mathematics topic, the social issued addressed, and the subsequent action taken by the students. The social issues varied in level of social justice intensity and student action. I felt that the level of intensity of the issue and the student action(s) might be a point of departure for some participants. In other words, I felt that some participants may be agreeable to elementary students discussing some issues but not others as well as the students taking some actions but not others.

The first six statements that follow each lesson description were developed by considering concepts that proponents of SJE assert that incorporating social justice in lessons promotes and concepts that have emerged from criticism of the SJE proposals. Again, the same set of six statements follow each scenario. Participants were asked to indicate their level of agreement with these statements. The seventh statement inquired as to the lowest grade at which the participant felt the lesson would be acceptable for each scenario. Their responses to the statements enabled us to ascertain their dispositions towards a specific use of SJE in a mathematics lesson. Participants were also provided with space in which they could make additional comments about any issue in the scenario. It was hoped that greater details about one's disposition would be revealed if free writing was permitted.

A pilot study was conducted using the survey. The purpose of the pilot study was to ascertain clarity of the survey. First, I surveyed pre-service students at a fifth university. As the pre-service teachers were students in my class, all surveys were done anonymously; no names or other identifying attributes were submitted with completed surveys. These

participants were also asked to comment on the level of clarity of the survey. Furthermore, fellow students in my graduate studies program were asked to complete the survey and submit comments. Changes to the survey were then made based on the collection of issues raised during the pilot study.

The validity of the instrument was guided by opinions of some members of my dissertation committee. I worked with these members, whose backgrounds include education, mathematics, and mathematics education, to develop the statements to which participants indicated their level of agreement. Reliability of the instrument will be discussed in chapter 4, Analysis of Data.

Description of the Data Collection Instrument. The following section presents the five classroom scenarios included in the survey and provide more details about the rationale for the choice of the social issue and teaching activities involved in each scenario. The six Likert-type scale items that were used to measure respondent reaction to the acceptability and desirability of using SJE lessons in mathematics teaching are also described. Finally, I describe the rationale for the twelve subsequent items designed to measure overall reaction to principles of SJE. The full instrument appears in Appendix C.

Classroom Scenario 1, Wage Disparity. (adapted from Hersh and Peterson, 1994)

Students analyzed and discussed a bar graph from a local newspaper that displayed median weekly earnings of full-time workers in 1993. The categories distinguished the wages along racial and gender lines. In general, men earned more than women and Caucasians earned more than African Americans who earned more than Hispanics. Students were asked how they felt about the statistics, they were asked to hypothesize about possible causes and to think of ways to test their hypotheses.

Finally a whole class discussion occurred about how the inequalities can contribute to hostility between the racial groups.

Very early in life, children become aware of differences in skin color. In my experience as a teacher of Black elementary students, they are also aware of injustices encountered by people of color, whether the experience is first hand or word of mouth - through siblings, parents or neighbors. Therefore, I believe that this activity helps young students elaborate on a topic with which they are already familiar and begins to help them understand what causes conflict between races and gives them ideas about how to begin to address the issue. Others may not be of the same mind on this issue and may think that the topic should not be discussed with young students. On the other hand, a classroom discussion is the only action the students take in this lesson. So this type of SJE lesson may be acceptable to many teachers.

Classroom Scenario 2, Liquor Store. (Tate, 1995)

Students in this class began to investigate the large number of liquor stores near their school. The investigation resulted from conversations the class had about issues they faced just getting to school each day. Several issues surfaced, from the harassment the students felt from the customers hanging around the stores everyday as they walked to and from school, to the fact that some family members were alcoholics and the resulting negative effects on the family. Using the tools they had on hand (yard sticks and meter sticks), the students measured linear distances between their school and the liquor stores. They also examined city ordinances to determine laws and regulations directed at establishments selling alcoholic beverages. In doing so they discovered that their measurements were different from

those conducted by city officials. Further investigation lead to their discovery of the sophisticated tools used by city officials. The students also discovered that laws existed that were being violated by some of the establishments. One such law prohibited certain establishments from being in close proximity to schools. Students began a letter campaign that resulted in the closure of some establishments and causing others to become compliant with the laws on the books.

I felt that this lesson represented a social issue and action by students that many teachers would find permissible and appropriate for classroom treatment in conjunction with mathematics instruction. The lesson addresses a known societal problem that few would say should remain at its current level. I expected that many teachers would respond positively to the fact that student action caused the establishments to adhere to city ordinances, thus helping themselves and the community at large.

Classroom Scenario 3, Gender Disparity. (Adapted from Peterson, 1994c)

A Fourth-grade teacher reported that his students analyzed front-page photos of a month's worth of three major newspapers. The students note major differences between how males and females were most often portrayed. They found that only a small number of front page photos depicted women. Of the women whose photos were shown none were in a professional category although more than half of the pictures of men were representatives of business or government.

Students used the math skills of simple computation and graphing. They wrote to the newspaper about their findings and prepared a discussion about the biases that they found and presented it to younger students in the school.

This lesson was expected to be judged an appropriate and acceptable example of social justice teaching because it does not involve sensitive social issues and the level of student action is minimal. The students act on their findings only by writing letters and speaking before the school board—rather innocuous activities.

Classroom Scenario 4, Sweat Shops. (Sweeney, 2002)

A unit on Global Sweatshops included activities such as reading a *Time for Kids* article about children as young as 6 sewing Nike soccer balls in Pakistan; viewing a *Dateline NBC* segment called Toy Story, which exposed child labor in Indonesia and China; viewing videos such as Mickey Goes to Haiti and Nike in Vietnam as well as reading materials from the public relations department of Nike and Disney.

Students examined the dynamics of topics such as economic globalization, capitalism, and cheap labor through simulations, role-play, first-person-testimonies, and guest speakers. Among the speakers were ex-factory workers who discussed actions they were taking to improve the working conditions in their countries. The students spent considerable time writing reflections on their learning and working in small groups as they reviewed printed materials.

Mathematical activities included analyzing fact sheets on noted sweatshops around the world, including the US, to determine number of hours worked, hourly and weekly salaries, and length of time one worker would have to work to purchase essential items. The students also gathered and graphed important statistics related to sweatshop workers' lives.

The students eventually wrote a play that included scenes from their own innocent childhood (their playground and the local fast food restaurant), along with scenes from sweatshop factories, mansions of sports figure who endorse Nike shoes, and the corporate offices of Nike and Disney. In short, the play represented the students' own political education and ended on the note that they themselves can do things to change the world, if only by making more people aware of worldwide working conditions.

Unfortunately, three days before the play was to be performed for the entire school, the principal decided the play would not be suitable for the other students of the school and that only parents could attend. However the press discovered and reported the censorship and eventually a local theater offered its stage for the production. In the end, the students actually performed the play on Broadway.

Many adults believe that the global nature of our world requires us to speak out on behalf of unfortunate others around the world. What remained to be seen was if the participants believed this is a topic and the type of actions in which young children should be engaged. It also seemed possible that many teachers would find this inappropriate use of mathematics instructional time.

Classroom Scenario 5, Hunger Drive. (adapted from Peterson, 1998)

In New York, a 3rd grade student brought a flyer to class about a local canned food drive. This inspired second- and third-grade teachers to host a canned food drive at the school. Through questioning techniques, the teachers guided their students into reflective discussions concerning poverty and hunger in the neighborhood, in the country, and in the world. Among the questions they asked

were: Why is there hunger? What should be the government's role in making sure everyone has enough to eat? Why isn't it doing more? What can we do after giving the canned food?

The second and third grade classes then collected canned food items, counted and categorized them and then graphed the categories of food items. Finally the teacher and the students delivered the food to the collection spot and the students helped to fill food packages for families. Students used knowledge of multiplication and division to sort the food into boxes that would be given to families. Some students and their parents came out on the day of distribution to help hand out the food packages to needy families.

The students then began a letter writing campaign. They wrote about the knowledge they had developed about the root causes of hunger and what can be done locally or nationally to eliminate it. Letters were written to elected officials, newspaper editors, and company presidents.

This lesson represented the sort of Good Samaritan project that seemed unlikely to cause adverse actions or sentiments towards any group of people. It was therefore expected that the scenario would acceptable by most teachers as an appropriate and effective use of SJE in mathematics instruction.

Survey Statements. Participants responded to seven survey items after each of the five social justice mathematics teaching scenarios. The first six survey items were about the appropriateness of teaching in the way described by the scenario. Using a Likert scale of 1 (strongly disagree) -5 (strongly agree), participants indicated their level of agreement with each

statement. For the seventh statement, participants indicated the lowest grade level at which they believe the social issue should be taught.

Statement 1. This is an example of teaching high quality, engaging mathematics.

A documented criticism of SJE is that so much effort is placed on the social issue that students are not experiencing high level mathematics. This question allows the participant to comment on the level of mathematics that the students experience in the lesson.

Statement 2. This is an acceptable social issue to discuss with students in elementary school.

This statement was included because it seemed likely that teachers would vary in their ideas about the age at which they believe young children should be exposed to topics like those that are central to Social Justice Education.

Statement 3. Teachers should encourage students to try to make changes in society on this issue.

Teacher respondents may have felt that while the topic of a scenario was appropriate for classroom discussion and practice in mathematical analysis, students should not be encouraged to take public action in reference to the topic. This item gave them a chance to express that view.

Statement 4. This is a topic that would motivate students to learn mathematics.

Much research speaks to the fact that students who are motivated learn better. Research also states that mathematics should be presented in ways that are relevant to students and this relevancy in itself is motivating. It would be useful to assess teachers' judgments about the motivational effects of various kinds of SJE lessons.

Statement 5. Teachers can balance teaching mathematics and this social issue effectively.

Another known criticism of SJE is that the social issue involved in a lesson may become time consuming and the mathematics will get shortchanged.

Statement 6. Teachers should take the extra time needed to incorporate the study of this social issue into mathematics lessons.

In the event that a teacher feels that more time could possibly be given to the social issue than the mathematics, this statement enabled him/her to comment on whether or not the extra time spent is worthwhile.

Statement 7. What is the lowest grade level in which this topic should be taught?

One of the hypotheses of this research is that while participants may agree with the incorporation of SJE in mathematics lessons, they would quite possibly vary in their views about the elementary grade in which it would be feasible to occur.

The following set of 12 items appeared at the end of the survey, to assess overall views of the respondents to basic tenets of Social Justice Education and the role of mathematics in SJE.

Statements on general matters about mathematics and education

1. Education should prepare students to be productive members of society.
2. Education should prepare students to voice their opinions about society.
3. Education should prepare students to change society.
4. Education as it is today maintains the status quo, prepares most students for only functional literacy and servitude jobs or the military.
5. School is an appropriate place to develop social activists.
6. Teachers should encourage students to take action against social injustices.
7. Teachers should take the extra time needed to incorporate the study of social issues into

   mathematics lessons.
8. Teaching should be politically neutral.
9. Mathematics should be used to make sense of the world.
10. Mathematics teachers have time to do both, teach mathematics effectively and have students investigate social injustices.
11. School mathematics should be used to analyze social injustices.
12. Mathematics is a tool that should make hidden injustices visible.

The following statement was placed in the very last section of the survey:

> A prominent researcher who supports the pedagogy used in each of the above scenarios says, “Students need to be prepared through their mathematics education to investigate and critique injustice, and to challenge, in words and action, oppressive structures and acts- that is, to ‘read and write the world’ with mathematics.” This pedagogy is called Social Justice Education. Teachers who

practice Social Justice Education take care to ensure that students do not develop certain attitudes, such as, an ‘us VS them’ attitude or a ‘what a world grownups have left us- we can’t fix the entire world’ attitude. Students are instead encouraged to do whatever small part they can to make a difference in their and others’ lives.

It was not until this statement is read that the name of the pedagogy, Social Justice Education, was revealed. This was done purposefully. It was felt that revealing the name earlier could unnecessarily bias opinions before participants fully reflected on each scenario. I also felt that it was extremely important for participants to know that children are not being inundated with the seemingly endless amount of social injustices in the world and left with pessimistic attitudes towards life.

Participants are then asked to respond to the following two statements.

Statement 1. It is important that mathematics teachers shed light on social injustices.

This statement provided the participants with an opportunity to present an overall opinion on teachers, in particular, mathematics teachers, integrating social justice issues in classroom lessons, given all of the pros and cons that a participant may have thought about during the completion of the survey.

Statement 2. I already had prior knowledge of teaching with an emphasis on social justice.

This statement enabled us to collect important data on the amount of pre-existing knowledge of Social Justice Education.

Distribution of the Data Collection Instrument. Conducting this research required the assistance of three instructors from each university. I made contact with instructors in various manners. For universities C and D, I requested assistance from four instructors I knew and who were teaching the targeted courses, either a mathematics methods or

mathematics content course for pre-service teachers. I also sent out emails requesting assistance to instructors who had been identified by acquaintances as teaching one of the courses. Almost immediately an adequate number of instructors from both universities responded and agreed to assist, enabling me to complete data collection within a month, late November, 2008.

Using the websites to locate schedules of classes, instructor names and contact information for the remaining two universities, I made attempts, via email and phone, to contact instructors who were scheduled to teach the desired courses and requested permission to have the survey completed in their classrooms. The responses varied. The instructors at University B readily agreed to assist while some at University A did not respond to the emails or phone messages. Subsequently, I contacted the chairs of the mathematics and the education departments for guidance with respect to instructors that might be willing to assist.

Furthermore, personnel at these two universities forwarded my request to their respective Institutional Review Boards (IRB) for permission to conduct the research. University A's regulations did not require a full-fledged IRB process so permission was granted in a short period of time. However, the regulations at University B required me to go attend to the entire IRB process. IRB approval from both universities was given at the beginning of the following semester and data collection began in early February, 2009.

In all, twelve instructors, three from each university, assisted in data collection. At all four universities, some instructors invited me in to conduct the surveys, in which case I presented the survey to the pre-service teachers and had the students complete them and turn them in immediately. Only one of these students opted not to participate in the

research by returning a blank survey.

Other instructors preferred to have their students take the survey home to complete. I delivered the surveys to these instructors. After a week or two the completed surveys were returned. These instructors informed me that a total of three students failed to return a survey. An additional three surveys were turned in blank as students decided not to participate. As a result, of the total of 169 surveys that were initially given out at the 4 universities, 162 were returned. Thus the return rate for the surveys was 96%. Further examinations of the surveys revealed that, although they returned the survey, 15 participants failed to complete at least one full section (one of the five scenarios or section six, the generic statements about education) causing their scores to be incomplete. I attempted to contact them via email to complete the missing sections. Only one participant complied so that participant's survey was included in the study but the other 14 had to be eliminated from the study. As a result there were 148 participants in the study and the effective return rate was 88%.

Individual Open-ended Interviews. Selected participants were subsequently invited to participate in audio-taped, semi-structured interviews (Appendix E) to determine the sources of their dispositions toward the use of SJE in elementary math lessons. The participants were selected based on responses to the survey. Targeted respondents were those who demonstrated strong reaction to the concept of Social Justice Education; in other words, those who strongly agreed or strongly disagreed with statements made in the survey as well as those whose comments demonstrated strong feelings. Based on this, fifteen participants were identified. The ten with the strongest reactions were invited to participate

in the interview and the other five were considered back up interviewees in the event that someone from the ten did not interview. In the end, these five were not needed.

Data Analysis Plan

Analysis of data from the survey and individual interviews explored the broad questions of how and why pre-service teachers respond to basic concepts of social justice teaching in elementary mathematics and the relationship of those responses to six potentially significant teacher variables: race, age, SES, experience in pre-service mathematics, experience in pre-service methods courses, experience in diversity courses, and university setting for teacher preparation.

Quantitative Analysis of Survey Data. For each participant, responses to the survey items were aggregated to produce an overall measure of pre-service teachers' disposition toward social justice teaching in elementary mathematics. Descriptive analysis of those aggregate measures and responses to individual questions provided insight into the broad question about attitudes and beliefs of pre-service teachers. Further statistical analyses provided information about the correlations of responses and various demographic variables.

Note that there were two statements throughout the survey that did not ascertain attitudes or beliefs. The last statement for the scenarios queried participants' opinion of the lowest appropriate grade level for the social issue and the last general statement queried the prior social justice knowledge of the participants. Because these statements do not assess attitudes or beliefs, they were analyzed separately. For the initial analysis, the survey was split into two sections. First, the 30 statements (the 6 remaining statements for each of 5 scenarios) for the classroom scenarios were analyzed and, second, the 13 remaining general

statements were analyzed. Then the statements concerning grade levels and prior knowledge of SJE were analyzed.

The following section contains the first research question, the sub-questions and rationales for studying each along with the methods of analysis for each.

Research Question 1. What attitudes and beliefs do prospective teachers display towards incorporating social justice into mathematics teaching?

The initial analysis presented distributions of all participants' responses in relation to three outcomes: 1) their mean response across the five scenarios, 2) their beliefs related to the appropriateness of Social Justice Education in elementary mathematics, and 3) their beliefs related to the appropriateness of Social Justice Education in general.

Sub-question 1.1. How do reported attitudes and beliefs differ among participants by race?

Researchers have proposed that people of color may be more committed to social justice education than Whites. Insight into this question was provided by conducting an ANOVA comparing responses of pre-service teachers, grouped by race (Black, White, and Other), to the three outcomes described above.

Sub-question 1.2. How do reported attitudes and beliefs differ among participants by age?

Because personal experience affects beliefs, I expected to be able to determine differences along age lines, regardless of race. The thinking was that older participants may have grown up when Civil Rights were prominent issues and this colored their beliefs while younger students may feel that society is equal and there was no need for Social Justice Education today. Insight into this question was provided by conducting a one

variable T-test comparing responses of older and younger pre-service teachers to the three outcomes.

Sub-question 1.3. How do reported attitudes and beliefs differ among participants by socioeconomic level?

While it is plausible that the students from lower socioeconomic backgrounds are more acutely aware of issues related to social justice and thus more responsive to suggestions about teaching from that perspective, that conjecture is not well-established by existing data. Insight into this question was provided by conducting a one variable T-test comparing responses of pre-service teachers with and without Pell grants supporting their studies to the classroom scenarios and general disposition questions. It was noted that although eligibility for Pell grants depends on several factors, this eligibility is often used to approximate SES by researchers.

Sub-question 1.4. How do reported attitudes and beliefs differ as a result of mathematics content and methods course experiences by participants?

I wanted to know if there would be a significant difference in dispositions toward SJE when I looked at the number of educational mathematics courses taken and whether the mathematics methods course had been taken. Insight into this question was provided by conducting a one variable T-test comparing responses of pre-service teachers with more and less teacher preparation course experience to the three outcomes.

Sub-question 1.5. How do reported attitudes and beliefs differ by type of college or university in which participants are being prepared for teaching careers?

Respondents to the survey questionnaire were from four quite different universities—two urban HBCU and two predominantly White suburban universities. Was

the setting for teacher preparation correlated with attitudes and beliefs toward SJE? Insight into this question was provided by conducting an analysis of variance comparing responses of pre-service teachers at the four universities to the classroom scenarios and general disposition questions. Also, in an effort to determine the extent to which type of university and pre-service teacher race interact, a two-level factorial analysis of variance including both types of university and race as independent variables, and the three beliefs outcomes as dependent variables was conducted.

Sub-question 1.6. How do reported attitudes and beliefs differ as a result of experience by participants in a diversity course?

Did participants who had taken any number of diversity courses display significantly different views from those who had not taken such courses? Insight into this question was provided by a one-variable t-test comparing responses of pre-service teachers with and without diversity course experience to the three outcomes.

Qualitative Analysis of the Interview Data. The aim of the individual interviews was to obtain deeper insight into pre-service teachers' perspectives on SJE, and to explore background situations and experiences that were potentially influential in shaping pre-service teachers' attitudes toward SJE. Data from the tape-recorded interview sessions were transcribed and member checking occurred by emailing transcripts of the interviews to each participant for approval. The transcripts were then analyzed by searching for patterns, and coding categories that emerged. The categories provided insight as to life experiences that have been the sources of the participants' dispositions toward teaching mathematics from a social justice perspective. The second research question which guided

the qualitative portion of the data collection is listed below, as are the related sub-questions.

Research Question 2. What factors appear to influence pre-service teachers' attitudes and beliefs about social justice education in the mathematics classroom?

Sub-question 2.1**.** What beliefs and perceptions do pre-service teachers who appear to be least supportive of teaching elementary mathematics with a social justice lens hold related to six relevant themes (current state of education, prior knowledge of SJE, life experiences of pre-service teachers, appropriateness of SJE, neutrality of teachers, and children's knowledge of injustices)?

Sub-question 2.2**.** What beliefs and perceptions do pre-service teachers who appear to be most supportive of teaching elementary mathematics for social justice hold related to six relevant themes (current state of education, prior knowledge of SJE, life experiences of pre-service teachers, appropriateness of SJE, neutrality of teachers, and children's knowledge of injustices)?

Sub-question 2.3**.** What appear to be potential influences on differences in subgroup (race, age, socio-economic class, teacher education experiences, and type of university) support of teaching elementary mathematics with a social justice lens?

In order to gather such information as presented by the second research question and sub-questions, I conducted a qualitative analysis of personal interview data. The development of the initial interview protocol is discussed in the next section.

Development of the Interview Protocol. To gain further insight into the reasons for attitudes expressed in the survey responses and to probe more deeply the limits of acceptable teaching via social justice themes, I developed interview questions by starting

with a core of general questions based on the literature and how respondents might have been expected to respond to the survey. They were basically generic in nature and could be asked of any interviewee. The intent of these initial questions was to provide participants an opportunity to expand their responses to the survey. Examples of this group of questions were:

- Your responses seem to indicate a somewhat (positive, negative) response to teaching mathematics through a Social Justice lens. Why is that?
- To what experiences in your life would you attribute your attitude/beliefs about social justice education?
- Question ___ states____, your response was ____. Please elaborate on why you responded that way.
- For the most part, the participants felt that incorporating social justice education was okay on some levels not others. Your responses indicate that you feel the same why. Why is that?
- How do you think teaching in this manner will affect the learning of mathematics? Why?

When the final list of interviewees was complete (the interviewee selection process is thoroughly discussed in the next section), I re-examined each of the ten completed surveys. Next, I customized the interview protocol to reflect each of the potential interviewees' survey responses; therefore the final interview protocols were slightly different for each interviewee. The new questions reflected comments written by either the interviewee or other survey participants.

The new set of questions were designed to probe the six dimensions of knowledge and attitude toward social justice education that are found in the general education and mathematics statements in the last section of the survey. The categories were: Current State of Education; Pre-service Teacher Knowledge of Social Justice Education; Pre-service Teacher Attitudes towards Social Justice Education; Being Politically Neutral; Appropriate Social Activism; and Children's Knowledge of Injustices. In this section I discuss the rationale for each category and list the questions associated with each.

Category 1: Current state of education. Part of my argument is that the current state of education in this country needs to be changed in order to benefit more students and that social justice education is a viable way to accomplish this desired change.

> Interview question: You strongly disagreed/agreed) with the statement about education and the status quo. Please say more about that.

The purpose of this question was to gather more data on how participants felt about the educational system in this country. The question was written to get them to elaborate on their response to the survey statement:

> Education as it is today maintains the status quo, prepares most students for only functional literacy and servitude jobs.

Category 2: Pre-service Teacher Knowledge of Social Justice Education. I was interested in discovering how the participants had developed any pre-existing knowledge of social justice education. This reform effort has been in existence for quite some time in one form or another, seeming to have become more widespread within the past 2

decades. My interest was in determining if participants already knew about SJE and how they may have learned about teaching in this manner. It also seemed equally important to probe levels of understanding about social justice education they may have gained from being introduced to the pedagogy by the scenarios in the survey.

Question 1 : What did you know about social justice education before this study?

Question 2. What do you think it means to incorporate social justice education into the teaching of math?

Category 3. Pre-service Teaches' Life Experiences that Might Influence their Attitudes Towards Social Justice Education. This study was designed to determine, in part, how pre-service teachers developed attitudes that affect their beliefs towards teaching with a social justice lens. This category presented questions designed to understand such origins. The questions also probe beliefs towards social justice education and its incorporation into elementary mathematics lessons based on what they have gained from the survey.

Question 1. Your responses seem to indicate a somewhat positive response to teaching mathematics through a Social Justice lens. Why is that?

Question 2. To what experiences in your life would you attribute your attitude/beliefs about social justice education?

Question 3. How do you think teaching in this manner (incorporating Social Justice Education) will affect students? Why?

Question 4. How do you think teaching in this manner will affect the learning of mathematics? Why?

Question 5. Beginning at which grade level would you say it is feasible to use social justice education? Why?

Question 6. What would you say to parents who want their children to learn math in a traditional classroom but are placed in classes teaching social justice math?

Question 7. You felt that teachers should take extra time if needed to study math in all situations except the wage disparity scenarios. Why is that?

Question 8. Students at 4 different institutions completed my survey. When analyzing the data from the survey, I discovered something about the way that students at each institution responded. Almost without exception, students at the 2 predominantly Black universities seemed less favorable towards teaching in this manner than students at the 2 predominantly White universities. Why do you think might be?

Category 4: Being Politically Neutral. The very nature of teaching with a social justice lens requires the use of what may be considered by some to be controversial social issues. These questions were designed to explore the extent to which participants felt teachers should discuss such issues in the classroom.

Question 1. You stated that you feel that teachers should be politically neutral, what would you say to those who say that by doing nothing you help spread dominant ideology?

Question 2. You stated that you feel that teachers should not be politically neutral, what would you say to those who say you would be indoctrinating students with your own beliefs?

Question 3. You stated that teachers should be politically neutral. What do you mean by 'politically neutral'?

Category 5: Appropriate Social Activism. It seems that the social agency promoted by this pedagogy is one of its dominant and potentially life changing features. During the interviews, I attempted to investigate the limits to which the pre-service teachers would have their young charges involved in social activism. The following questions were asked to see how far pre-service teachers might go in having their students act on the knowledge obtained while studying math through social injustices.

Question 1. A major aspect of social justice education is the actions students take after learning and understanding the issues they investigate. Some teachers have had their students discuss the issues with each other, some have written letters, and others have spoken before adult board members or politicians. One teacher, with parental permission, had students walk a picket line with him. What would be the limit of actions you might request of your students? At what lowest grade level?

Question 2. It seemed that many participants saw the last scenario only as a "canned food drive". Very few commented on the social activism portion. Most felt that all grades could benefit from this activity; it helps everyone, not just one group. What do you think about that?

Question 3. The lowest grade in which you feel it is appropriate to teach in this manner is ____ grade. Since Social Justice Education has an activism component, what kinds of activities do you feel would be inappropriate for ____ graders?

Category 6: Children's Knowledge of Injustices. This final category was created because some survey comments indicated a perceived need, by a significant number of pre-service teachers, to protect young children from the knowledge of existing injustices. It was as if they thought that young children did not already know about injustices and teachers would be violating students' innocence if the issues were discussed in class. Some comments written on the surveys were:

"I do not feel that elementary aged students should acknowledge or be near liquor stores."

"Race relations and income are too deep a topic for children in early grades"

"Children may have trouble understanding the race and gender issue, it may make them feel bad."

"Fifth graders do not need to be exposed to social problems such as these."

The questions that follow asked what the interviewees felt young students knew about or may have experienced in reference to social injustices.

Question 1. In reference to the Liquor Store scenario, how would you respond to the persons who said:

- Before the age of 12, most parents do not let students walk to schools or walk by themselves, so it wouldn't really be a big deal.
- Students should not be encouraged to go near liquor stores.
- Kids could be affected by older adults who may be drunk. Also because some of the kids have to deal with alcohol at home, they know the effects and don't need to face it going to school.

- My biggest fear is that family of local business owners in the class may be caught in the crossfire.

Question 2. How much do elementary students understand about differences in race?

Question 3. How much do elementary students understand about differences in gender?

Question 4. Do elementary children know about or experience racial or gender prejudice?

Question 5. How much do elementary students understand about hostility between racial groups?

The resulting interview protocol contains these questions as well as some of the questions developed initially and can be found in Appendix E.

Selection of Interviewees

Potential interviewees were chosen from amongst the participants who had indicated on the survey that they would be willing to participate in one on one, audio-taped, semi-structured interviews if selected. Targeted respondents were those who demonstrated strong reaction to the concept of Social Justice Education; in other words, those who strongly agreed or strongly disagreed with statements made in the survey as well as those whose comments demonstrated strong feelings. A pool of 15 pre-service teachers was selected based on their responses to the survey.

Of the 15 participants who were identified, the 10 with the strongest reactions were invited to participate in the interview and the other 5 were considered back up interviewees in the event that someone from the 10 did not interview. In the end, these 5 were not

needed. I eventually interviewed 6 students from the two TWIs and 4 from the HBCUs. Two of the interviewees were Asian, four were African American and 4 were Caucasian; two were males and eight were females.

I contacted each of the ten by the email address they had provided on the survey and set up a time and date to meet with each on them on their perspective campuses. Seven of the ten showed up as scheduled. Three students forgot their appointments so I re-scheduled. I was able to meet with two of the three and complete the interview on another day. The last interviewee developed such time constraints that I had to conduct the interview by a series of emails. I emailed the initial list of questions and she responded. I had a few follow-up questions that she also responded to in subsequent emails.

Each face-to-face interview lasted approximately one hour. After transcribing each interview, I did member checks by emailing the completed transcriptions to each interviewee for their comments and making a few necessary edits. All interviewees were each compensated with a $25 gift card.

The Interviewees. I looked across the ten interviewees to determine where they fell within the variables that proved to be significantly different in the quantitative analysis. Those three variables were whether or not the mathematics methods course had been taken, the number of diversity courses taken, and the type of university attended. The levels for the three variables are as follows: no mathematics methods course or one methods course; no diversity course, one diversity course or 2 or more diversity courses; and finally, enrollment at either a TWI or HBCU. Seven of the interviewees had not taken the methods course. Two of these seven scored above the overall survey mean and five scored below.

The remaining three interviewees had taken the methods course. All three of these participants scored above the overall survey mean.

Out of the four interviewees who had not taken a diversity course, three scored below the overall survey mean and one scored above the mean. Three interviewees reported having taken one diversity course. Of the three, two scored below the overall mean and one scored above. The remaining three interviewees had taken two or more diversity courses. All three of them scored above the overall mean.

Four of the interviewees were enrolled at an HBCU; three of them scored below the overall survey mean. Of the six interviewees enrolled in a TWI, two scored below the overall mean and four scored above the mean.

Table 2 below displays demographic information about and educational experience of the ten pre-service teachers who interviewed, along with their mean scores. All names have been changed to protect identities.

Table 2.

Interviewee Statistics and Mean Responses

Name	Alice	Bee	Chante	Dora	Eric	Fran	Gayle	Hazel	Iris	John
Code #	241	152	170	300	299	280	311	115	325	234
University Type	HB	TWI	TWI	HB	HB	HB	TWI	TWI	TWI	TWI
Age	29	20	20	28	23	22	21	43	38	36
Gender	F	F	F	F	M	F	F	F	F	M
Rec'd Pell Grant	No	No	No	No	No	Yes	No	No	Yes	No
Race	Af Am	As Am	Caus	As Am	Caus	Af Am	Af Am	Caus	Af Am	Caus
# Content Courses	1	3	2	2	2	1	3	3	1	3
# Methods Courses	0	0	0	0	0	0	1	1	0	1
# Div Courses	1	0	0	0	1	0	1	2	2	2
					Means					
Scenario 1	2.8	2.7	2.7	3.0	3.5	4.3	4.0	4.0	3.8	4.2
Scenario 2	2.8	2.7	2.8	3.2	4.0	4.2	4.7	4.7	3.8	4.8
Scenario 3	2.8	2.8	3.3	3.0	4.3	4.3	4.0	3.7	4.2	5.0
Scenario 4	2.8	3.3	2.2	3.3	3.7	3.3	4.2	5.0	5.0	5.0
Scenario 5	2.8	3.7	4.0	3.5	2.2	4.2	4.3	5.0	5.0	5.0
Overall Scenario	2.8	3.0	3.0	3.2	3.5	4.1	4.2	4.5	4.4	4.8
GEFS	-1.5	-4.8	0.19	-5.7	0.4	-0.4	0.12	1.28	2.26	1.19
GMFS	0.88	-1.6	0.22	-0.6	-0.1	0.4.	0.54	0.64	0.54	0.87

HB means Historically Black College or University

Coding the Interviews. Initially, I read through each one of the interviews just to get a feel for what the group was saying. I mentally made notes of some emerging themes and subthemes. Although it was hard to resist, I took the advice of Corbin and Strauss (1998) not to make notes in the margin or underline anything during the initial read. My purpose for the first read was just to 'hear' what the interviewees were saying.

On the second read of each interview I began to use open coding, breaking the data down and highlighting major themes. The themes that emerged reflected those listed during the creation of the interview protocol. I then reread the transcripts, this time using axial coding to break down the major themes into sub-themes. In this way I was able to compare and contrast the interviewees based on their responses. Table 3, displays the themes and sub-themes which drove the qualitative analysis.

Table 3.

Coding Frame for Survey Responses

State of Education
Disagree that education as it is today perpetuates the Status Quo
Agree that education as it is today perpetuates the Status Quo
Knowledge of SJE
No prior knowledge
Prior knowledge from diversity course
Prior knowledge from life experiences
Appropriateness
PRO- Influence by life experiences
PRO- Improves math learning
PRO- Improves society
PRO- Promotes social agency
PRO- Promotes critical thinking
PRO- Reveals relevance of math
Some issues more critical than others
Age appropriate issue
Promotes critical thinking skills Social issue may improve society
Promotes social agency
CON- liberal educations drilled it for 12+ years
CON- Can teacher present all sides of issue
CON- Irrelevant Issue
CON- Issue not appropriate
CON- Not the purpose of school
CON- Not the teacher’s job
CON- Teacher cannot present all sides
CON- Protect innocence of children
CON- Math not appropriate
CON- Indoctrination
Life experiences associated with attitudes towards SJE

Diversity class
Critical Literacy Class
Discussions of diversity in many classes
Experiences growing up
Relationship with member of another race
Parental guidance

Teachers Neutrality

Impossible to be neutral
Impossible and unintended indoctrination occurs
Possible but teachers will be unable to present all sides
Possible but present all sided
Possible but perpetuates status quo
Social justice not the same as politics
Avoid politics in classroom

Children's Knowledge of Injustices

Not aware
Experienced but not aware of potential impact
Aware from own experiences
Aware from experiences of others
Aware from media influence

Limitations of Study

The participants in this study were not randomly selected, yet it can be said that they are representative of the body of students enrolled as education majors at their respective institutions. Furthermore, the fact that all four universities are in the same state may affect the degree to which generalizations can be extended to other settings.

The implications that can be drawn from student reactions to the survey questions and individual interviews will also be limited by the extent to which the SJE scenario descriptions and probing questions accurately reflect key principles of SJE and effectively solicit true student attitudes and beliefs about that way of teaching mathematics.

Chapter 4

Analysis of Data

In this study, I investigated pre-service teachers' prior knowledge of and beliefs and attitudes towards incorporating social justice issues into elementary mathematics lessons. This chapter will provide the results of data collected from students at four east coast universities. First, I provide the demographics of the participants. Next, the survey instrument is analyzed. Following that I analyze the quantitative results, focusing on results in which significant differences were found. Finally, I present the qualitative analysis of the interviews, reporting the responses in two groups, those who seemed to be least supportive of and those who seemed most supportive of social justice education.

Demographics of Study Participants. A comparison of Tables 4 (below) and 3 (page 84) demonstrate that the racial breakdown of study participants was comparable to the racial breakdown at each of the four universities. Therefore the participants were a representative sample of the student body at each university.

Table 4.

Racial Percent Represented by Participants at each University

Race	Univ 1 (n=20)	Univ 2 (n=23)	Univ 3 (n=59)	Univ 4 (n=47)	Total 148	Percent of Total Participants
Asian	1 (10%)	0 (10%)	1 (10%)	8 (10%)	10	6.8%
Biracial	2 (10%)	2 (9%)	0 (0%)	2 (4%)	6	4.0%
Af/Am	11 (55%)	20 (87%)	10 (17%)	9 (19%)	50	33.5%
Caucasian	4 (20%)	0 (0%)	45 (76%)	26 (55%)	75	50.3%
Hispanic	1 (5%)	0 (0%)	3 (5%)	1 (2%)	5	3.3%

Native American	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0	0%
Not Marked	0 (0%)	1 (4%)	0 (0%)	1 (2%)	2	1.3%
Percent Female	75%	84%	93%	91%		

% in this column does not total 100% due to rounding

Reliability of the Survey

Survey Statements. Participant's attitudes and beliefs towards teaching elementary mathematics through a social justice lens were elicited through their responses to a series of statements, seven statements following each of five scenarios and fourteen statements concerning education and mathematics in general. All of the statements are displayed in the table below.

Table 5.

Survey Statements

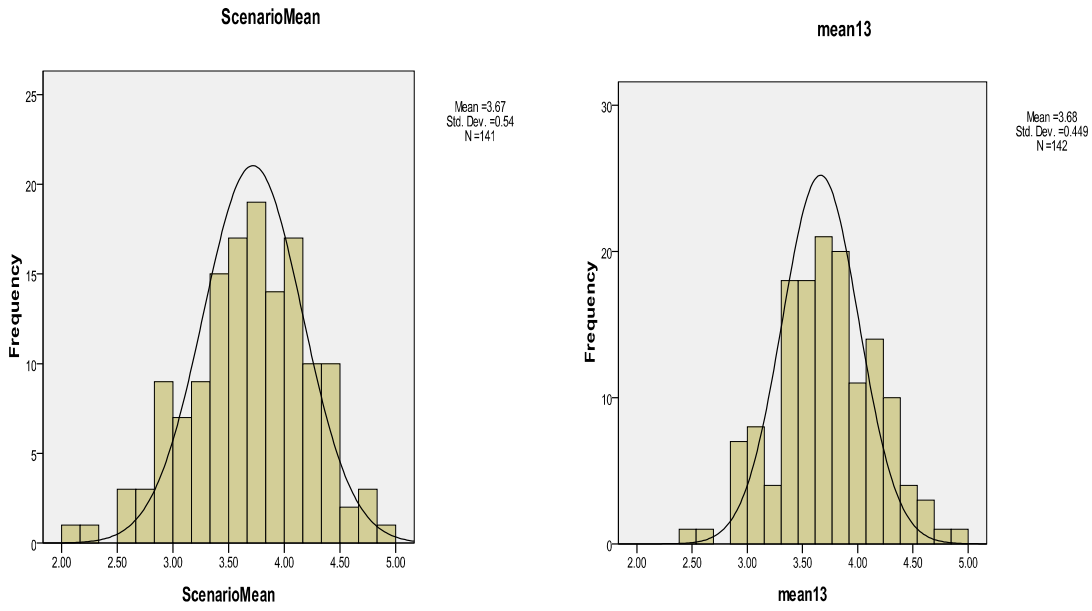
Classroom Scenario Statements
This is an example of teaching high quality, engaging mathematics.
This is an acceptable social issue to discuss with students in elementary school.
Teachers should encourage students to try to make changes in society on this issue.
This is a topic that would motivate students to learn mathematics.
Teachers can balance teaching mathematics and this social issue effectively.
Teachers should take the extra time needed to incorporate the study of this social issue into mathematics lessons.
What is the lowest grade level in which this topic should be taught?

	General Statements on Mathematics and Education
A	Education should prepare students to be productive members of society.
B	Education should prepare students to voice their opinions about society.
C	Education should prepare students to change society.
D	Education as it is today maintains the status quo, prepares most students for only functional literacy and servitude jobs or the military.
E	School is an appropriate place to develop social activists.
F	Teachers should encourage students to take action against social injustices.

G Teachers should take the extra time needed to incorporate the study of social issues into mathematics lessons.
H Teaching should be politically neutral.
I Mathematics should be used to make sense of the world.
J Mathematics teachers have time to do both, teach mathematics effectively and have students investigate social injustices.
K School mathematics should be used to analyze social injustices.
L Mathematics is a tool that should make hidden injustices visible.
M It is important that mathematics teachers shed light on social injustices.
N I already had prior knowledge of teaching with an emphasis on social justice.

The following histograms (Figure 1) reveal the normal distribution of the mean responses to the 30 scenario statements as well as the 13 general statements.

Figure 1. Histograms, Distribution of Scenario and General Statements Means



The scenario statements asked specific questions about the scenarios. As the intent in that section was not to determine any underlying traits, a Factor Analysis was not necessary. On the other hand, the second section of statements, the general statements, was

aimed at uncovering underlying thoughts about mathematics and education.

Factor Analysis. SPSS was used to conduct a Factor Analysis on the second set of statements to determine how consistently the survey measured the intended constructs.

Before further discussing the Factor Analysis, a little information about the general statements is necessary. On the survey, statements A through F and H concerned general education ideas (hereafter referred to as the Gen Ed statements) while statements G, and I through M covered general ideas about mathematics (hereafter referred to as the Gen Math statements). Of the 13 statements, statement H – "Teachers should be politically neutral" - was worded in such a way that a low response would have been a favorable response while all other statements were just the opposite. Therefore a new variable, Hneg, was created to negatively score the statement, using an equation of 6 minus H (the original response).

I then conducted a Factor Analysis of the statements to determine the inter-correlations between them. Field (2005) states that there will be high correlations between variables that have significance values greater than 0.05 with the majority of other variables or coefficients greater than 0.9. While none of the coefficients were high, the results show that the statement Hneg, was extremely highly correlated with all of the other statements (significant values ranging from 0.096 to 0. 380), while every statement was correlated with 2 or less other statements (most values less than 0.05).

To avoid the extreme multi-collinearity posed by Hneg, I eliminated that statement and ran another Factor Analysis on the remaining 12. The results show that there were very few high correlations between the remaining statements. Table 6 displays the significance values from the Factor Analysis. Only a scattered few are higher than 0.05

Table 6.

Significance Values for General Statements

	A	B	C	D	E	F	G	I	J	K	L	M
A	----	.000	.000	.062	.005	.000	.023	.001	.405	.369	.423	.008
B		----	.000	.036	.000	.000	.000	.000	.269	.002	.003	.000
C			----	.183	.000	.000	.000	.023	.022	.009	.023	.000
D				----	.012	.070	.261	.048	.142	.001	.030	.009
E					----	.000	.000	.249	.007	.000	.000	.000
F						----	.000	.010	.022	.000	.005	.000
G							----	.000	.000	.000	.000	.000
I								----	.006	.000	.001	.000
J									----	.000	.000	.000
K										----	.000	.000
L											----	.000
M												----

In running the factor analysis on the remaining 13 general education statements I allowed SPSS to determine the number of factors to extract and it extracted 3 factors. Most of the statements loaded sufficiently on one of the first 2 factors (see table 7). Statements A through C loaded on the first factor only while statements G, J through M loaded on the second factor. Several statements did not load sufficiently on one factor only (D, E and I).

Table 7.

Factor Analysis 1, General Statements

Statement	General Ed	General Math	Unknown
A		.76	
B		.78	
C		.73	
D			
E			.78
F		.44	.66
G	.70		
I	.44	.56	-.45
J	.67		
K	.84		
L	.83		
M	.70		

Factor loadings < .4 are suppressed
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. a.
Rotation converged in 7 iterations.

Due to items loading on multiple factors, I ran another factor analysis, this time forcing only 2 factors. The result, shown in table 8 below, statements A, B, C, and F each loaded only on the second factor, hereafter called the Gen Ed Factor, while statements G and J through K loaded only on the first factor, hereafter called the Gen Math Factor. Problematic statements were D and I (which did not load sufficiently on either factor) along with E which loaded onto both factors. These three statements were thus eliminated from the analysis.

Table 8.

Factor Analysis II, General Statements

Statement	General Ed	General Math
A		.76
B		.75
C		.81
D		
E	.41	.46
F		.67
G	.72	
I		
J	.68	
K	.84	
L	.83	
M	.71	

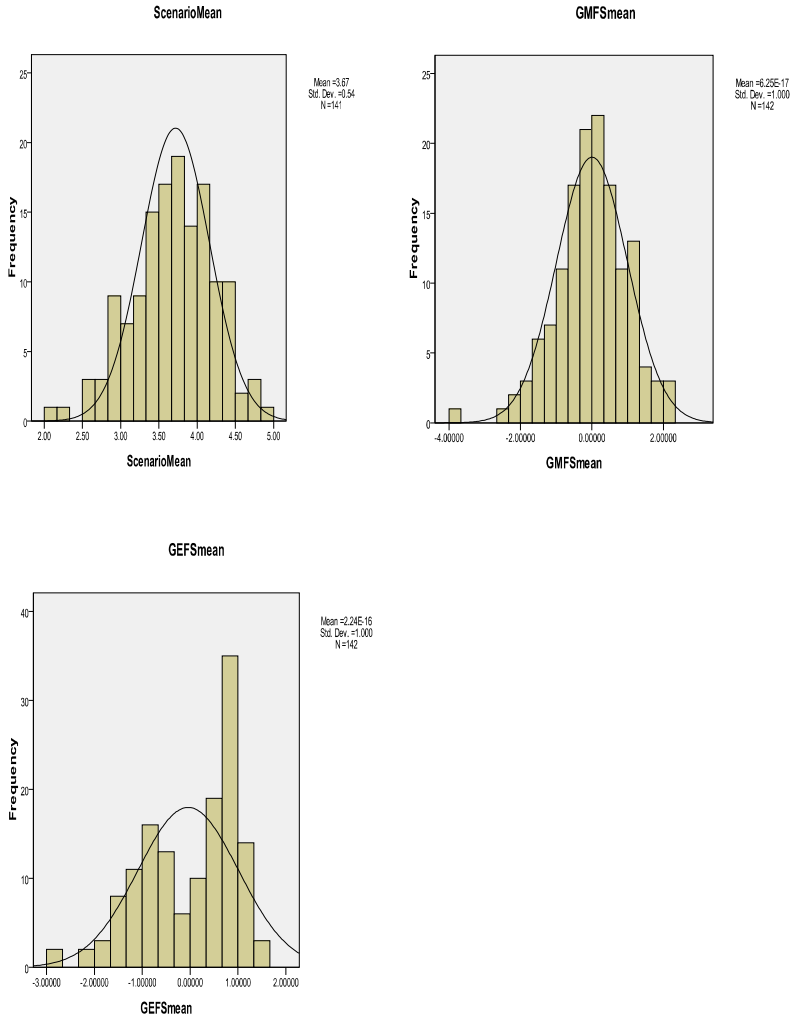
Factor loadings < .4 are suppressed
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. a.
Rotation converged in 3 iterations.

Hereafter, general education statements will refer to statements A, B, C and F, while

general mathematics statements will refer to statements G, J, K, L, and M. The quantitative analysis, therefore, was conducted in relation to three outcomes: 1) the scenario mean – mean across the 5 scenarios (30 statements total), 2) the factor score on the four general education statements, and 3) the factor score on the 5 mathematics statements. Hereafter, the factor scores on the four general statements and the factor scores on the 5 mathematics statements will be referred to as GEFS and GMFS, respectively.

Distribution of Data. The reliability of a survey is of paramount importance as it establishes whether or not, one participant taking the survey on different occasions would produce similar results. Before checking reliability I checked the distribution of my data. Although responses to the classroom scenario and the general mathematics statements were found to be normally distributed, the responses for the general education statements were not normally distributed (see Figure 2). Pearson Product Moment correlation coefficients were used to statistically measure reliability of the scenario and the general mathematics statements. The non-parametric measure, Spearman's Rho, was used for the general education statements.

Figure 2. Histograms, Distribution of Means, Scenario, General Mathematics Statements and General Education Statements



Correlation Coefficients for the Scenarios. First, correlation coefficients were computed for the six statements that followed each classroom scenario (shown below).

This is an example of teaching high quality, engaging mathematics.

This is an acceptable social issue to discuss with students in elementary school.

Teachers should encourage students to try to make changes in society on this issue.

This is a topic that would motivate students to learn mathematics.

Teachers can balance teaching mathematics and this social issue effectively. Teachers should take the extra time needed to incorporate the study of this social issue into mathematics lessons.

The range of correlation coefficients is along a continuum from -1.00 to +1.00. The closer the correlation is to -1/+1, the closer to a perfect (negative/positive) score. Correlation coefficients range from weak (0.1 to .03), modest (0.3 to 0.5) and strong (0.5 to 1.0). Table 9 below reveals positive modest correlations ranging from .321 to .511 between the five scenarios at the 0.01 significance level.

Table 9.

Correlation Coefficients for the Classroom Scenarios

	Wage Disparity Gender/Race	Liquor Store	Media Display of Genders	Sweatshops	Hunger Drive
Wage Disparity Gender/Race	---	.463(**)	.511(**)	.412(**)	.321(**)
Liquor Store		---	.433(**)	.455(**)	.336(**)
Media Display of Genders			---	.502(**)	.360(**)
Sweatshops				---	.427(**)
Hunger drive					---

**. Correlation is significant at the 0.01 level (2-tailed).

These correlations provide a way to determine how the scenario responses are or are not related to each other. This is accomplished by looking at whether the average responses for each scenario vary from the mean in the same way. The highest correlation was found between participants' responses to Wage Disparity and the Media Display of Genders lessons (.511) and between the Media Display of Genders and the Sweatshop lessons (.502). The actual amount of variance is determined by squaring the correlation coefficient.

Thus approximately 25% of the responses to the Wage Disparity and the Media Display of Genders lessons have the same variance. A slightly less variance, 26%, is found between the responses to the Media Display of Genders and the Sweatshop lessons.

Spearman's Rho for the General Ed Statements. The four statements now considered the general education statements are shown below.

Statement A Education should prepare students to be productive members of society.

Statement B Education should prepare students to voice their opinions about society.

Statement C Education should prepare students to change society.

Statement F Teachers should encourage students to take action against social injustices.

As the data for the General Education statements were not normally distributed, I obtained correlation coefficients by generating Spearman's rho. Spearman's Rho produces rank correlation coefficients. A coefficient of less than 0.2 represents a weak correlation, a modest correlation is represented by a rho between 0.2 and 0.4, and, finally, a rho of 0.4 to 0.6 represents a strong correlation. Table 10 demonstrates modest to strong correlations between the general education statements since the coefficients range from .359 to .601.

Table 10.

Spearman Rank Correlation Coefficients for General Education Statements

	GenEdA	GenEdB	GenEdC	GenEdF
GenEdA	---	.453(**)	.449(**)	.359(**)
GenEdB		---	.601(**)	.455(**)
GenEdC			---	.551(**)
GenEdF				---

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation Coefficients for the General Mathematics Statements. The Pearson Product coefficients for the Gen Math statements are slightly higher, ranging from .369 to .668, all significant at the .01 level (Table 11). These coefficients represent modest to strong relationships between the General Mathematics statements (listed below).

Statement G Teachers should take the extra time needed to incorporate the study of social issues into mathematics lessons.

Statement J Mathematics teachers have time to do both, teach mathematics effectively and have students investigate social injustices.

Statement K School mathematics should be used to analyze social injustices.

Statement L Mathematics is a tool that should make hidden injustices visible.

Statement M It is important that mathematics teachers shed light on social injustices.

Table 11.

Correlation Coefficients for the General Math Statements

	GenMathG	GenMathJ	GenMathK	GenMathL	GenMathM
GenMathG	---	.415(**)	.531(**)	.519(**)	.615(**)
GenMathJ		---	.499(**)	.422(**)	.369(**)
GenMathK			---	.668(**)	.516(**)
GenMathL				---	.587(**)
GenMathM					---

**. Correlation is significant at the 0.01 level (2-tailed).

Cronbach Alpha. Next I used Cronbach's Alpha to rate the internal consistency of the two normally distributed sets of data, the scenario means and the general mathematics statement means. Cronbach's Alpha can range from 0.00 to 1.00 with high numbers indicating higher levels of reliability. Gliner and Morgan (2000) state that Alphas fall within three ranges and associated levels of reliability; 0.00 – 0.30 represents a weak level of reliability, 0.30 – 0.70 is modest while 0.70 and above represents a strong reliability level. The scenario data had a very strong inter-item reliability of .92. Next I checked the internal reliability of the general mathematics statements and found a strong internal reliability alpha of .84.

Thus, the correlations for the classroom scenarios, the general mathematics statements and the general education statements all displayed medium to strong correlations. Taken together, the correlation and reliability data suggest that the survey instrument used to probe attitudes toward social justice education provided a consistent measure of those attitudes and the separate scenarios provoked similar, but not identical reactions.

Data Analysis

In this section I will discuss the eight outcome variables derived from analysis of the data. The variables (Table 12) include the means for each of five scenarios, the overall scenario mean and the Factor Score means for each of the two groups of SJE general statements. The data in this study was analyzed in two parts. I first analyzed responses to the classroom scenarios. Secondly, I analyzed the responses to the general education and mathematics statements.

Table 12.

Outcome Variables

	Variable	Mean	SD	Reliability Coefficient
1	Wage Disparity Mean	3.41	.64	NA
2	Liquor Store Mean	3.51	.79	NA
3	Gender Display Mean	3.56	.78	NA
4	Sweatshop Mean	3.71	.78	NA
5	Hunger Drive Mean	4.17	.68	NA
6	Overall Scenario Mean	3.67	.54	.915
7	General Ed Factor Score Mean	.000	1.00	.359-.601
8	General Math Factor Score Mean	.000	1.00	.837

Analysis of Survey.

Scenario Means. Given that each participant could have scored from 1 - 5 points on each of the 30 items, total scores could range from 30 to 150 points. The actual scores ranged from 60 to 145, with an average of 110.15.

The mean response for the individual scenarios ranged from 3.41 to 4.17. The Hunger Drive scenario, with a mean of 4.17, garnered the most support from the participants. Participants seemed to feel that this was a topic that all children could and

should be aware of. It was as if the prevailing thoughts concerning this scenario were those of merely benevolence and sharing with those less fortunate. Not that these sentiments are of little value but there did not seem to be any reflections concerning the social justice aspect of the situation. Three of the other four scenarios were all below the overall scenario mean of 3.71. Participants seemed least supportive of the Wage Disparity scenario (mean 3.41). Judging by comments written on the survey, the participants reported feeling that this issue was above the maturity level of most elementary children.

Table 13.

Descriptive Statistics Data for the Scenarios

Scenario	Mean	Lowest Score	Highest Score
Wage Disparity	3.41	1.33	4.83
Liquor Store	3.51	1.33	5.00
Gender Display	3.56	1.67	5.00
Sweat Shops	3.71	1.83	5.00
Hunger Drive	4.17	2.17	5.00

General Statements Mean Responses. The histograms below (Figure 3) demonstrate that the factor scores for the GMFS (listed as A-R factor score 1 for analysis 7 on histogram) were normally distributed, ranging from -3.82 to 2.26 with a mean of .000. The GEFS (listed as A-R factor score 2 for analysis 7 on histogram) were not normally distributed. These scores ranged from -2.93 to 1.65 (see Table 14). Therefore non-parametric tools had to be utilized to answer some of the research questions. SPSS tools of Independent t-tests and ANOVAS were employed to compare means of the normally

distributed data items. Non-parametric tests utilized were the Mann-Whitney rank sum test, the Kruskal-Wallis test and the Spearman rank correlation test.

Figure 3. Histograms, Distribution of Factor Scores

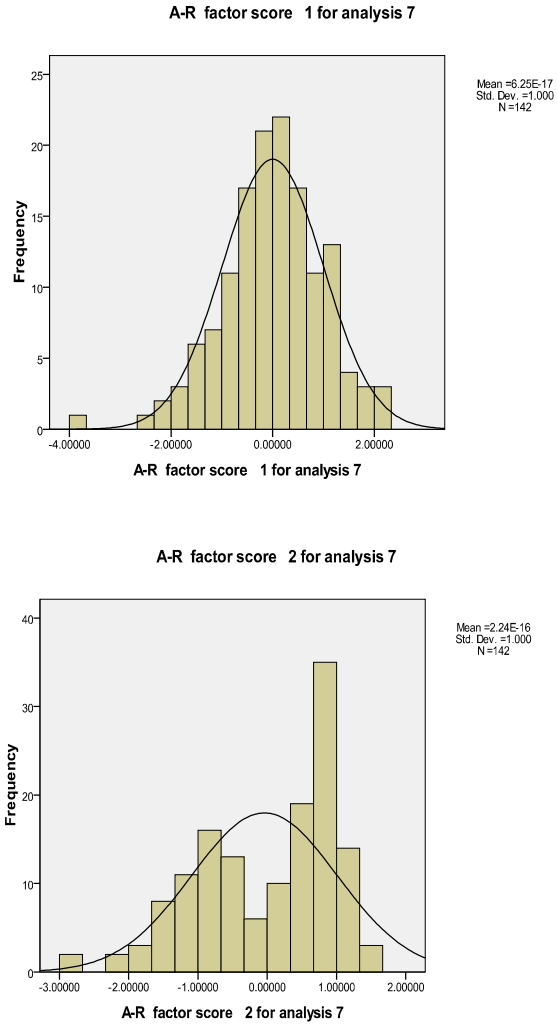


Table 14.

Factor Score Ranges and Means

	GMFS	GEFS
Valid N	142	142
Missing N	69	69
Mean	0.0	0.0
Minimum	-3.82	-2.93
Maximum	2.26	1.65

Although I derived eight outcome variables from my analysis of the data collected, to further discuss participants' response to the survey, I focused on three outcomes, 1) the scenarios as a whole, using overall scenario means, 2) the general education factor scores (GEFS), and 3) the general mathematics factor scores (GMFS). To analyze the means for the normally distributed data, Scenario Means and GMFS, I used independent T-Tests for the independent variables that had only 2 levels (age groups, gender, receipt of Pell grant, number of mathematics content courses taken, number of methods courses taken, and university attended) and ANOVAs for the independent variables that had more than 2 levels (number of diversity courses taken and racial groups).

To analyze the means of the data for the GEFS, which were not normally distributed, I used the non-parametric tests of Mann–Whitney for the two level independent variables and the Kruskal-Wallis for the ones with more than 2 levels.

Significant Differences between Mean Responses.

The data revealed significant differences between the scenario, GEFS and GMFS mean responses based on the number of diversity courses taken. The difference between the scenario means based on whether the participant had taken the mathematics methods

courses was also significant. Finally, when grouped by university type, there were significant differences between the scenario means and the GEFS means.

There were no significant differences found among any of the means for the independent variables of race, age, socio-economic level, number of content courses taken. Accordingly, variables that demonstrated significant differences between means will be discussed in depth but only brief attention will be given to variables for which there were no significant differences found. The analysis will follow the order of the sub-questions as presented in chapter 1.

Analysis by Sub-questions.

Sub-question: 1.1. How do reported attitudes and beliefs differ among participants by race?

White pre-service teachers were the only racial group whose average response was above the overall scenario mean of 3.67. The mean response for White participants was 3.74. Participants in the group labeled Other had a mean of 3.60. The mean for Black participants was 3.16. Table 15 demonstrates the breakdown, by percent, of how each racial group scored in reference to the overall scenario mean (3.67), the general mathematics factor score mean (0.00) and the general education factor score mean (0.00). Although a higher percentage of White participants scored above the mean in 2 of the 3 categories, the ANOVA revealed no significant differences between the means in any of the categories.

Table 15.

Mean Overall Scenario Mean

Race	Scenario Mean	GEFS Mean	GMFS Mean
Other	3.60	0.132	-0.099
Black	3.16	-0.192	-0.985
White	3.74	-0.039	0.827

Sub-question: 1.2. How do reported attitudes and beliefs differ among participants by age?

The overall scenario mean response for the 18 to 22 age group was 3.62 while the older group, 23 to 53, had a mean response of 3.76. Therefore the mean response of the younger participants to the scenarios was slightly below the overall mean of 3.67 while that of the older participants was above the mean. The younger group of participants also scored below the mean for both the general education and the general math factor score means (-0.794, -0.962, respectively) while just the opposite was true for the older group of participants (1.672, 1.670).

Further insight into this sub-question was provided by conducting an Independent T-tests and the Mann-Whitney test comparing responses of older and younger pre-service teachers to the classroom scenarios, the general education and the general mathematics statements. The tests revealed that there were no significant differences between mean responses of the two age groups.

Sub-question: 1.3. How do reported attitudes and beliefs differ among participants by socioeconomic level?

Socioeconomic levels were approximated by whether or not the participant received a Pell Grant. The pre-service teachers who had not received a Pell Grant (N=103) were only slightly more favorable to the pedagogy depicted by the scenarios (mean response of 3.69, above the overall mean of 3.67) than those who had not (N= 45), mean response of 3.63. Both groups fell below the factor score means for both the general education factor score means (-0.962, -0.233, respectively) and the general math factor score means (-0.794, -0.317, respectively). Again, Independent T-Tests and the Mann-Whitney test confirmed that there was no significant difference between any of these means.

Sub-question: 1.4. How do reported attitudes and beliefs differ as a result of mathematics content and methods course experiences by participants?

Mathematics Content Course. I found that the three means for participants who had taken from zero to one mathematics course were 3.71 (above the scenario mean), 0.194 (above the GEFS mean) and 1.25 (above the GMFS mean). Their counterparts who had taken 2 or more math content courses scored lower than the means (3.65, -0.962 and -0.794, respectively). The mean of 3.65 was just below the overall scenario mean of 3.67. Statistical tests revealed that while there were no significant differences found in the mean responses to any of the three outcomes.

Mathematics Methods Course. The pre-service teachers who had not taken the methods course scored means of 3.59 (below the overall scenario means), -0.551 (below the GEFS mean) and 0.834 (above the GMFS mean). With respective means of 3.81, -0.551, and -

0.794, those who had taken the math methods course were only slightly above the scenario mean but below both the GEFS mean and the GMFS mean.

Table 16.

Mean Responses by Methods Course Completion

# Methods Courses	Scenario Mean	GEF S Mean	GMFS Mean
	3.67	.000	.000
0 courses	3.59	-0.551	0.834
1 course	3.81	-0.551	0.794

As this was a two level variable (either they had or had not taken the course) and the data was normally distributed, I used an Independent T-Test (Table 17) to ascertain significance amongst differences of mean responses.

The test results revealed only one significant difference. That significance was found between the scenario means, but not for the GEFS mean or the GMFS mean. The results from the T-Test (see below) demonstrate a significance of .016 between the mean response of 3.59 for those who had yet to take the Methods course and 3.81 for those who had already taken the course. Therefore it seems that information learned in the Mathematics Methods courses may make one more supportive of the roles that math teachers and school should play in the promotion of student social agency.

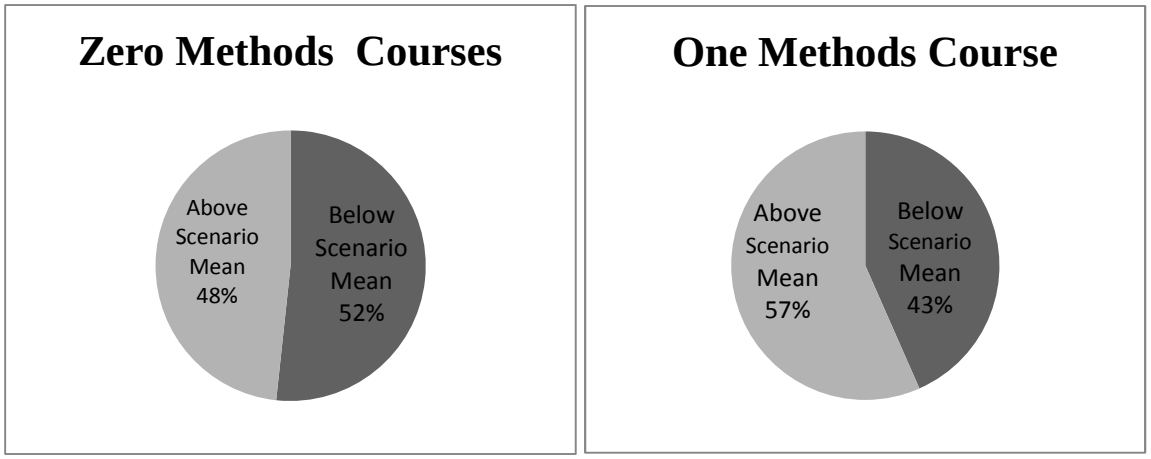
Table 17.

Independent T-Tests of Scenario Responses by Methods Courses

Methods Course	No. of Cases	Mean	S.D.	t-Value	df	2-Tail Sig.
No	87	3.59	.522	-2.439	139	.016
Yes	54	3.81	.545			

Figure 4 below reveals that 57% of the participants who scored above the scenario means had completed the required math methods course while 52% of those who scored below the means had not taken the methods course.

Figure 4. Scenario Means, Grouped by Methods Course



Sub-question: 1.5. How do reported attitudes and beliefs differ by type of college or university in which participants are being prepared for teaching careers?

Participants attending TWIs seemed to be more supportive of incorporating social justice into mathematics lessons. They obtained higher mean responses on all three portions of the survey compared to their counterparts attending HBCUs. The three means for participants attending a TWI were 3.77 (above the scenario mean of 3.67), .201 (above

the GEFS mean of .000) and .103 (above the GMFS mean of .000). Participants attending HBCUs scored 3.41, -0.478 and -0.245, respectively, each well below the means. The data are displayed in Table 18 below. Statistical tests (shown below) revealed that there were significant differences found in the mean responses all three of the survey sections.

Table 18.

Mean Responses by University Type

Univ.	Scenario Mean	GEF S Mean	GMFS Mean
	3.67	.000	.000
TWI	3.77	.201	.103
HBCU	3.41	-0.478	-0.245

Given that the majority of the students at the TWIs were White and those at the HBCUs were Black, I sought to investigate whether the differences in means were related to race or university. A Factorial Anova (Table 19) was conducted and the findings revealed that the significant differences were not related to race, but in fact were related to univeristy type only.

Table 19.

Factorial ANOVA University by Race

Scenario Means, Tests of Between-Subject Effects

	Type III Sum of Squares	df	F	Sig.
Universities	1.961	1	7.14	.008

Races	.202	2	.368	.693
Univ*Race	.002	2	.003	.997

a. R Squared = .092 (Adjusted R Squared = .059)

From Table 20 we see the scenario means by race groups at each university type. As each racial group has higher means at TWI as opposed to HBCU, it seems that it is University Type and not Race group that makes the difference. Furthermore, the interaction effect of race and university was not significant.

Table 20.

Scenario Mean, University by Race Groups

Race	Scenario Mean
TWI	
Other	3.71
Black	3.84
White	3.76
HBCU	
Other	3.30
Black	3.43
White	3.37

Table 21 and Figure 5 disclose that almost 60% of the participants at the TWIs compared to approximately 33% of HBCU participants scored above the mean for the

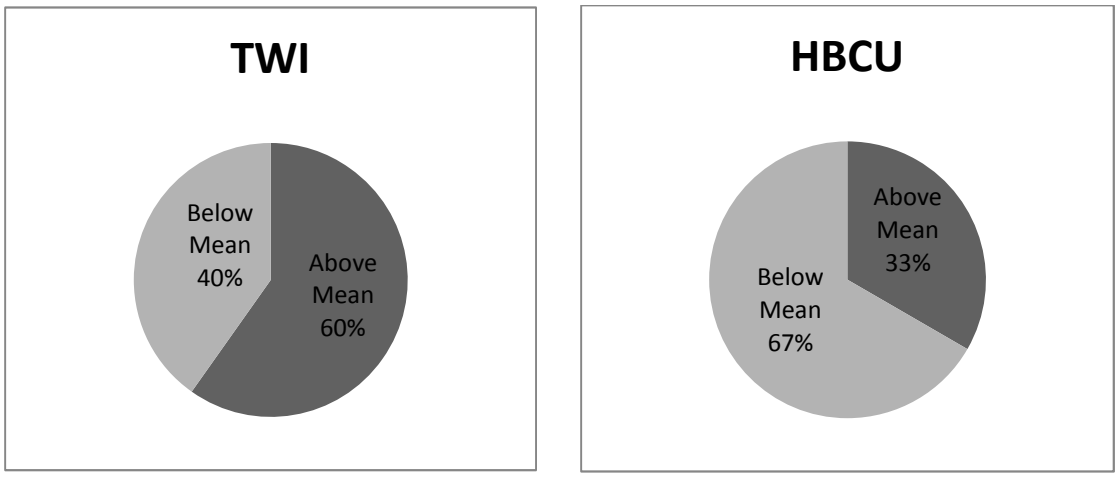
responses to the scenario statements with a significance of .000. Conversely, the majority (almost 67%) of the participants at the HBCU's scored below the scenario means.

Table 21.

Percent Above/Below Scenario Mean when Grouped by University

Most Supportive of SJE – Above Mean			Least Supportive of SJE – Below Mean			
Univ.	N	%	Univ	N	%	Total Univ %
TWI	61	59.8%	TWI	41	40.2%	100%
HBCU	12	33.3%	HBCU	24	66.7%	100%

Figure 5. Percent Above/Below Scenario Means, Grouped by University



General Education Factor Scores. A Mann-Whitney test (Table 22) was conducted to determine whether there was a significant difference between the mean responses for participants according to the type of university attended. The TWI participants had an average rank of 78.97 while their counterparts at the HBCUs had an average rank of 53.71. The z score of -3.339 is significant at the .05 level.

Table 22. Mann –

Mann – Whitney Test for GEFS by University Type

Univ. Type	No. of Cases	Mean Rank	Z -Value	Sig. 2-Tail
TWI	100	78.97	-3.339	.001
HBCU	42	53.71		

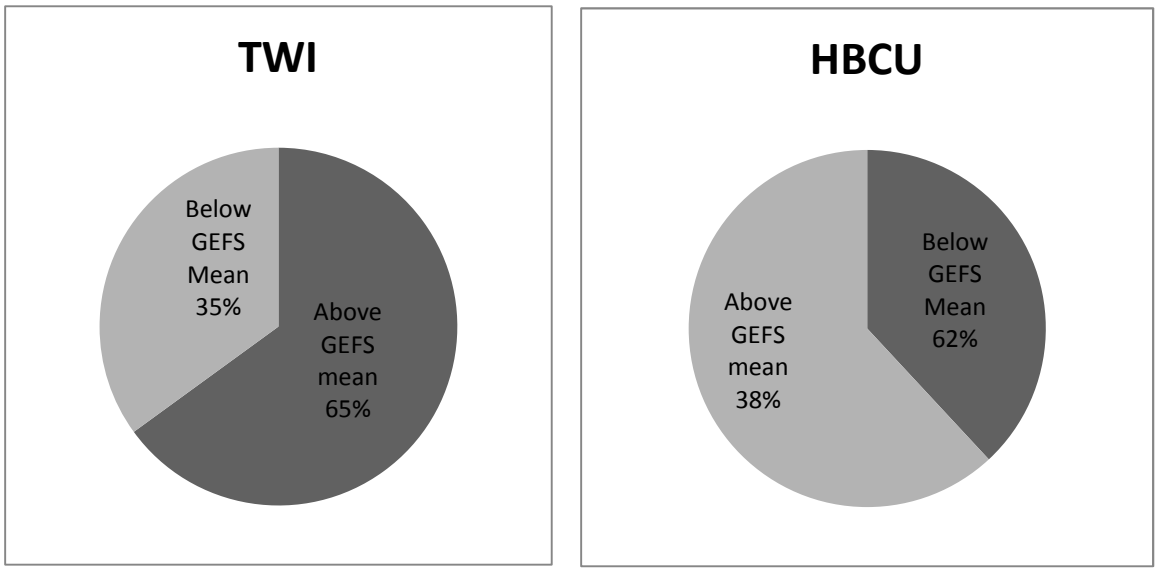
Looking across the participants at each type of university I found that 65% of the participants at TWIs scored above the mean while only about 38% of the participants at HBCUs scored above the mean (Table 23 and Figure 6).

Table 23.

Percent Above/Below GEFS when Grouped by University

Univ.	No.	%	Univ.	No.	%	Total Univ %
Above Mean			Below Mean			
TWI	65	65%	TWI	35	35%	100%
HBCU	16	38%	HBCU	26	62%	100%

Figure 6. Percent Above/Below GEFS, Grouped by University



Students at the predominantly White institutions seemed to be more agreeable to teaching mathematics with a social justice lens. This fact somewhat contrasts the expectations of Montecinos and Rios (1999) who expected that people of color (which, as expected, were the overwhelming majority of participants at the HBCUs) would be more apt to see social justice education as a means to correct societal injustices because they themselves have possibly faced unwarranted adversities throughout their lives.

Sub-question: 1.6. How do reported attitudes and beliefs differ as a result of experience by participants in a diversity course?

The purpose of this question was to gauge differences between responses based on experiences and knowledge received in diversity courses. Humphreys (1997) described diversity courses as those that address issues of socioeconomics or race or class or gender or sexual orientation, or any other institutionalized systems of inequality. Most of the

participants in this study reported having taken two or less such courses. Another seven reported taking 3 or more diversity courses. For the purposes of data analysis, these seven participants were included in the group that took two diversity courses. As a result the analysis examined responses by those who took zero diversity courses, one course, and two or more diversity courses.

The mean responses for the group that did not take a diversity course (n=63) were 3.52 (survey mean), -0.321 (GEFS), and -0.085 (GMFS). For those with one diversity course (n=52) the means were 3.66 (survey mean), 0.148 (GEFS), and -0.186 (GMFS). Five of the 6 aforementioned means were below the overall means in the respective categories. For students who had taken two or more diversity courses (n=28), the means were 4.05 (survey mean), 0.485 (GEFS), and 0.524 (GMFS). Each of these means is above the overall means in the respective categories (Table 24).

Table 24.

Mean Responses by Diversity Course Completion

# Diversity Courses	Scenario Mean	GEFS Mean	GMFS Mean
	3.67	.000	.000
0 courses	3.52	-0.321	-0.085
1 course	3.81	-0.551	0.794
≥ 2 courses	4.05	0.485	0.524

Scenario Means. The ANOVA (Table 25) confirms that there was a significant difference between the scenario means of the groups. I sought to further investigate the differences. The Sheffe Post Hoc (Table 26) revealed further that there was a significant

difference, at the .05 level, between the responses of pre-service teachers who had taken no diversity courses and those who had taken two or more diversity courses as well as between those who had taken only one diversity course and those who had taken two or more diversity courses.

Table 25.

ANOVA for Scenario Means when Grouped by Diversity Course Completion

	df	Sum of Squares	Mean Squares	F	Sig.
Between Groups	2	5.178	2.589	10.07	.000***
Within Groups	138	35.705	.259		

*** 0.05 significance level

Table 26.

Scheffe Post Hoc for Scenario Means when grouped by Diversity Course Completion

Independent Variable			Mean Difference	Sig.
# Diversity Courses	(I) DIV	J) DIV	(I – J)	
	no courses	one course	-.13762	.321
	no courses	two courses	-.52992	.000**
	one course	two courses	-.39231	.005**

** The mean difference is significant at the .05 level.

From Table 27 we see that out of the 74 participants who scored above the scenario means, 48, which is about 65%, of the participants had taken at least one diversity course. Of the participants who had not taken a diversity course, 58% scored below the scenario

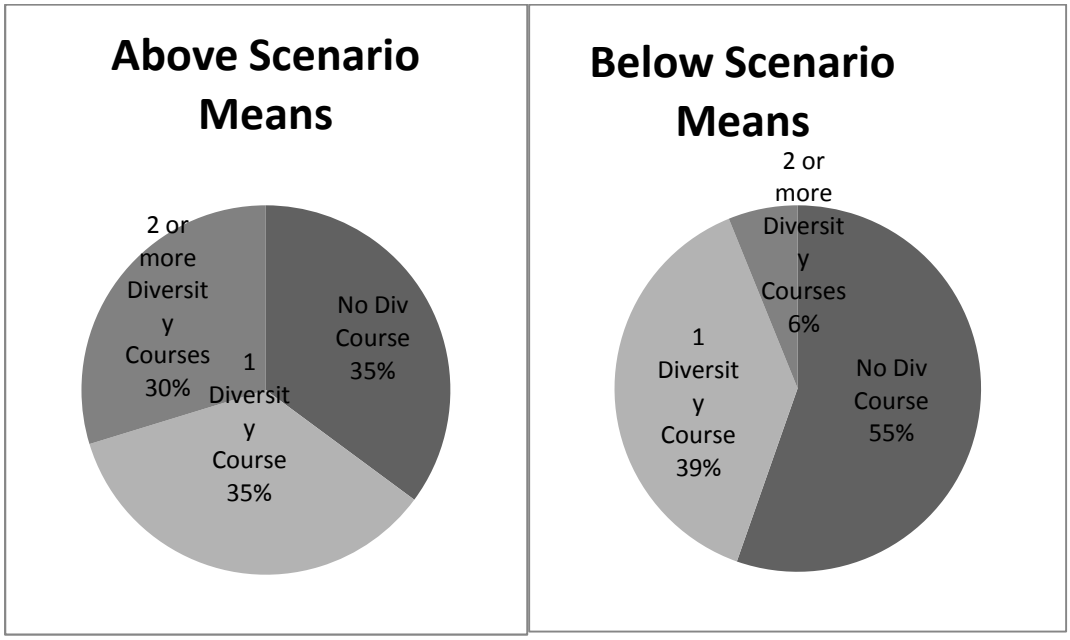
means. Figure 7 further illustrates the division of participants as far as the scenario means is concerned.

Table 27.

Scenario Means when Grouped by Number of Diversity Courses

Most Supportive Above Scenario Mean			Least Supportive Below Scenario Mean		
# Div	n	%	# Div	n	%
0	26	35.0%	0	36	55.0%
1	26	35.0%	1	25	39.0.0%
2	22	30.0%	2	4	6.0%
Total %		100%			100%

Figure 7. Diversity Courses, Grouped by Above/Below Scenario Means



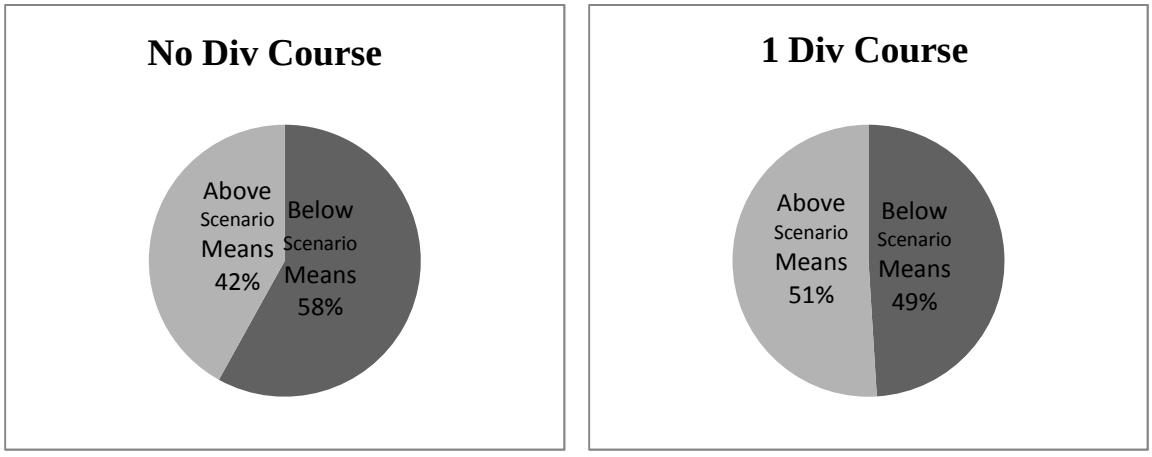
I also examined the diversity data by looking across the number of courses reported. Participants who had taken less than 2 diversity courses were almost split evenly above and below the scenario means. Conversely, 84% of the students who reported 2 or more diversity courses scored above the scenario means. This data is illustrated both in Table 28 and Figure 8.

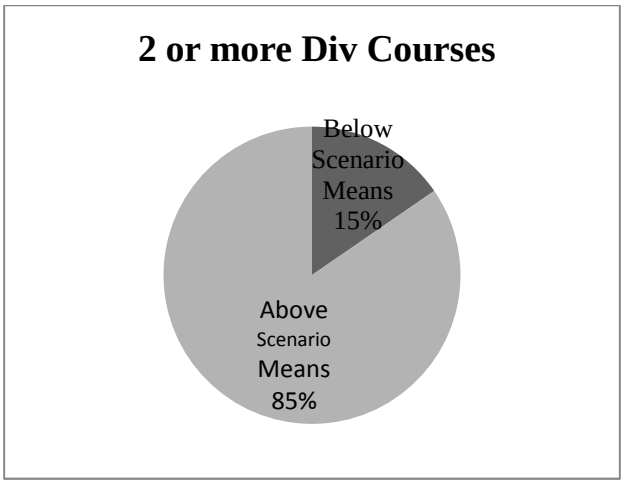
Table 28.

Scenario Mean Across the Number of Diversity Courses

	Most Supportive Above Scenario Mean			Least Supportive Below Scenario Mean			
	#.	n	%	#	n	%	Total %
	0	26	42.0%	0	36	58.0%	100%
	1	26	51.0%	1	25	49.0%	100%
	2	22	84.0%	2	4	6.0%	100%

Figure 8. Scenario Means across Number of Diversity Courses





General Education Factor Scores. As the GEFS means are not normally distributed a Kruskal-Wallis test was conducted. The results from the Kruskal-Wallis test are shown in Table 29. The data revealed that there was a significant difference between the mean responses for participants according to the number of diversity courses taken. Participants who had not taken a course had a mean rank of 58.18, those with 1 course had a mean rank of 78.35 and finally, those with 2 or more courses had a mean rank of 90.43. The test revealed these differences to be significant.

Table 29.

Kruskal-Wallis Test for GEFS when Grouped by Number of Diversity Courses

# Div	n	Mean Rank	D.F	Sig.
0	65	58.18		
1	49	78.35	2	.001
2	28	90.43		

From table 30 we see that out of the 81 participants that scored above the scenario means, 52, or about 64%, had taken at least one diversity course. Of the participants who

had not taken a diversity course, 59% scored below the scenario means. A mere 8% of those with 2 or more diversity courses scored below the GEFS mean. Figure 9 further illustrates the division of participants for the GEFS mean when group by diversity courses taken.

Table 30.

GEFS Means when Grouped by Number Diversity Courses

No. Div Courses	N	%		Univ. Div Courses	N	%	
Above Mean				Below Mean			
0	29	36%		0	36	59%	
1	29	36%		1	20	33%	
2	23	28%		2	5	8%	
Total %			100%				100%

Figure 9. GEFS Means, Grouped by Diversity Courses

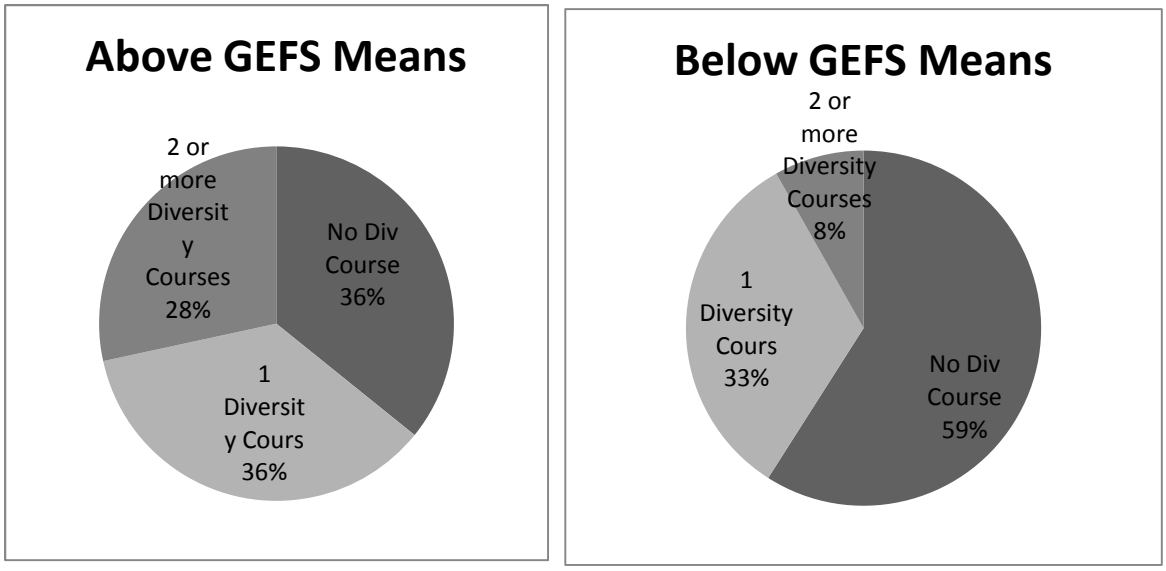


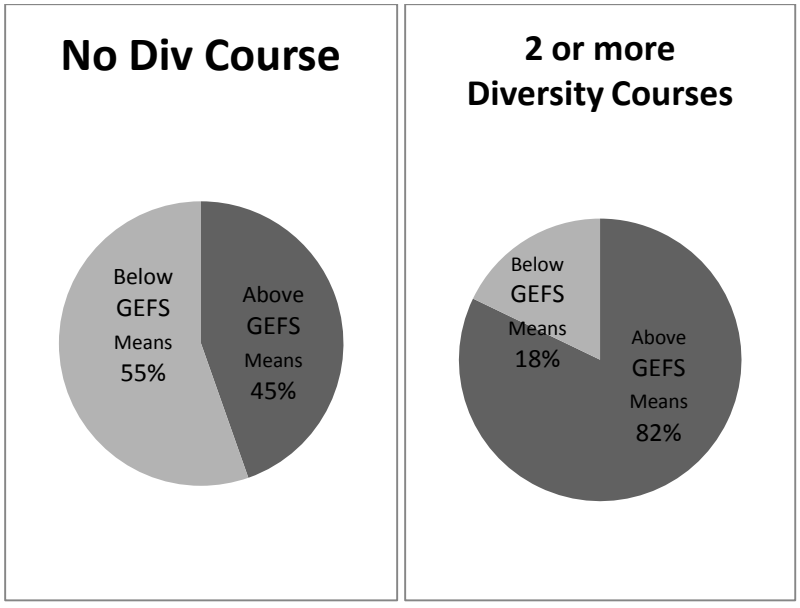
Table 31 and Figure 10 shows us that in looking across the number of diversity courses, 82% of the participants who had taken 2 or more diversity courses scored above the GEFS mean of .000. On the contrary, 55% of those who had not taken a diversity course scored below the mean.

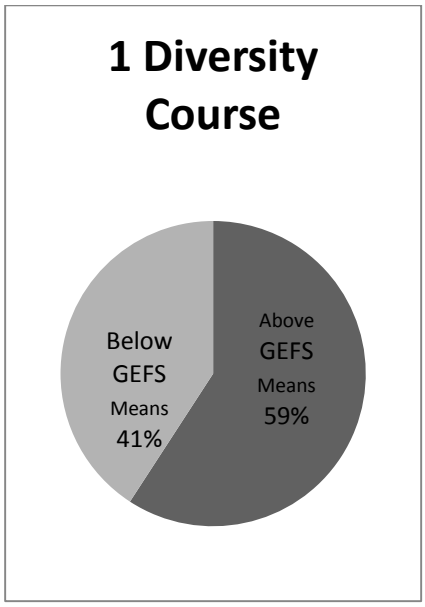
Table 31.

Number of Diversity Courses When Grouped by GEFS Mean

# Div	N	%	#. Div	N	%	Total % per #
Above Mean			Below Mean			
0	29	45%	0	36	55%	100%
1	29	59%	1	20	41%	100%
2	23	82%	2	5	18%	100%

Figure 10. Diversity Courses, Grouped by GEFS Mean





General Mathematics Factor Scores. The ANOVA, see Table 32, confirms that there was a significant difference between groups. I sought to further investigate the differences. Just like with the scenario mean responses, the Sheffe Post Hoc revealed that there was a significant difference, at the .05 level, between the responses of pre-service teachers who had taken no diversity courses and those who had taken two or more diversity courses as well as between those who had taken only one diversity course and those who had taken two or more diversity courses. Once again, favorability towards SJE increased as the number of diversity courses increased.

Table 32.

ANOVA for GFMS by Diversity Course Completion

	df	Sum of Squares	Mean Square	F	Sig.
Between Groups	2	9.866	4.933	5.229	.006***
Within Groups	139	131.134	.943		

*** 0.05 significance level

Table 33 demonstrates that 58% of the participants who had completed at least 1 diversity course scored above the general mathematics factor score mean while 49% of those who did not take a diversity course scored below the mean.

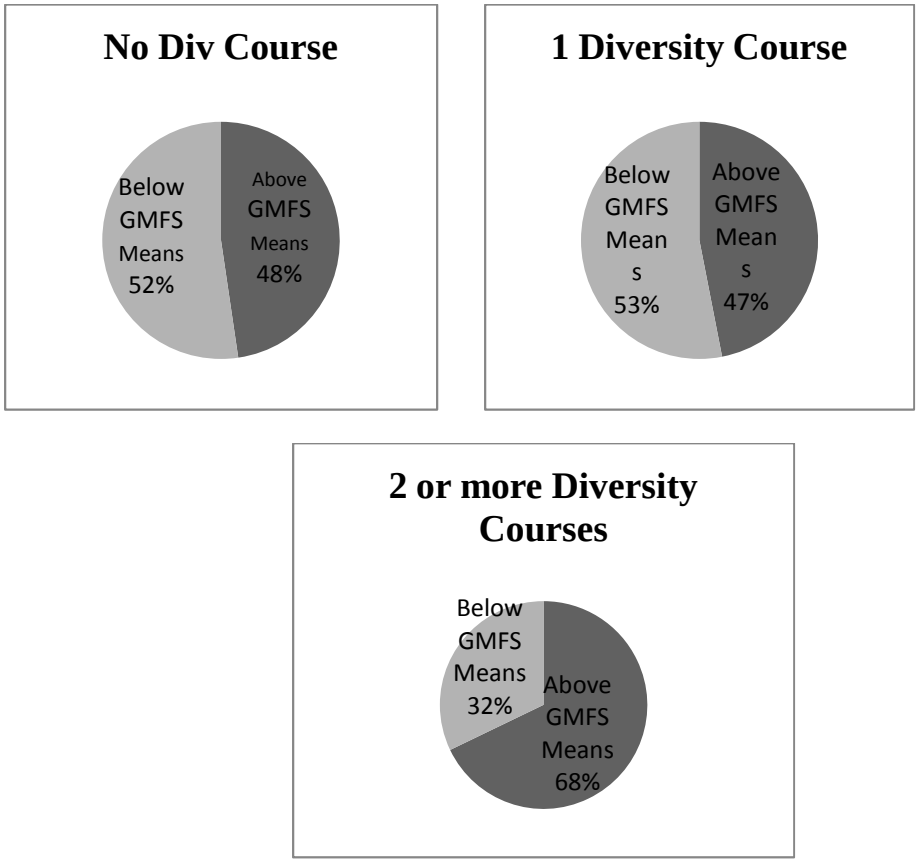
Table 33.

GMFS Mean when Grouped by Number Diversity Courses

# Div	n	%	# Div	n	%
Above Mean			Below Mean		
0	31	42%	0	34	49%
1	23	32%	1	26	38%
2	19	26%	2	9	13%

Further, Figure 11 shows that those who had completed 1 or no diversity courses were split quite evenly above and below the mean while within the group with 2 or more diversity courses, the number that scored above the means is more than twice that of those who scored below the mean.

Figure 11. GMFS Mean, Grouped by Diversity Courses



In summary, diversity courses seemed to make a difference in how participants ranked on each of the three sections of the survey; the more diversity courses taken the more participants seemed to favor teaching mathematics with a social justice lens.

Summary of Quantitative Analysis

Of the six sub-questions, the data revealed significant differences between the scenario, GEFS and GMFS mean responses based on the number of diversity courses taken. The difference between the scenario means based on whether the participant had taken the mathematics methods courses was also significant. Finally, when grouped by university type, there were significant differences between the scenario means and the GEFS means. Table 34 provides data on significant differences found.

Table 34.

Outcome Table of Significant Differences

Variable	Overall Scenario Mean	GEFS	GMFS
Race	NO	NO	NO
Age	NO	NO	NO
SES	NO	NO	NO
# Content Courses	NO	NO	NO
# Methods Courses	YES	NO	NO
# Diversity Courses	YES	YES	YES
Type University	YES	YES	NO

The quantitative data reported above drove the qualitative analysis. In the following section I will report on trends and themes found in the interviews concerning the areas in which significant differences were found.

Qualitative Analysis

Through the quantitative analysis I discovered overall means associated with survey responses. That data provided answers to my first research question and the associated six sub-questions. The survey responses from 148 pre-service elementary teachers gave an overall picture of their receptiveness to mathematics instruction influenced by a social justice perspective.

Analysis of interviews of the subset of ten pre-service elementary teachers sought to gain deeper insight into pre-service teachers' perspectives related to SJE in the classroom, and to identify life experiences and circumstances that may have shaped those perspectives.

The qualitative analysis of the ten interviews is structured as follows. First, I present a discussion of how I ranked and grouped the ten participants into two groups: least supportive of incorporating social justice into mathematics lessons and most supportive of incorporating social justice into mathematics lessons. Following that I analyze the interviews by the six themes (Current State of Education; Pre-service Teacher Knowledge of Social Justice Education; Pre-service Teacher Attitudes towards Social Justice Education; Being Politically Neutral; Appropriate Social Activism; and Children's Knowledge of Injustices). I look at each theme in terms of responses from both the least supportive and the most supportive interviewees, respectively. Lastly, I examined interview data in relation to findings of significant differences in the quantitative analysis to determine if themes emerged in interviews related to the type of university pre-service teachers attend, and the role of coursework (methods and diversity courses) in shaping perspectives on SJE.

Ranking the Interviewees. As the five scenarios were the major portion of the survey, interviewees were grouped by whether or not they scored above or below the overall scenario mean of 3.67. Those who scored above the scenario mean are hereafter called the Most Supportive group while those who scored below are called the Least Supportive group.

The Least Supportive group consists of Alice, Bee, Chante, Dora and Eric; their scenario means ranged from 2.8 to 3.5. Members of the Most Supportive are Fran, Hazel, Gayle, Iris and John; their means ranged from 4.1 to 4.8.

Analysis by the Six Interview Themes

In this section of this analysis I have grouped the interviewees by their survey mean (labeled Least Supportive for those below the survey mean and MOST Supportive for those above the mean) and provided a synopsis of comments made during the interview for each of the six interview themes.

Status of Education. The focus behind many educational reform efforts is to help the multitude of students who have been traditionally marginalized by the current system; a system that functions in a way that continually relegates this group of students to the margins of life where they seldom rise above the level of their parents. In this way, education keeps the status quo going, generation after generation. This topic was asked during interviews to allow participants to expand on their responses on the survey.

***Least Supportive of SJE*.** Members of this group did not agree that education perpetuated the status quo. They felt that students who did not do well in school did not have an emphasis on education at home. One interviewee did feel that in the absence of home emphasis, it was the teachers' job to make students see the importance of education.

Take Eric for example (23 year old white male who was attending an HBCU, 2 mathematics content, 0 mathematics methods, and 1 diversity courses). Eric totally disagreed with the concept of education determining status in life. He unequivocally stated that "it's the parents who are the ones that push the children not the teacher". He offered his family life as an example. Although his father had periods of unemployment as they were growing up, each of Eric's siblings graduated from high school and went on to successfully matriculate college and land successful careers.

He further elaborated his point that parents drive students' educational focus. "You can go to the PTA meeting of any school in this county and see the number of parents that are there and I guarantee that the number of parents correlates to the number of students who achieve basic of proficient or advance on their MSAs. That's not to say that the PTA has anything to do with the grades but its parent involvement does."

Dora (28 year old Asian American female attending an HBCU, 2 mathematics content, 0 mathematics methods courses, and 0 diversity courses) agreed in part that the push to do well in school should come from parents and often does not. However, she also felt that "part of the teacher's job is to make them (students) see how it (education) works."

Most Supportive of SJE. Although he was responding to the question of teacher neutrality, John (36 year old Caucasian male attending a TWI, 3 mathematics content, 2 mathematics methods, and 1 diversity courses) made a salient remark about education that has to do with the claim about it perpetuating the status quo. "…and I think that's the danger of being a teacher and believing that you are neutral because you are a part of this dominant machine that is just turning out more people to… churning out grist for the mill, just fuel for the machine, just spitting out people to do the least they can do. Not helping them to reflect on what things could be or what they could become if they could see a broader spectrum."

Prior Knowledge of SJE. My interest was in determining if participants already knew about SJE and how they may have learned about teaching in this manner. It also seemed equally important to probe levels of understanding about social justice education the pre-service teachers may have gained from being introduced to the pedagogy by the scenarios in the survey.

Least Supportive of SJE. Without exception, the group of interviewees stated that they had no prior knowledge of Social Justice Education before the survey. One student said that's why her survey responses were so neutral. A second student stated that it seemed odd to him that he had not heard of SJE before since his previous major was Criminal Justice.

Most Supportive of SJE. Only one of the five interviewees in this group, John, had prior knowledge of SJE. In addition to his own existing interest in social justice, which had been stimulated as a child by his mother, he credits his current educational program as a source of this knowledge. SJE was a focus in two of his courses, a critical literacy and a diversity course. I expand on his experiences in the courses in the upcoming section on life experiences.

Although one member of this group, Fran, felt that SJE "would not affect the manner of teaching mathematics but it will make students realize that they do need mathematics in their life." Otherwise, members of this group felt that SJE would make major changes in the teaching and learning of mathematics. They felt that learning in this manner would "get students involved with the world that they are growing up in; interested about topics that affect them; help students to understand that no matter how young or old they are, they truly can make a difference in their world; take us away from traditional teaching; enable students to see math as it is connected to every subject in school; give them critical thinking skills in order to form their own opinions regarding their world and the larger world around them; see how math is relevant to everyday life; and create a community of learners where everyone felt safe to reveal the limits of their knowledge and grow together" (Gayle, Hazel, Iris).

Life Experiences that Determined Attitudes towards SJE. It is important to understand the types of experiences that led to the participant's current attitudes and beliefs about teaching mathematics through social justice issues.

Least Supportive of SJE. Seemingly contradictory to their survey means, several interviewees, who scored below the survey mean and thus seem less supportive of SJE, professed to somewhat negative life experiences that shaped their attitudes towards SJE. From their conversations, one would imagine them more supportive of SJE than their scores make them seem.

Alice (29 year African American female attending an HBCU,1 mathematics content, 0 mathematics methods, and 1 diversity courses) stipulates that her view was colored by growing up as a minority in the inner city. She mentioned the fact that throughout her schooling, she witnessed teachers paying lip-service to equality while failing to actually practice it. She went on to say, "So many unfair things happen to people based on their age, race, gender, income, and the area they live in [sic] and the duty of schools is to help students avoid that thinking when they get in the real world". It is just such comments that seem contradictory to the fact that her scenario mean (2.8) was considerably lower than the mean of 3.67 for all survey participants. Additionally, of the ten interviewees, hers was the lowest mean response.

In contrast Eric, whose scenario mean was 3.5, emphatically stated "We have had it drilled into our heads that education and schooling is a tool for social change. I think it comes to a point where I don't agree with that social change."

Most Supportive of SJE. Interviewees who seemed more supportive of SJE pointed to life experiences as well as courses they had taken as the reason they were more

supportive of SJE. The life experiences ranged from differences observed between schools based on location, growing up in the inner city versus the suburbs; dating a non-majority race member; thoughts on the purpose of education as well as lessons learned from parent's interest in giving back to society.

One supportive interviewee stated that she had had "experience with several schools, as a student, as a parent and as an educator". She said, "I have seen students & schools where I worked in higher socioeconomic areas, and then compared them to the schools where I lived in lower socioeconomic areas. I believe that SJE is needed for BOTH environments." (Iris, 38 year African American female attending a TWI,1 mathematics content, 0 mathematics methods, and 2 diversity courses).

Hazel's (43 year Caucasian female attending a TWI, 3 mathematics content, 1 mathematics methods, and 2 diversity courses) attitude toward SJE was shaped in part by a close relationship with a minority. "I dated a Russian guy. Through talking to him and his family I learned how unfair living in America can be. Foreign students have a lot on their plate. Learning English is not easy at all…and they are being taught in very unjust ways. The Social Justice lens for teaching is a more balanced way of teaching."

Hazel continues by saying she took a diversity course which made a difference. "This class was different because we actually looked at the diversity within schools. In this diversity class we worked with classroom scenarios and how we should handle the diversity within our classroom. We studied a lot of information that was common knowledge but the statistics that were pointed out were shocking. I was very unaware of how much teachers focus on the typical American holidays instead of those that are celebrated by today's minorities."

Furthermore, this interviewee stated that her feelings about diversity are also a result of practically every course in her major that she has taken at her university. “In every course I have had to take in our elementary education program we have to read about, talk about and write about teaching and what we will do in our own room. Many of the papers that were written focused on diversity within your own classroom.” From these experiences she has developed the feeling that “Education has been created free for everyone. Why should we teach to a specific person or even race? Everyone deserves to learn mathematics because it is an important part of daily living. Teaching mathematics through a Social Justice lens will allow all students to learn how others use math.”

John, the interviewee who had the highest mean response of all survey participants, a 4.8, commented on the various sources of his supportive attitude towards SJE. As he grew up, his “mother was (and still is) deeply involved. She worked for the Legal Aide Bureau and she defended abused and neglected children. I come from what I consider a position of privilege and she shared from the beginning that it was a position of privilege and you need to give something back. And I took that to heart.” He has worked several jobs that catered to the poor and the homeless.

John also credits two college courses he had taken as contributing to his attitude. The first course, a diversity course, concerned the history of and the biases of schooling. In this course he stated that the students also had to focus on their own biases. In the second course, a critical literacy course, they read the book ‘The Pedagogy of the Oppressed’ by Paolo Freire. In this class they discussed in depth links between ideology and education and “how education is often used to propagate a particular ideology.”

Appropriateness. The sub-themes that emerged for this group under the concept of appropriateness concerned the social issues; whether schools were the place to present the issues; the age of students as well as a combination of issue and age; and how SJE would improve society and the learning of mathematics.

Least Supportive of SJE. Eric kind of sums up most of the sub-themes by saying, You just have to be careful with things that you are exposing kids to that the parents would not want you to teach them. Like sex education in high school that is all of a sudden a taboo issue and all of the abstinence programs. Some of these hardships of life are a reality but how much do you want to expose them to it at a young age. And my issue is, do I want to be the one to expose them to it or should I wait for their parents to all expose them to it at one point and then as a teacher step in and continue that education. I feel that the teacher should be the first one to expose them to all these social issues but the parents should be and the parents should be given an abundant amount of time to work on all these social issues in the raising of their children before the school steps in and attempts to do it themselves (personal interview).

Appropriateness-Teacher Incompetence. Eric felt that teachers would not be competent enough to teach social issues. His primary concern was that teachers would not know enough to teach both sides of any issue. Instead the focus would be on what is 'bad' about the topic. For instance, teachers would focus on what is bad about sweatshops while not covering the benefits to the workers and to the consumers of the goods.

Appropriateness- Purpose of Schools. In reference to the purpose of education, Eric was adamant about schools usurping parental rights to expose their children to controversial issues in their own time frame. During the interview he stated several times

that as a teacher, he would not want to introduce controversial issues until his student's parents had done so. In fact his comment was, "I feel that the teacher shouldn't be the first one to expose them to all these social issues but the parents should be and the parents should be given an abundant amount of time to work on all these social issues in the raising of their children before the school steps in and attempts to do it themselves."

Appropriateness of Issue, Age Appropriateness. Several of the social issues in the survey were met with skepticism. By far, the issue involving liquor stores seemed to be the most unacceptable. Many participants thought that it was outrageous to teach children about liquor stores. They indicated that this would be introducing liquor stores to young children, a thought which to me points to the disconnect between many pre-service teachers and their potential charges. The existence of liquor stores in many neighborhoods is too pervasive for even elementary children to be unaware of.

On the other hand, no one objected to the Food Drive issue. In fact, this issue seemed to be considered merely a hunger drive with little reference to social activism. The issues of gender and wage disparity were considered to be beyond the maturity level of young children for this group.

Chante (20 year Caucasian female attending a TWI, 2 mathematics content, 0 mathematics methods, and 0 diversity courses) felt that children were too young to understand the impact of many injustices. She thought that the sweatshops scenario was an issue the children would misconstrue and wonder why the parents were not working. They would not understand that the children were working because that was the only way the families could get money to live.

She also thought that the innocence of children should be preserved. “At 2nd grade (they’re) too young for gender or racial injustice lessons. (They) won’t understand (the) true impact. (They) will recognize that persons (*sic*) getting better deals are different from them but won’t make the correlation between racism or social justice, won’t know that it happened because things are not fair” (Chante).

Appropriateness- Improve the learning of mathematics. In responding to the question, “How do you think teaching in this manner will affect the learning of mathematics?” Alice, the least supportive of the least supportive, replied that she did not think teaching with a social justice lens would affect the learning of mathematics because students already are enthusiastic about math or they are not and nothing will change that.

Others in the least supportive group, Bee and Dora, disagreed with her and further stated that teaching through social justice would enable students to learn math better, especially because they will be able to see the relevance of math in their lives. Dora stated “I think it might open up their (students) eyes more when you talk about the social injustices.”

Appropriateness- Improve Society. An interesting point about this group is that although they scored lower than the mean on the survey, the interview responses of four of them made them seem much more supportive of SJE than their scores indicate. Collectively, these four felt that SJE would have a positive effect on children because it would encourage learning in mathematics, encourage students to become social agents, and it would help student see the relevance of math in their lives. Alice stated that “If teachers highlight injustices in elementary classrooms it would present accurate pictures of the world the students live in and would encourage them to become social agents later in life”.

Most Supportive of SJE. Unlike their counterparts in the less supportive group, the interviewees in this group never expressed the feeling that schools were not a proper place to present social injustices. The Appropriateness sub-themes that emerged for this group were SJE improves society; improves the learning of math; highlights the relevance of math to students' lives; and creates social agency in young children. Members of this group agreed with the first group that the issues discussed should be age appropriate. For example, Fran (22 year African American female attending an HBCU, 1 mathematics content, 0 mathematics methods, and 0 diversity courses) felt that the innocence of young children should be preserved so the she opposed presenting wage, the liquor store and the sweatshop issues to children.

Appropriateness- Purpose of Schools. On the topic of the purpose of schools, Hazel felt that "schools are the place to generate active citizens so that when they get older they can take steps to eliminate injustices." In addition, John felt that it was a great idea to use education to "explore the conditions of a community, what different members of a community experience and how it turns up in the numbers." For instance, "What happens to the income of a family of four when we look at different ethnicities? The family size remains the same, it is a control. The ethnicity could be called an independent variable and the income changes become our data. The inferences we could make from that data would need to be guarded because I are not talking about lab experiments. These numbers are the result of personal and social histories that are irregular and chaotic." His intent would be to have students analyze the numbers and discuss the differences while not trying to lay blame anywhere

Appropriateness of Issue. While Gayle (21 year African American female attending a TWI, 3 mathematics content, 1 mathematics methods, and 1 diversity courses) gave many examples of how SJE would improve society and math learning she also is cautious about the topics presented. She stated "Although (sic) I would love to talk about all these issues in my classroom I think that there are many students that are aware of wage disparity from their parents, liquor stores in their neighborhood and hunger that even they may face. However some students may not have a concept of sweatshops and such. I would want to teach to what I know my students want to discuss or have questions about before raising new issues on my own which may be more difficult to justify to parents."

John asserted that his interest does not really concern particular social injustices but is more focused on "helping children develop a critical faculty, helping children see that there are issues that they can analyze. I am more interested in this shift in teaching children how to make the shift from the abstract thing on the page to analyzing the world around them."

John also felt that the topic of wages would be too abstract for third graders. He went further to say that for him, the particular issue discussed was not important, "Because there's lot we could talk about. For instance if someone (a parent) had an issue with race we could talk about something else, if someone had an issue about gender we could talk about something , the particular issues aren't such an important thing for me personally. I am more interested in helping children develop a critical faculty, helping children see that there are issues that they can analyze. I think that's the beauty of using SJE in math."

Appropriateness- Improve Learning of Mathematics. Fran stated that she would not try to avoid math today if her learning of math had been infused with social justice. She

stated, “I would know that I need math to accomplish many things instead of trying to find a different and probably longer way of accomplishing things”.

Several in this group felt that SJE would improve the thinking skills of children. Gayle believes that SJE will “give them (students) critical thinking skills in order to form their own opinions regarding their world and the larger world around them.”

Iris stated, “I believe that education should give them (students) critical thinking skills in order to form their own opinions regarding their world and the larger world around them. Once they have learned to form these opinions based on their knowledge, then the thought pattern has been set for life.”

Fran felt that she would have benefitted from SJE as a child. She said, “If I was taught social justice education math instead of traditional math I would not avoid it like I do today; it will make students realize that they do need mathematics in their life. Because most students today, myself (*sic*) included, feel like you don’t really need math to survive in the real world.” For Gayle, teaching math with a social justice lens “forces the students to be more minds on and active in the classroom discussion and activities; promotes cross curricular teaching.”

According to Iris, the achievement gap in math could eventually be closed if SJE were a major focus in schools. She said “The social justice philosophy could change the cultural and socio economic dynamics of American society. Studies show a gap in cultural achievement of mathematical skills. This applies directly to socioeconomic status in a given area, which generally translates to culture. Culture reflects environment, and affects aspects including learning style, or comfort level within a specific area. Making

mathematics a more understandable concept would allow mathematical achievement to be more accessible cross culturally."

Appropriateness- Improve Society. Each of the five members of this group expressed the idea that incorporating social justice in math classes would lead to improvements in society. They made comments such as "They (elementary students would) know effective methods of trying to change what they think is wrong in their world (Fran); I think it will also help students to understand that no matter how young or old they are, they truly can make a difference in their world (Gayle); This way of education is striving to create a balance in our unjust world; Students will still learn the required material. However, they will also learn how to be equal and fair" (Hazel).

Iris said "The social justice philosophy could change the cultural and socio economic dynamics of American society", while Hazel felt "This way of education is striving to create a balance in our unjust world." Gayle's belief is that, "By teaching SJE, students will be able to be able to stand up for themselves and their rights as they get older, with the knowledge and background they receive in younger grades. I think it will also help students to understand that no matter how young or old they are they truly can make a difference in their world, which students need to understand."

Neutrality of Teachers. The very nature of teaching with a social justice lens requires the use of what may be considered by some to be controversial social issues. We sought to explore the extent to which participants felt teachers should discuss such issues in the classroom.

Least Supportive of SJE. This group's concept of neutrality varied from being political to just presenting all sides of any topic. Alice stated that "It is not our job to teach

children politics. If they want that they can get it from their parents. It's our job to educate them and make them book smart. It's our job to educate them about life and the things that may come along with it….however….getting involved in any sort of politics is a very shaky area and it should be left to that child to decide when he/she is at the legal age to vote and make a difference." Another interviewee stated that teachers should be neutral so that students can form their own political opinions. This last concept of neutrality might have been fueled by the 2008 presidential race.

Chante believes that "Being politically neutral depends on what age you are talking about, high school or middle school… it means presenting both sides of the argument. There is a difference between campaigning in a classroom and educating in a classroom. I think that it might be important for upper level middle schoolers (*sic*) and high schoolers to be educated on what's going on in the world. The liquor store scenario is not political I think that's community well being." Bee's concept of teacher neutrality was tied to politics. She felt teachers should allow students to form their own political opinions.

Others in the less supportive group believed that it is impossible to be neutral as a teacher. For instance, Eric declares that, "Neutral is impossible. Seeing the obvious two sides of an argument and presenting both, I think is a necessity for teachers." He goes on to say that being neutral is impossible for teachers because they are not educated enough on these controversial topics to enable them to present both sides of any of the issues and therein, for him, lies the problem with trying to teach with a social justice lens. For when teachers one-sidedly present such issues, that's exactly what students will believe since whatever a teacher says carries great weight with most students.

Most Supportive of SJE. A few of the students in this group also felt that neutrality concerned politics. This is evidenced by a comment made by Hazel, "Teachers can be socially just without politics. It is the teacher's job to keep their beliefs out of the classroom." Iris disagrees that she would present the issues one-sidely. She contends that "If I taught in this manner it would not be indoctrinating students with my own political beliefs at all. I am providing my students with the information that they need in order to make an informed decision for themselves."

Still another supportive interviewee, John, felt that teachers could be neutral but in doing so would be to promote educational status quo. He asserts that "Critical thinking skills are the most important educational tools I can provide my students with (*sic*). By being neutral you simply adopt the dominant ideology and propagate that and I think that's the danger of being a teacher and believing that you are neutral because you are a part of this dominant machine that is just turning out more people to... just churning out grist for the mill, just fuel for the machine, just spitting out people to do the least they can do. Not helping them to reflect on what things could be or what they could become if they could see a broader spectrum.

Children's Knowledge of Injustice. Members of both groups felt that young children have a range of knowledge of injustices. As a whole the interviewees felt that children recognize early on the different things available or not available to them due to their gender. For instance in pre-school there are girly things (kitchen play) that are acceptable for one gender and not the other. Later on boys are pushed towards sports but girls are not.

Most felt that, even though children may experience the prejudiced behavior of others, initially they do not recognize it as a prejudice; they don't know that it occurred because of their race or gender. But their perception changes as they get older and the influence of family members and the media take hold. Several interviewees felt that this change may occur as early as the second or third grade (Dora, Gayle and John). By this age, some children may have experienced and recognized racial prejudice against themselves or someone close to them. It was also felt that whether or not children knew about hostilities between races depended upon the neighborhoods in which they live and go to school. Further, they seemed to feel that students in diverse neighborhoods and schools would know more about racial inequalities.

Themes Related to Significant Differences. The quantitative data revealed significance among the scenario means only related to whether or not a participant had completed a mathematics methods course. There were significant differences in all three means (scenario, GEFS and GMFS) based on the number of diversity courses completed. When considering the type of university attended, there were significant differences in the scenario and the GEFS means. There were no significant differences found among any of the means for the independent variables of race, age, socio-economic level, or number of content courses taken. Consequently, only the three sub-questions representing the variables that demonstrated significant differences between means are discussed in this section.

There were two pre-service teachers, both in the most supportive group, who credited diversity courses and reading courses with influencing their beliefs about SJE. Hazel spoke of a diversity class where discussions of handling diversity in the classroom

were frequent. John submits that although he was raised in a way that encouraged him to give back to those less fortunate, he first learned of the term SJE in a reading course. “It (SJE) was brought up first in one of my reading courses in terms of critical literacy. He goes on to say that a second diversity class led him to go out and get the book Pedagogy of the Oppressed (it was not required reading). One of the topics in this diversity course required the students to focus on the bias of schooling as well as their own biases. This diversity course “brought up education and ideology and how education and ideology are linked and how education is often used to propagate a particular ideology.”

Another interviewee mentioned the resistance of students in one of his diversity classes. He attributed the resistance in large part to a mismatch between the professor’s lecturing style of teaching and the discussions that the cohort of students had come to expect. Another contributing factor was the difference in the race of the professor (Black) and the students (White) as well as the requirement for the students to confront their own biases.

One interviewee in each group pointed how the type of university attended can be an influence on one’s attitude toward SJE. Eric, in the least supportive group, attended an HBCU. When asked why there seemed to be less support at the HBCUs, he said “I don’t think we are really taught social justice here. Maybe in those other schools the students are taught about it in their classes.” On the other hand, Hazel, in the most supportive group, stated “In every course that I have been required to take in University C’s Elementary Education Program we have had to read about, talk about, and write about teaching and how we will do so in our own room. Many of the papers that were written focused on diversity within your own classroom.”

Summary

In this chapter I presented the results from the survey data from 148 participants and interview data from 10 interviewees. The first section of my survey enabled participants to express their level of agreement to five mathematics classroom episodes which included social justice issues. The Hunger Drive lesson garnered the most support while the Wage Disparity episode was the one with which most participants strongly disagreed.

I analyzed the three main outcome variables (overall response to the surveys, responses to the general education statements, and responses to the general mathematics statements) to find what differences existed amongst the beliefs and attitudes of the participants. Significant differences between participants' responses were found, to varying degrees, when analyzing the data based only three of the seven demographic issues addressed in the sub-questions. Those three were the number of diversity courses taken, whether the mathematics methods course had been taken and which type of university (HBCU or TWI) the pre-service teacher attended.

The interview analysis provided a deeper look into why these variables made a difference. Most importantly for this study, the interviews provided insights into types of life experiences that resulted in positive and negative experiences toward including social issues into math lessons.

Chapter 5

Discussion

This chapter begins with a discussion of how my research has led me to believe that social justice education should and can be in elementary schools. An issue reinforced by my study is the fact that although social justice education is a dynamic field it is not well known at all by those who can have considerable impact on its growth. This is the second issue I discuss in this chapter. Other issues discussed in this section are pre-service teachers' perceptions about appropriateness, grade levels and social agency. I also provide suggestions for teacher educators interested in guiding their students in incorporating social justice education into mathematics lessons.

Social Justice Education in Elementary Schools

Finn (2007) speaks of three inalienable rights that all citizens have - civil rights, political rights and social rights. Civil rights, which are essential to individual freedoms, are provided by various court systems. Political rights that enable individuals to participate in political processes are provided by the legislatures. Social rights, which are basic rights to a decent standard of living, are to be secured through school systems according to Finn. He further believes that it becomes problematic when people think that these rights will occur naturally and equally for everyone. Finn poignantly points out that,

> The facts are: (a) Every advance in civil and political rights was preceded by agitation perpetrated by parties who were denied their rights; and (b) Social rights are not distributed equally or fairly in our schools. Schools are failing in their function of securing social rights for working-class students, and it will take agitation to change this.

> But in this case it is the children who are short changed. Who is to agitate on their behalf? I believe it is the teachers and the parents of working-class students (and perhaps older students themselves) who must act (pp. 18-19).

It is on this very premise that social justice education is based. From a social justice curriculum, students learn to become informed and critical citizens. They are also empowered to become change makers in their lives and communities (Bigelow et al., 1994).

As I worked on this project, I was often asked, why elementary children? What can elementary children do about injustices? Why introduce injustices to children so young? Shouldn't teachers protect the innocence of children? To the first question, I remind the readers that even very young children can become critical observers of their world. This study reported several practitioners who have provided instances of young children reacting in positive manners to oppressive situations in their world. When these children change their behavior based on what they learned about social justice education and discuss these issues at home they are, in fact, taking action, they are spreading the word. Freire (1996) and Edelman (1992) inform us that there are times when these actions are more than sufficient.

The last two questions were also reflected in the participants' responses to my survey and interview. Many comments on the survey indicated that children's innocence should be protected. It seemed as if the participants felt that elementary children were oblivious to injustices in their neighborhoods. Some interviewees were asked to respond to these questions: How much do elementary students: understand about differences in race?

difference in gender? know about or experience racial or gender prejudice? or understand about hostility between racial groups?

While most interviewees felt that children may have experienced one or more of the injustices, some felt that although children had indeed been victims of racism or sexism, they were too you to recognize that it had indeed been an 'ism'. This line of thinking also indicated that a child who had faced a racial discrimination act thought it was something about his person that sparked the act. It would never occur to the child that it was racism. In fact, these interviewees stated that children only know about injustices based on what they have heard from their parents, siblings and the media. Others felt that children did recognize sexism and had in fact been socialized into thinking that there were just some things that girls do (the kitchen area in Kindergarten) and others that boys do (cars and trucks).

Pre-service teachers who feel that young children are unaware of our societal problems are woefully unaware of the facts of life faced by their future charges. Tenorio (1994) purports that "between the ages of 2 and 5, children not only become aware of racial differences but begin to make judgments based on that awareness" (p. 25). She elaborates by sharing incidents in her racially diverse kindergarten class where four and five year old students had used racial slurs or putdowns openly, apparently feeling that there was absolutely nothing wrong with what they had said.

Also noted in this class was that white or light-skinned children would move if a darker-skinned child sat down next to them. Often play groups were formed in this manner and some children were not allowed to participate. What she found equally disturbing was that children on both sides often accepted this as a way of life. Tenorio's focus is on Anti-

bias and Anti-racist education which shares some of the same basic tenets as SJE. She believes that among a teacher's most important role is to "give students the beginning skills and strategies they will need to combat racism in their lives" (p. 24). She further states that children should be encouraged to speak up for themselves as well as for others.

Pre-service Teacher Prior Knowledge of SJE

Using social justice to promote critical education of everyone has been around since Freire's early work in the 1960s. Within the past 3 decades there has been a focus on teaching mathematics through social justice issues. It seems that this movement, if it can be called that, is slow in taking off. Only 33% of the 148 participants acknowledged having any prior knowledge of incorporating social justice into mathematics classes. Only one of the 10 interviewees had prior knowledge of SJE. Another interviewee was surprised that, having been a Criminal Justice major before, SJE had never come up in that program.

I found that across the country there are pockets of grassroots organizations emerging. The number of these groups is growing. What's more, resources are being published by experienced researchers and practitioners that will aid and guide teacher educators and teachers interested in making change in student lives in this manner.

Pre-service Teacher Perception of the Appropriateness of Social Issues

My findings indicated that pre-service teacher's level of appropriateness of SJE was highly dependent upon the social issue involved, not so much on the math involved. Only one participant stated that the mathematics involved was inappropriate. He qualified this by saying that by the time students were mature enough to deal with most of the issues, the mathematics involved would already have been taught in previous grades.

The fifth scenario, the hunger drive issue, was by far more acceptable by participants of my study than the any other issue. This scenario was adapted from Peterson's 1998 chapter in Repo's book *Making Schools Matter: Good Teachers at Work.* In the chapter he describes possible teacher response to a second grade student bringing in a flyer about a hunger drive. There are typically 3 responses, that of the traditional teacher, the progressive teacher and the critical teacher. The Traditional teacher affirms student interest in others. The progressive teacher does the same but goes further in that (s)he uses the flyer to launch a discussion about hunger and poverty. Canned foods are then collected, counted and sorted and the students write about their feelings.

A critical teacher would do all of the above. However the discussions in this teacher's class would include the extent of hunger and poverty in the neighborhood, expanding to the country and the world. The conversations would include brainstorming about what students could do and involves discussing government roles in poverty. All three teachers conduct a food drive but Peterson's litmus test is the reflective discussions in which the students do or do not participate.

Peterson asserts that while there are no strong dividing lines between the three types of teachers, American schools seem to lean toward the traditional. In fact, from the comments on the surveys, it seemed to me that the participants saw the hunger drive scenario as an activity that would not ruffle the feathers of anyone.

The other issues were deemed less appropriate or downright inappropriate mostly due to what the participants perceived to be the maturity levels of elementary age children. The liquor store issue was undoubtedly considered the least desirable issue to present in an elementary classroom. Some pre-service teachers were aghast at the thought of introducing

liquor stores to young children. Two scenario comments stand out, in part, because they were similar to comments from other participants and, in part, because they highlight one of the major complaints about students who are becoming education majors. The comments are 1.) “Before the age of 12, most parents do not let students walk to schools or walk by themselves, so it (walking past a liquor store) wouldn’t really be a big deal” (participant number 150) and 2.) “Students should not be encouraged to go near liquor stores” (participant number 116).

These complaints showcase the obvious disconnects between the lives of the majority of pre-service teachers and the lives of their future students. Liquor stores are so prevalent in urban areas that not only do children know about the stores and experience the harassment stated in the scenario, it is highly likely that the students themselves have been inside the stores either with older family members or with friends to purchase snacks and sodas.

While the Sweatshop scenario was acceptable to the many of the participants, others felt that this was the case where the innocence of children should really be protected. The wage and gender disparity issues were thought to be beyond the maturity level of elementary children and therefore should not be used. Of course, one interviewee stated that it did not matter what the issue was, his focus was on helping children read the world critically.

Lowest Grade

I was interested in determining how soon the pre-service teachers felt that an elementary child should be involved in social justice activities. While there was no clear consensus about the lowest grade level at which Social Justice Educations was appropriate,

the Hunger Drive scenario had the lowest mean response as well as mode (grade 2.4, mode 3.0) and of course the liquor store scenario had the highest (grade 6, mode 6.0). The minimum grade level and the maximum grade level for each scenario ranged from Pre-school or Kindergarten to the 11^{th} or 12^{th} grade.

I believe that the higher grades reflect the opinions of the participants who felt that children's innocence should be protected. However, as previously stated, very young children already recognize injustices as well as the root causes (racism, sexism, etc). Therefore these issues can be topics in elementary classes.

Appropriate Levels of Social Agency

I consider the social agency promoted by SJE to be its most prominent feature. Interviewees were asked the levels of activism in which they might engage their students. Immediately, many said that it would depend upon the maturity level of the students. Others said that the students would be required to write letters to appropriate parties. A few interviewees would allow mature students to speak before an education or political board. I shared with them the fact that one teacher had his students (with parental approval) on a picket line and they each felt that this was an extreme move that they would not do.

Comparing Responses Based on Type of University

Participants attending TWIs seemed to be more supportive of incorporating social justice into mathematics lessons. They obtained higher mean responses on two portions of the survey (each was significantly different) as compared to their counterparts attending HBCUs. A Factorial ANOVA determined that it was in fact the type of university that

made the difference and not race, although the majority of the students at TWI are White while the majority of the students at HBCU are Black.

The fact that students at the predominantly white institutions seemed to be more agreeable to teaching mathematics with a social justice lens contrasts the expectations of Montecinos and Rios (1999) who expected that people of color (which, as expected, were the overwhelming majority of participants at the HBCUs) would be more apt to see social justice education as a means to correct societal injustices because they themselves have possibly faced unwarranted adversities throughout their lives.

Richardson and Murray (2007) cite Freire's model of how people may respond to and, perhaps, analyze an oppressive condition. Perhaps the model will shed light on this subject. The model consists of three possible responses. The first of the three is labeled magical-conforming. For people who respond in this manner, the oppressive situation is seen as either not problematic or as an unchangeable act of existence. Participants who may be characterized in this group either would not see any of social issues presented as a problem or would accept them as unchangeable facts of life. They then would be expected to have low responses to the survey regardless of the events in their lives.

Secondly, there is the naïve-conforming view in which it is felt that "individuals who deviate from the rules and roles of the system are blamed for the injustice within a system" (Richardson and Murray, 2007, p. 72). In other words, the victims are seen as the cause of their problems. There are actually victims who take this view and see themselves as the problem. Either way the result is that the issues are seen as the problem but it is the victims that need to change.

Finally there is the critical-transforming view. Those who take this view see oppressive situations, along with the rules and societal roles that promote them, as being the problem and take actions intending to transform the rules and roles.

I assumed that the majority of the students at the HBCUs grew up in areas where they faced unwarranted adversities throughout their lives, if not directly, at least as a minority group. Like Montecinos and Rios (1999), I expected a higher level of support from the HBCU participants for incorporating social justice into math lessons and encouraging students to speak up for themselves in an effort to correct wrongs.

I surmise that many of the participants at the HBCU could be characterized as either magical conforming or naïve conforming in reference to changing what seems clearly to others to be injustices. Either, as several interviewees stated, the HBCU participants live with most of these situations every day and don't feel them to be insurmountably problematic. After all, they got beyond the situations and made it to college so others will be able to do so also. On the other hand, these students may feel that these problems existed long before they were born and nothing has been done so nothing can be done to change the situations.

This puzzling outcome was included as a part of the interview protocol. Interviewees were presented with the perceived support from TWI participants and lack of support from the HBCU participants. They were asked what they thought might have contributed to the outcome. Some of the responses reflected Freire's magical-conforming view. For instance an HBCU student in the least supportive group stated, "You see a lot more of these issues on an everyday basis. Because a lot of these issues, the fact that they are felt on an everyday basis and this just brings it to the forefront even more and I don't

think that a lot of us think that it needs to be brought up. Another issue is that this is a predominately urban population and a liquor store on the corner is not an issue" (Eric, Interview).

Still others felt that it might be a result of who believes that they have power to make changes in our country. Gayle surmises that, "Perhaps students at majority of white universities believe that any student can truly make a difference if they want their voice to be heard. Especially since we are still a predominantly white culture, the chance of their voices being heard is great. Students at predominantly black schools are still a minority and perhaps teachers feel that even if these issues are taught the students voices won't be heard, and then they will be disappointed." Another aspect that differs between university type is presented by Eric who states that SJE is not explicitly taught at an HBCU whereas it may well be a curriculum requirement at TWIs.

Suggestions for the Future

In this final section, I present suggestions about the delivery and completion of the data collection instrument. Following that I discuss the importance of in-depth research required in order to present both sides of any argument. Finally I provide examples of teacher educators' efforts to design diversity courses that create sustainable change in teachers.

The Surveys. One thing that troubled me about this study while I was analyzing the data was the number of incomplete surveys and the lack of comments offered despite the abundance of space allotted for comments. Out of a concern of what I felt was a lackadaisical approach to completing the survey on the part of some participants (which could account for the incomplete surveys and the lack of comments provided) I would

distribute the survey in a different manner. If I were to repeat this research, I would deliver the survey myself and speak to each group personally – not that each professor (who presented the survey in this study) did not do a sufficient job – but I would impress upon the participants the importance of their contributions. Maybe a personal appeal from me, as the researcher who is directly affected by their responses, would improve the completion of the survey as well as the thought put into completion.

Additionally, I would conduct the surveys at the beginning of the semester before course work load gets heavy and allow students to take them home. Maybe peer pressure in some ways kept some from taking the survey and the concept seriously. Perhaps seeing that their friend(s) was(were) very casual about it inspired others to treat the survey similarly. In privacy, more students may have attended to it properly. Of course there would be the concern of getting them to actually do the survey AND to return it. One way to encourage the return is to have students who agree to participate provide an active email address so the research could follow up as often as possible. A second 5 minute visit at the end of a class would allow me to pick up surveys, to thank those who returned completed surveys and to encourage others to do so. Leaving students with my email address would allow them to join in later if at first they declined the invitation to participate.

I was also concerned about the apparent contradiction between survey responses (and low mean scores) and professed support of SJE during interviews. I believe that somehow the survey did not evoke responses that the interviews did. Perhaps the use of pre and post surveys similar to Richardson and Murray, 2007 (see below) as a part of diversity classes would remedy this situation.

Presenting All Sides. Everyone would agree to the importance of presenting all ~~both~~ sides of any situation. Sometimes that is easier said than done and could be handled superficially. I must admit that I was shocked to hear the response from the interviewee who indicated that sweatshops were a necessity. I did as he suggested however. I looked further into sweatshops and was amazed to find that not everyone, particularly the families of some of the sweatshop workers, holds the same outraged view that many Westerners do.

In their article, Two Cheers for Sweatshops, Kristof and WuDunn (2000), two American reporters, write about their trip to China to cover the dangers of sweatshops. Instead, after coming to know the area and the people, they saw things from another angle. They found that parents were proud that their children had secured good jobs that kept the family fed. They also reported that sweatshops were "dirty and dangerous but also the reason Asia is back on track", not to say that there can't be improvements made. This is the kind of in-depth coverage that needs to be provided in classrooms in order to accurately present both sides of an argument. Students then can make up their own minds as top what side they take.

Teacher Preparation. The literature is filled with documentation (although conflicting) on the results of the one diversity class many pre-service teachers are required to take. My interviews reflected the positive impact of attitudes towards social justice education of participants who had experienced diversity coursework. Of course, as is well documented in the literature, something needs to be done to reduce the level of resistance to diversity studies. If teacher educators are planning to include social justice education into their curriculum it would be beneficial to investigate current best practices in diversity training to determine what types of approaches, activities and life experiences to include.

Research shows that long term, positive effects on the support of SJE is promoted by certain activities, a few of which are demonstrated below.

Acknowledging that classroom activities and studies sometimes fall short of making middle and upper-class pre-service teachers cognizant of the lived experiences of their future students, interested teacher educators are pursuing alternative avenues (Richardson and Murray, 2007; Romano, 2007). In their Critical Literacy course for pre-service teachers, Richardson and Murray's approach was to integrate critical reflection, critical pedagogy theory and practical experience (a literacy tutoring project) into their course activities. One of the intents was to have pre-service teachers explore their own values and beliefs about urban education while also experiencing perspectives of the students they would someday teach.

The pre-service teachers participated in pre and post surveys, pre and post focus groups, and group debriefing following each tutoring sessions. They also were required to keep reflective logs about their experiences as well as the course content. The themes that emerged during the data collection were " a) school culture, b) movement towards critical-transforming problem solving, and c) self-development" (p. 69).

The theme 'school culture' meant that initially the pre-service teachers felt that students weren't learning because they were inadequate. Before the end of the semester this perspective changed to the fault being the social and cultural differences between students, teachers and curriculum. The second theme incorporated Freire's three part model (see page 157 of this document) of how people respond to oppressive situations. The pre-service teachers moved through the three stages until by the end of the semester they were focusing on ways they and the students could change the system which they had come to believe

was the root cause of the problem. In the final theme, self-development, the participants reported personal growth, to include growth in pedagogical knowledge and interpersonal skills useful to all teachers.

In Romano's (2007) research, pre-service teachers began by researching the school climate of local middle or high schools. Through observations and student interviews, the pre-service teachers collected information on what students considered to be moral and ethical dilemmas that they faced daily. Under careful direction of a skilled social activist and theatre consultant, the pre-service teachers developed a storyline based on the information they collected.

Eventually, the pre-service teachers acted out the roles of both teachers and students and present the stories at the same school where the information was collected. In the audience were the students, faculty and administrators of the school. After each scene the audience members posed questions to the characters. In this manner, pre-service teachers were able to "view the very experiences, dilemmas, perspectives, and challenges" (p. 100) faced by their future students. The method also permitted pre-service teachers to "try out new ways of thinking about how to act that could potentially be applied to real-life situations" (p. 101) when they are in their own classrooms. Both the students and pre-service teachers were enabled to view social justice issues in real life situations and were provided with opportunities to learn more about themselves as well as the social issue. Students were given chances to speak up for themselves or others and to recognize the value of social agency.

Not only does such activity provide teachers with an inside view of the lives of their students, it also permits teachers to practice posing "probing questions that move the

dialogue towards action in the self-interest of the youth, a kind of critical action, as opposed to a reactive or negative action that does not promote their self interest" (p. 103).

Romano's approach was to engage her pre-service teachers in an interactive theater project during which they became cognizant of the issues that their potential students face in life. As they experienced, albeit on stage only, small bits of the students' lives, the pre-service teachers altered the ways they thought about teaching, moving towards teaching in ways that were embedded in the interests of their students; in ways that would encourage and enable theirs students to work in their own collective interests.

When I started this study there was not much written about incorporating social justice education into mathematics. This has quickly changed. The field is growing by leaps and bounds and is now replete with resources that can provide the interested with examples of students on all levels teaching/learning mathematics with the intent to improve society. The literature also provides evidence of student social agency based on knowledge they have gained in classrooms that provide opportunities to study social issues in their society as they study mathematics.

Appendix A: Introduction to Study, Invitation to Participate

I am Wanda McCoy, graduate student at the University of Maryland, College Park. My dissertation study will assess pre-service teachers' knowledge of and beliefs and attitudes towards an innovative method of teaching mathematics. To gather this information, I have created a survey which provides a description of a series of activities that have occurred in mathematics classrooms that utilize this method of teaching. Each activity is followed by a list of statements to which you will indicate your level of agreement. Completion of the survey should take no more than 20 minutes. After I analyze the completed surveys, I will invite some participants to a personal interview. The interviews will be audio-taped. The interview questions are designed to allow participants to elaborate on initial responses.

This research is not designed to help you personally, but the results may help me learn more about attitudes towards an innovative method of teaching mathematics. I hope that, in the future, other people might benefit from this study through improved understanding of pre-service teachers' attitudes towards the proposed pedagogy. Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide that you will participate in this research, you may stop participating at any time. If you decide that you will not participate in this study or if you stop participating at any time, you will not be penalized. We will do our best to keep your personal information confidential. To help protect confidentiality, the names of the sites and participants will be changed. Your name will not be included on any data. If we write a report or article about this research project, your identity will be protected to the maximum extent possible.

Appendix B: PRE-SERVICE TEACHER CONSENT FORM

Project Title: Assessing Pre-service Elementary/Middle School Teachers' Knowledge of and Attitudes/Beliefs Toward a Proposed Innovative Method of Teaching Mathematics

Why is this research being done?: This is a research project being conducted by Dr. Jim Fey and Wanda McCoy, Doctoral Candidate at the University of Maryland, College Park. We are inviting you to participate in this research project because you represent a population that research has documented to being critical to implementing innovative efforts in mathematics education. The purpose of this research is to understand your knowledge of and attitudes towards a new pedagogy that encourages students to learn and use mathematical knowledge.

What will I be asked to do?: You will be asked to complete a survey designed by the researcher. The survey will present scenarios that describe innovative approaches in mathematics lessons and have you indicate your level of agreement with statements about the lesson. You may also be asked to participate in an interview with the researcher. The interview will last about 30 minutes.

What about confidentiality?: We will do our best to keep your personal information confidential. To help protect confidentiality, the names of the sites and participants will be changed. Your name will not be included on any reported data. If we write a report or article about this research project, your identity will be protected to the maximum extent possible. All information may be shared with representatives of the University of Maryland, College Park or governmental authorities if we are required to do so by law.

Risks: You may feel somewhat anxious while completing the survey or during the audio-taping of the interview.

What are the benefits of this research?: This research is not designed to help you personally, but the results may help the researcher learn more about attitudes towards a new way of teaching mathematics. We hope that, in the future, other people might benefit from this study through improved understanding of pre-service teachers' attitudes towards this innovative pedagogy.

Participating in the survey earns you a chance to win one of several $10 gift cards. If you choose to also participate in the interviews, are chosen, and complete the interview, you will earn a $25 gift card.

Do I have to be in this research? May I stop participating at any time?: Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide that you will participate in this research, you may stop participating at any time. If you decide that you will not participate in this study or if you stop participating at any time, you will not be penalized.

What if I have questions?: This research is being conducted by Dr James Fey, Department of Education and Curriculum Instruction at the University of Maryland, College Park. If you have any questions about the research study itself, please contact Dr. James Fey at: 2226 Benjamin Building, University of Maryland College Park, Md. 20742, (301) 405-3151, jimfey@umd.edu or Wanda McCoy same address, (301) 405-7059, wmccoy@umd.edu . If you have questions about your rights as a research subject or wish to report a research-related injury, please contact*:* Institutional Review Board Office, University of Maryland, College Park, Maryland, 20742; (e-mail) irb@deans.umd.edu; (telephone) 301-405-0678. This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

Statement of Age of Subject and Consent*: Your signature indicates that: you are at least 18 years of age; the research has been explained to you; your questions have been fully answered; and you freely and voluntarily choose to allow your child to participate in this research project.*

Please check one response:

_____ I agree to complete the survey _____ I agree to complete the survey only. _____ I do not agree to be and to participate in the interview. involved in this research study.

NAME (printed)_____

SIGNATURE_____

Email address_____ DATE_____

APPENDIX C: SURVEY INSTRUMENT

Pre-service Teachers' Knowledge of and Attitudes towards an Innovative Approach to Teaching Mathematics Survey

Thank you for agreeing to complete this survey. This survey consists of five Classroom Scenarios, in which teachers maintain that they are using an innovative approach to teaching mathematics. You will be asked to indicate your level of agreement with several statements pertaining to each scenario. You then will be asked to indicate your level of agreement with statements on general matters about mathematics and education. Selected participants, based on responses, will be invited to take part in an interview at a later time.

DEMOGRAPHICS

Before you begin the survey, please complete the following. We will do our best to keep your personal information confidential. To help protect confidentiality all names will be changed. Your name will not be included on the interviews or any other collected data. A code will be placed on the surveys and interviews. Through the use of an identification key, the researcher will be able to link your survey or interview to your identity; and only the researcher will have access to the identification key. If we write a report or article about this research project, your identity will be protected to the maximum extent possible. All information may be shared with representatives of the University of Maryland, College Park.

Name _____

University _____

Age_____ Gender (circle) Female Male

Pell Grant Recipient (circle) Yes No Scholarship Recipient (circle) Yes No

Name of scholarship_____

Race (please fill in or check one)

Asian/American___ Biracial___ African American ___

Caucasian American __ Hispanic/American ____ Native American___

Current educational mathematics course _____

Please list Mathematics Content/ Methods courses completed:

_____

Please list Diversity Courses completed:

_____

DIRECTIONS:

On the following pages you will find the five Classroom Scenarios, in which teachers maintain that they use mathematics to help students understand social issues while using the social issues to help students learn, understand and appreciate the mathematics involved. Each scenario is followed by a list of statements. Please indicate the degree to which you agree or disagree with the opinion or belief expressed in each of the sentences in the following manner:

If you *strongly disagree* with the opinion or belief expressed in a sentence, circle the letters SD to the right of that sentence.

If you *disagree* with the opinion or belief expressed in a sentence, *but not so strongly*, circle the letter D to the right of that sentence.

If you are *not sure* how you feel about the opinion or belief expressed in a sentence, that is you *cannot decide* or you *do not really have an opinion*, circle the letter N to the right of that sentence.

If you *agree* with the opinion or belief expressed in a sentence, circle the letter A to the right of that sentence.

If you *strongly agree* with the opinion or belief expressed in a sentence, circle the letters SA to the right of that sentence.

There are no "right" or "wrong" answers. The only correct responses are those that reflect what you believe to be true. Be sure to respond to each item in a way that reflects your personal beliefs.

The final page has a list of statements on general matters about Social Justice Education, mathematics and schooling.

Do not spend too much time pondering each sentence. Work briskly, but carefully.

CLASSROOM SCENARIO 1

Fifth-grade students analyzed and discussed a bar graph from a local newspaper that displayed median weekly earnings of full-time workers in 1993. The categories distinguished the wages along racial and gender lines. In general men earned more than women and Caucasians earned more than African Americans who earned more than Hispanics.

Students were asked how they felt about the statistics, they were asked to think about possible causes and to think of ways to test their hypotheses. Finally a whole class discussion occurred about how the inequalities can contribute to hostility between the racial groups.

The Math in the scenario: Data Analysis

The MSDE VSC requires that students as early as Pre-K "analyze or interpret data to make decisions or predictions." Kindergarteners are also required to "talk about data from real graphs to answer questions.

Please indicate the degree to which you agree with each of the following statements

	Strongly Disagree	Disagree	Not Sure No Opinion	Agree	Strongly Agree
This is an example of teaching high quality, engaging mathematics.	SD	D	N	A	SA
This is an acceptable social issue to with students in elementary school.	SD	D	N	A	SA
Teachers should encourage students to try to make changes in society in reference to this issue.	SD	D	N	A	SA
This is a topic that would motivate students to learn mathematics.	SD	D	N	A	SA
Teachers can balance teaching mathematics and this social issue effectively.	SD	D	N	A	SA
Teachers should take the extra time needed to incorporate the study of this social issue into mathematics lessons.	SD	D	N	A	SA

What is the lowest grade level in which you feel it would be appropriate to teach? this social issue? (Indicate a grade Pk -12) _____

CLASSROOM SCENARIO 2

Six-grade students in this Texan class began to investigate the large number of liquor stores near the school. The investigation resulted from conversations the class had about issues they faced just getting to school each day. Several issues surfaced, from the harassment the students felt from the customers hanging around the stores everyday as they walked to and from school to the fact that some family members were alcoholics and the resulting negative effects on the family.

The teacher helped the students locate and understand city laws that regulated the liquor stores in their area. One of the laws governs the distances between schools and certain businesses. Using the tools they on hand (yard sticks), the students measured linear distances between their school and the liquor stores. In doing so they discovered that their measurements were different from those conducted by city officials. Further investigation lead to their discovery of the sophisticated tools used by city officials.

Upon discovering that several laws were being violated by the liquor stores, students began a letter campaign. This student action resulted in the closure of some establishments and causing others to become compliant with the laws on the books.

The Math in the scenario: Linear Measurement

The MSDE VSC requires that students as early as Pre-K "apply a variety of techniques, formulas or tools or technology for determining measurements" Lessons on customary anf metric measurements start in the second-grade.

Please indicate the degree to which you agree with each of the following statements

	Strongly Disagree	Disagree	Not Sure No Opinion	Agree	Strongly Agree
This is an example of teaching high quality, engaging mathematics.	SD	D	N	A	SA
This is an acceptable social issue to with students in elementary school.	SD	D	N	A	SA
Teachers should encourage students to try to make changes in society in reference to this issue.	SD	D	N	A	SA
This is a topic that would motivate students to learn mathematics.	SD	D	N	A	SA
Teachers can balance teaching mathematics and this social issue effectively.	SD	D	N	A	SA
Teachers should take the extra time needed to incorporate the study of this social issue into mathematics lessons.	SD	D	N	A	SA

What is the lowest grade level in which you feel it would be appropriate to teach? _____
this social issue? (Indicate a grade Pk -12)

CLASSROOM SCENARIO 3

A fourth-grade teacher reported that his students analyzed front-page photos of a month's worth of three major newspapers. The students note major differences between how males and females were most often portrayed. They found that only a small number of front page photos depicted women. Of the women whose photos were shown, none were in a professional category although more than half of the pictures of men were representatives of business or government.

Students used the math skills of simple computation and graphing. They wrote to the newspaper about their findings and prepared a discussion about the biases that they found and presented it to younger students in the school.

The MSDE VSC requires that students as early a Pre-K to "collect, organize and display data to make real graphs" and "interpret data to make decisions". "Organizing data into single bar graphs" begins in the first grade.

Please indicate the degree to which you agree with each of the following statements

	Strongly Disagree	Disagree	Not Sure No Opinion	Agree	Strongly Agree
This is an example of teaching high quality, engaging mathematics.	SD	D	N	A	SA
This is an acceptable social issue to with students in elementary school.	SD	D	N	A	SA
Teachers should encourage students to try to make changes in society in reference to this issue.	SD	D	N	A	SA
This is a topic that would motivate students to learn mathematics.	SD	D	N	A	SA
Teachers can balance teaching mathematics and this social issue effectively.	SD	D	N	A	SA
Teachers should take the extra time needed to incorporate the study of this social issue into mathematics lessons.	SD	D	N	A	SA

What is the lowest grade level in which you feel it would be appropriate to teach? _____
this social issue? (Indicate a grade Pk -12)

CLASSROO SCENARIO 4

A fourth-grade interdisciplinary unit on Global Studies included activities such as reading a *Time for Kids* article about children as young as 6 sewing Nike soccer balls in Pakistan and viewing videos of child-labor conditions worldwide. Students also read materials from the public relations departments of large American companies depicted in the article and the videos. The students experienced topics such as globalization, capitalism, and cheap labor through simulations, role-play, first-person-testimonies, and guest speakers.

Mathematical activities included analyzing fact sheets on noted sweatshops around the world, including the US, to determine number of hours worked, hourly and weekly salaries, and length of time one worker would have to work to purchase essential items. The students also gathered and graphed important statistics related to sweatshop workers' lives.

The students eventually wrote a play that included scenes from their own innocent childhood (their playground and the local fast food restaurant), along with scenes from sweatshop factories, mansions of sports figure who endorse Nike shoes, and the corporate offices of Nike and Disney. In short, the play represented the students' own political education and ended on the note that they themselves can do things to change the world, if only by making more people aware of worldwide working conditions. Unfortunately, three days before the play was to be performed for the entire school, the principal decided the play would not be suitable for the other students of the school and that only parents could attend. However the press found out about the situation and reported the censorship and eventually a local theater offered its stage for the production. In the end, the students actually performed the play on Broadway.

Please indicate the degree to which you agree with each of the following statements

	Strongly Disagree	Disagree	Not Sure No Opinion	Agree	Strongly Agree
This is an example of teaching high quality, engaging mathematics.	SD	D	N	A	SA
This is an acceptable social issue to with students in elementary school.	SD	D	N	A	SA
Teachers should encourage students to try to make changes in society in reference to this issue.	SD	D	N	A	SA
This is a topic that would motivate students to learn mathematics.	SD	D	N	A	SA
Teachers can balance teaching mathematics and this social issue effectively.	SD	D	N	A	SA
Teachers should take the extra time needed to incorporate the study of this social issue into mathematics lessons.	SD	D	N	A	SA

What is the lowest grade level in which you feel it would be appropriate to teach? this social issue? (Indicate a grade Pk -12) _____

CLASSROOM SCENARIO 5

In New York, a 3rd grade student brought a flyer to class about a local canned food drive. This inspired second- and third-grade teachers to host a canned food drive at the school. Through questioning techniques, the teachers guided their students into reflective discussions concerning poverty and hunger in the neighborhood, in the country, and in the world. Among the questions they asked were: Why is there hunger? What should be the government's role in making sure everyone has enough to eat? Why isn't it doing more? What can we do after giving the canned food?

The second and third grade classes then collected canned food items, counted and categorized them and then graphed the categories of food items. Finally the teacher and the students delivered the food to the collection spot and the students helped to fill food packages for families. Students used knowledge of multiplication and division to sort the food into boxes that would be given to families. Some students and their parents came out on the day of distribution to help hand out the food packages to needy families.

The students then began a letter writing campaign. They wrote about the knowledge they had developed about the root causes of hunger and what can be done locally or nationally to eliminate it. Letters were written to elected officials, newspaper editors, and company presidents.

Please indicate the degree to which you agree with each of the following statements

	Strongly Disagree	Disagree	Not Sure No Opinion	Agree	Strongly Agree
This is an example of teaching high quality, engaging mathematics.	SD	D	N	A	SA
This is an acceptable social issue to with students in elementary school.	SD	D	N	A	SA
Teachers should encourage students to try to make changes in society in reference to this issue.	SD	D	N	A	SA
This is a topic that would motivate students to learn mathematics.	SD	D	N	A	SA
Teachers can balance teaching mathematics and this social issue effectively.	SD	D	N	A	SA
Teachers should take the extra time needed to incorporate the study of this social issue into mathematics lessons.	SD	D	N	A	SA

What is the lowest grade level in which you feel it would be appropriate to teach? _____
this social issue? (Indicate a grade Pk -12)

Thank you for attending to the above classroom scenarios. Please take another minute to share your opinions on the following statements on general matters about mathematics and education.

Please indicate the degree to which you agree with each of the following statements

	Strongly Disagree	Disagree	Not Sure No Opinion	Agree	Strongly Agree
1. Education should prepare students to be productive members of society.	SD	D	N	A	SA
2. Education should prepare students to voice their opinions about society.	SD	D	N	A	SA
3. Education should prepare students to change society.	SD	D	N	A	SA
4. Education as it is today maintains the status quo, prepares most students for only functional literacy and servitude jobs.	SD	D	N	A	SA
5. School is an appropriate place to develop social activists.	SD	D	N	A	SA
6. Teachers should encourage students to take action against social injustices.	SD	D	N	A	SA
7. Teachers should take the extra time needed to incorporate the study of social issues into mathematics lessons.	SD	D	N	A	SA
8. Teaching should be politically neutral.	SD	D	N	A	SA
9. Mathematics should be used to make sense of the world.	SD	D	N	A	SA
10. Mathematics teachers have time to do both, teach mathematics effectively and have students investigate social injustices.	SD	D	N	A	SA
11. School mathematics should be used to analyze social injustices.	SD	D	N	A	SA
12. Mathematics is a tool that should make hidden injustices visible.	SD	D	N	A	SA

_____

_____

_____

A prominent mathematics education researcher who supports the pedagogy used in each of the above scenarios says, "Students need to be prepared through their mathematics education to investigate and critique injustice, and to challenge, in words and action, oppressive structures and acts- that is, to 'read and write the world' with mathematics." This pedagogy is called Social Justice Education. Teachers who practice Social Justice Education take care to ensure that students do not develop certain attitudes, such as, an 'us VS them" attitude or a 'what a world grownups have left us-we can't fix the entire world' attitude. Students are instead encouraged to do whatever small part they can to make a difference in their and others' lives.

	Strongly Disagree	Disagree	Not Sure No Opinion	Agree	Strongly Agree
It is important that mathematics teachers shed light on social injustices.	SD	D	N	A	SA
I already had prior knowledge of teaching with an emphasis on social justice.	SD	D	N	A	SA

Please provide the number of diversity and/or multicultural classes you have taken. _____

Use this space to make comments about Social Justice Education (and grade levels at which this should or should not occur) and teaching mathematics.

_____

_____

_____

_____

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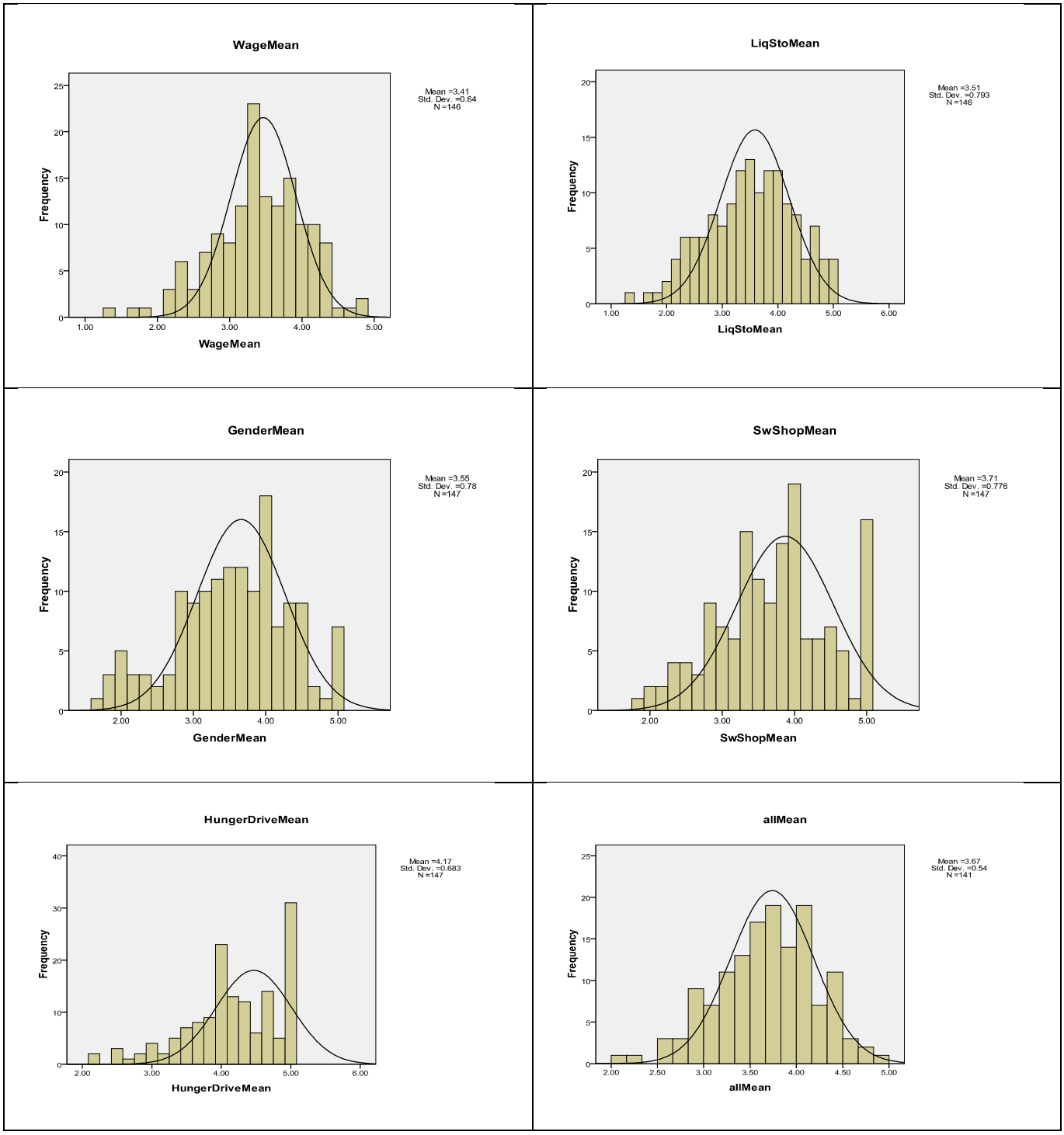
_____

_____

APPENDIX D: Scenario Means



APPENDIX E: Semi-structured Audio-taped Interview Questions (60 minutes)

State of Education

1. You strongly disagreed with the statement about education and the status quo. Please say more about that.

Pre-service Teacher Knowledge of Social Justice Education

1. What did you know about social justice education before this study?

2. What do you think it means to incorporate Social Justice Education into the teaching of math?

Pre-service Teacher Attitudes towards Social Justice Education

1. Your responses seem to indicate a somewhat positive response to teaching mathematics through a Social Justice lens. Why is that?

2. To what experiences in your life would you attribute your attitude/beliefs about social justice education

3. How do you think teaching in this manner (incorporating Social Justice Education) will affect students? Why?

4. How do you think teaching in this manner will affect the learning of mathematics? Why?

5. Beginning at which grade level would you say it is feasible to use social justice education? Why?

6. What would you say to parents who want their children to learn math in a traditional classroom but are placed in classes teaching social justice math?

7. You felt that teachers should take extra time if needed to study math in all situations except the wage disparity scenarios. Why is that?

8. Students at 4 different institutions completed my survey. When analyzing the data from the survey, I discovered something about the way that students at each institution responded. Almost without exception, students at the 2 historically Black universities were less favorable towards teaching in this manner than students at the 2 majority White universities. Why do you think might be?

Politically Neutral

1. You stated that you feel that teachers should be politically neutral what would you say to those who say that by doing nothing you help spread dominant ideology?

2. You stated that you feel that teachers should not be politically neutral what would you say to those who say you would be indoctrinating students with your own beliefs?

3. You stated that teachers should be politically neutral. What do you mean by 'politically neutral'?

4. Aren't you indoctrinating your students with your own political beliefs? Politics doesn't belong in the classroom anyway.

5. How would you respond to people who say that teachers should be politically neutral?

Appropriate Social Activism

1. A major aspect of social justice education is the actions students take after learning and understanding the issues they investigate. Some teachers have had their students discuss the issues with each other, some have written letters, and others have spoken before adult board members or politicians. One teacher, with parental permission, had students walk a picket line with him. What would be the limit of actions you might request of your students? At what lowest grade level?

2. It seemed that many students saw the last scenario only as a "canned food drive". Very few commented on the social activism portion. Most felt that all grades could benefit from this activity; it helps everyone, not just one group. What do you think about that?

3. In reference to the Liquor Store scenario, how would you respond to the persons who said:
    a. Before the age of 12, most parents do not let students walk to schools or walk by themselves, so it wouldn't really be a big deal.
    b. Students should not be encouraged to go near liquor stores.
    c. Kids could be affected by older adults who may be drunk. Also because some of the kids have to deal with alcohol at home, they know the effects and don't need to face it going to school.
    d. My biggest fear is that family of local business owners in the class may be caught in the crossfire.

4. The lowest grade in which you feel it is appropriate to teach in this manner is 3rd-grade. Since Social Justice Education has an activism component, what kinds of activities do you feel would be inappropriate for 3rd-graders?

Children's Knowledge of Injustices

1. How much do elementary students understand about differences in race? Difference in gender?

2. Do elementary children know about or experience racial or gender prejudice?

How much do elementary students understand about hostility between racial groups?

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