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Professionalism: What is it and are we teaching for it?

A Dissertation Presented for the
Degree of Doctor of Philosophy
The University of Tennessee, Knoxville

Brian K. Tate
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Dedication

This dissertation is dedicated to my family. My wife, Tonya, who supported, nudged, cried, and laughed with me through this journey. She is an amazing best friend and a loving mom that allowed me to take this long endeavor for a Ph.D. To my three children, Mackenzie, Kendrick, and Zoe, who didn't see dad as much as they wanted but still loved me unconditionally and cherished every free moment.

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Abstract

With rising accountability standards and the need for content specialists within education, the qualifications of mathematics teachers have become increasingly scrutinized. For over three decades, within the parameters of educational reform, the need for the professionalization of teaching has reoccurred (Carnegie Task Force, 1986). When examining the nature of teacher professionalism, no concise definition within the educational community exists (Noddings, 1992). The purpose of this study was to take characteristics defined by the medical and law fields and use them to develop a definition of professionalism within mathematics education. Once a clear set of characteristics was identified, the study then looked to reveal the nature of which those characteristics were instilled within mathematics teacher education programs at higher education institutions.

Current mathematics teachers and mathematics teacher educators were surveyed and the set of characteristics rated as to their importance in defining professionalism with mathematics education. A second part to the survey asked mathematics teacher to rate the extent they felt prepared within those same characteristics. Mathematics teacher educators were asked to reflect upon their curriculum with respect to the same set of characteristics. The results were compared with similarities and differences among the two groups presented. The results from this study can be used by higher educational institutions in shaping current and future teachers' set of professional characteristics. Current teachers can examine the results of this study with the intent to evaluate themselves as professionals.

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Chapter 1

Introduction

In spite of the fact that licensing procedures, education, and continuing educational requirements are the same for teachers as other occupations such as law and medicine, the same level of respect that is awarded to law and medical careers is not afforded to the teaching profession. Since teaching is viewed as a good and worthy profession, it should garner the same professional status as other professions (Noddings, 1992).

With the passing of the No Child Left Behind Act, (Department of Education, 2004), the professionalism, specifically in regards to subject matter knowledge, has been emphasized with the introduction of highly qualified requirements for teachers to the exclusion of any other competency (Department of Education, 2004). In fact, the definition of a professional teacher mathematics has no clear definition. The professionalism aspect of teacher preparation seems to be missing in many programs where content and pedagogy are the prime concerns (Noddings, 1992). In fact, Brousseau and Freeman (1988) point out that teacher education programs generally do not challenge future teachers' beliefs about the teaching of mathematics and do not stress the responsibility a teacher has toward the profession. Ann Lieberman (1988) expands this thought highlighting the importance of professionalism in the educational process of teachers. She states that professionalism is for all teachers not just an elite cadre of teachers. Before teacher education programs can be encouraged to incorporate the idea of professionalism into the curriculum, professionalism in education needs to be defined.

The idea of teacher professionalism, although not new, is certainly hidden among the vast amount of content addressed in teacher education programs. With no relevant or consistent definition, colleges and universities may find developing the characteristics of a professional teacher within teacher education programs somewhat frustrating. Leaders from business, medicine, and politics often define professionalism by a set of characteristics. These characteristics include a special body of knowledge, code of ethics, personal responsibility, commitment to the profession, and service to the profession (Reynolds, 1994). Reynolds (1994) describes professionalism as a set of values, attitudes, and behaviors that put others before one self. Popkewitz (1994) in addition to collegial interaction adds the professional mathematics teacher also embodies traditions from the teaching profession. Professionalism, within organizations, involves specialized training programs, examinations, and a code of ethics (Dyer, 1988). This code of ethics, as Dyer suggests, can be used somewhat as a filter to include or exclude certain members. Professionalism may also be described with historical-sociological traditions, founded in elitism (Burbules, 1990). In mathematics education, interaction, knowledge, and common practices, are used by educational leaders as three of the most common attributes when describing professionalism (Noddings, 1992).

Pulling from our associates in business, medicine and politics, we can link interaction, knowledge, and common practices as characteristics of professionalism in industry to those in education. Interaction, simply defined, is the relationships forged among professionals. Relationships may be developed through professional

organizations and collaboration opportunities (Lieberman, 2008). Interaction directly corresponds to the professional characteristics of personal responsibility and service to the profession. The specialized body of knowledge characteristic currently associated with professionalism is also quite evident in mathematics education. Educators' knowledge not only consists of specific subject matter knowledge but also that of general pedagogical methods as well. The final attribute, common practices, correlate to a couple of the defined characteristics of professionalism within business and medicine. Teaching has a common set of practices, the why's and how's of teaching, that when examined make up a rather refined commitment to the profession. In order to excel in the teaching profession, a dedication to refining these tools exists (Reynolds, 1994). Inside these inherit common practices also lay a transparent code of ethics and trustworthiness. Public persona have certain expectations for educators as wells as professionals within education itself (Dyer, 1988). Revisiting Noddings (1992) research on professionalism within mathematics education, we can focus on the three main topics; interaction, knowledge, and common practices.

This study will focus on establishing a definition for professionalism within mathematics education from the viewpoint of mathematics teachers and mathematics teacher educators. In order to generalize the definition, the characteristics will be categorized into three identifiable areas; interaction, knowledge, and common practices.

Interaction

Professional interaction among mathematics teachers takes place within the school, the district, and through professional organizations such as the National Council of Teachers of Mathematics (NCTM). Popkewitz (1994) addresses mathematics education as a profession which contains collegiality and teacher knowledge. Lieberman (1988) also advocates that the professional teacher develops relationships among peers both inside the school and outside the school and with other teachers across the nation. This development may be through local, state or national professional organizations such as NCTM or increasingly through electronic social media. Without relationships, teachers suffer from a lack of professional stimulus and a lack of commitment to share knowledge (Lieberman, 1988). Peddler (2005) concludes teachers derive a range of benefits from social networking including learning new material, new teaching techniques as well as emotional support. Cwikla (2004) suggests the professional teacher should collaborate with researchers to increase the subject matter knowledge, pedagogical understanding, and derive new and innovative theories. This relationship building provides a catalyst for collegial interaction. Collegial interaction is the characteristic used by Lieberman (2008) and Cwikla (2004) to describe teacher professionalism. Pedder (2005) adds that the development of a teacher's professionalism involves collaborative learning. Teachers should be prepared to engage in lesson study, action research, peer observation, coaching, and other various collegial interactions and encouraged to do so (Darling-Hammond, 2009). Collegial interaction serves to characterize a teacher as a professional and serves the teacher with increase learning, philosophical support, and encouragement.

Knowledge

Professionals base their careers on a use of specialized knowledge (Furlong, 2000). For teachers of mathematics, this consists of a deep understanding of mathematics, a wide range of pedagogical tools and the ability to apply psychology and learning theory to promote the highest achievement possible for their students. Schulman (1987) refers to this specialized knowledge in mathematics education as “pedagogical content knowledge (PCK).” PCK fits as a descriptor for professionalism since the teacher is prepared in such a manner as to have the ability to differentiate instruction in order to reach all students. Vacc and Bright (1999) suggest the professional teacher, especially in the area of mathematics, should engage in personal reflection in order to improve the development of mathematics PCK. This personal reflection together with collegial interaction, demonstrates a teacher’s dedication constant improvement. Lieberman (2008) notes the ability to professionalize an organization rests upon the “questions of theory, research, policy, and practice” (pg. 82), all of which are driven by the constant quest for knowledge. Darling-Hammonds and Richardson in a 2009 presentation reported that teachers need to be prepared to take control of their own learning, in order to grow in the teaching profession through the expansion of their knowledge base.

During the past 45 years, higher education faculties have maintained a subject-knowledge focused curriculum as established by the National Defense Education Act and Elementary and Secondary Education Act. Professors in universities teach future teachers, especially secondary teachers, within their areas of expertise in discipline-

specific courses (Lieberman, 2008). While secondary teachers become relevant experts in their respective teaching fields, elementary teachers are only exposed to basic concepts throughout the curriculum, including mathematics (Pedder, 2005). This lack of knowledge negatively stereotypes elementary teachers considering only one element of PCK and shows a lack of respect for the pedagogical and child development knowledge shared by most elementary teachers and sometimes lacking in secondary teachers. These consistencies confound attempts to define professionalism in teaching.

Common Practices

Generalized practices are needed on top of specialized knowledge. Teachers need to understand how to deal with disruptive students, manage everyday administrative tasks, communicate with parents, evaluate students subjectively, and various other rituals encumbered in the day-to-day operations of the classroom (Noddings, 1992). Teachers are often deeply committed to students, a common practice in education (Biklen, 1987). Relationship building is a vital link in professionalism and developing the rapport needed with students (Commer, 1988). As Noddings (1992) concludes:

Mathematics teachers may need to give more attention to the moral conduct of their teaching. In a time when “They don’t care” is the number one complaint heard from student dropouts, it may be necessary to cultivate a trusting relationship with students.

Educators are forced to make decisions on content, assessments, and overall curricular issues without always having access to direct data (Berry, 2004). Berry

(2004) contends this inadequate access to data, or lack of knowledge on where to find the data, creates a void in assessing a course of action in curriculum development and assessment inside the classroom. With teacher turnover raising exponentially, a wave of new teachers enter into the profession with very little knowledge of common practices and leave well before they become skilled (Carroll, Reichardt, et al, 2000). This turnover dilemma leaves Berry (2004) to question if teachers were prepared with subject matter knowledge but ill-prepared with the knowledge of the basic responsibilities, thus driving potentially high-achieving educators into other careers.

Role of Higher Education

For the past fifty years, colleges and universities have prepared the vast majority of teachers licensed in the United States. Working in conjunct with state departments of education, licensure requirements have been established in each content area and for each level. These standards vary from state to state further complicating the task for defining professionalism. A review of the standards from various states shows a consistent attention to subject matter knowledge with some attention to pedagogy but little if any attention to professionalism (University of Kentucky, 2010). Although like the varying theories of learning and the ensuing debate on the “best” practice for teaching, professionalism has a much more complex description.

In the United States, teacher development has its roots in the late 1950’s and early 1960’s when Congress passed the National Defense and Education Act (NDEA) in response to the Russian launching of Sputnik. Eyed at making a stronger mathematical

and science educational unit, the NDEA may have lead to redefining the role of a teacher as a foot soldier race to space. Higher education faculties were called upon and funded to train and develop the new era of teachers and usher into public education a new curriculum developed around mathematics, science, technology and foreign languages (Lieberman, 2008). In 1965, the Elementary and Secondary Education act (ESEA) assisted in the transformation of the schools into institutions for social change (Cohen, 1970). Once again, universities were assigned the duty of disseminating the expertise and knowledge for this new society emphasizing racial equity and access for those with disabilities (Lieberman, 2008). Now the responsibility for economic supremacy has been placed on the shoulders of teachers.

New curricular demands have placed restraints on the amount of courses a higher education institution can require of a student in order to receive a degree (Volkwein & Lorang , 1996; Wright, 2001). This constraint places a heavy burden on colleges and universities to compact as much subject-related knowledge as possible in the amount of course hours available. The increase in subject-specific knowledge decreased the curricula in regards to other areas and perhaps characteristics of professionalism suffered as a result.

Once teachers enter the classroom, they cross into an arena in which subject-related knowledge is merely one tool needed to survive and be successful in the education field. Bakioglu (2000) noted the lack of research on the professional identity of teachers and the development of such an identity. He concludes that the perception of teachers is one of subject matter experts and pedagogical experts. Teachers self-

imposed as professional experts, he concludes, form elitist standards and render teaching to more of an elite cadre of teachers and thus impact the robustness of the definition of professionalism.

Could a lack of professionalism be from a lack of preparation? Are pre-service teachers being introduced to professional attributes enabling them to control their own learning? This study is important given the current emphasis on accountability of educators, the rigor of highly qualified, and the public focus thrust upon the teaching profession. Barnett Berry (2004) states that research on teacher professionalism has fueled an overhaul in recruiting, preparing, licensing, supporting and paying teachers of highly qualified teaching subjects, such as mathematics. The study could add a level of validity and credibility to mathematics educators by providing a consistent description of the characteristics of professionalism within the mathematics education community.

Problem Statement

In 1986, the Carnegie Task Force recommended, as part of its efforts to reform education, the professionalization of teaching (Noddings, 1992). While the vigor to redefine educators as a profession has not met opposition, it lacks a strong advocacy. The lack of a concise definition of professionalism and professionalization within education further hinders progress toward the goal (Mkhize, 2004; Noddings, 1992). In addition, mathematics educators face a double standard when speaking in terms of professionalism. Mathematics educators are trapped between two distinct yet related professions, professors of education and academic mathematicians. For several years,

the relationship between the two professions has encountered an incredible lack of cooperation (Noddings, 1992).

Given the requirements for teaching mirror those in the law and medical fields, and the only true test of professionalism lies within the medical and law professions (Noddings, 1992), the characteristics which define mathematics educators as professionals need to be studied. Along with these characteristics, the development of pre-service teachers should also be addressed in order to insure the future teachers are enabled to garner these professional characteristics.

Purpose of Study

Is there a certain set of characteristics that define a mathematics teacher as professional and are our higher education institutions enabling future teachers to refine these characteristics? To answer these questions, research needs to be conducted on current opinions of mathematics those in charge of preparing future mathematics teachers, and current mathematics teachers. Research must be conducted on the criteria currently being used to define professionalism and which, if any, of these criteria are being relayed to pre-service teachers. Therefore, the purpose of this mixed-method study is to gather data regarding the characteristics needed to define professionalism of mathematics educators. The study also seeks to determine whether or not higher education institutions are equipping future educators to become professionals.

The data for this study will be collected through two online surveys. The first survey will be administered to mathematics teachers in public schools across the United

States. The second survey will be administered to mathematics teacher educators, those responsible for training future mathematics teachers, also from varying regions across the United States.

Assumptions

For the purpose of this study the following assumptions will be made:

1. Subjects will respond to the best of their ability and with honesty to the instrument administered.
2. The instrument used gives a broad picture for characteristics used to define professionalism.
3. The instrument used gives a broad picture of characteristics discussed in universities' curricula.
4. The researcher's analysis will be comprehensive and the findings correctly described.

Limitations

Since both survey instruments being designed will be administered online, the data collected will exclude any participants without the technological resources to gain access to the instrument. In addition, participants unwilling to survey via the internet will also add to the limitations of the study. The participants selected are all employed within accredited schools across the nation; therefore, teachers employed by schools choosing not to be part of the accreditation process are excluded.

Delimitations

The study is designed to uncover the characteristics current mathematics teachers and mathematics teacher educators deem of most importance in defining the professional teacher. Mathematics teachers and mathematics teacher educators are the only curricular specialists being surveyed for responses; therefore a broad generalization across all areas of the educational curriculum is not implied.

Research Questions

The guiding research question will be: How do mathematics teachers and mathematics teacher educators define professionalism? To answer this question, I ask concrete questions based on areas of characteristics determined from related research, using a developed survey from similar questionnaires. The secondary question guiding research will be; how are higher education institutions developing professionalism in pre-service teachers?

Organization of the Study

This study will be organized into five major chapters. Chapter 1 will provide an introduction, the statement of the problem, the purpose of the research, the importance of the study, assumptions, limitations, delimitations, definitions of important terms, and the organization of the study. Chapter 2 will be a review of the related literature which provides background and basis for the study. Chapter 3 will identify and explain the methods and procedures which will be used for data collection and analysis. Chapter 4 will have data presentation and analysis of the data. Chapter 5 will contain a summary,

major findings and conclusions of the research, implications, and recommendations for further research.

Chapter 2

Literature Review

Professionalism is a subject often referred to, especially in medical fields, but is seldom defined (Cruess, 1997). "The problem is that despite the increasing interest in professionalism there is no agreement on how to define the term." (Arnold, 2002, p 502) While this lack of a definition leads to professionalism being used in an inconsistent matter (Van de Camp, 2004), professionalism is recognized for importance among leaders in business, politics, medicine and education. Reynolds (1994) describes professionalism as a set of values, attitudes, and behaviors that put others before one self. Professionalism is not a right but a privilege (Cruess, 1997). The status of a professional, according to Cruess, is a privilege granted by society and consists of a set of characteristics which may change over time. Professionals base their careers on a use of specialized knowledge (Furlong, 2000).

The principles describing professionalism vary across research. Cruess (1997) cites expertise, ethics, and service as criteria that guide professionalism. Professionalism requires expertise in applying the knowledge or skills and the idea of professionalism is to be pursued, added Cruess. Reynolds (1994) adds to the previously mentioned criteria, behaviors such as pursuit of specialized knowledge and skills throughout a lifetime, collegial and cooperative approaches, meeting goals set for the by the public and other members of the profession. Professionalism is a multidimensional concept defined by many elements (Van de Camp, 2004).

In his 1997 book, Alan Dyer lists 8 principles defining professionalism in the medical field.

1. The professional is engaged in social service that is essential and unique.
2. The professional is one who has developed a high degree of knowledge.
3. The professional must develop the ability to apply the special body of knowledge that is unique to the profession.
4. The professional is part of a group that is autonomous and claims the right to regulate itself.
5. The professional recognizes and affirms a code of ethics.
6. The professional exhibits a strong self-discipline and accepts personal responsibility for actions and decisions.
7. The professional's primary concern and commitment is to communal interest rather than merely to the self.
8. The professional is more concerned with services rendered than with financial rewards.

Many professions share common characteristics of professionalism, however the nature of the individuals vary. A set of attributes describing professionalism in general across many professions will vary according to the researcher (Cruess, Johnston, & Cruess, 2004). Professionalism, within teaching, is commonly viewed as; learning is “straightforward consumption” and teaching is a “reliable service and skilled performance.” (Lieberman, 1988) A teacher may be referred to in many states as professional when a probationary period of a certain number of years has ended. By any definition in the literature “professional” is not something that is simply conferred. Professionalism is earned and demonstrated by teachers through various avenues inside and outside the school environment (Lieberman 1988, 2008; Noddings 1992).

“To be a professional means to place oneself in an attitude of service to one’s fellow man, yet at the same time to earn one’s living by the knowledge one has acquired” (Dyer, 1988, p16).

An American sociologist Lortie (1975) suggests teachers fail to establish professionalism because of an inability to create collective knowledge and primarily develop on a personal basis, leaving a conservative, individualized theory of education. Burbules (1990) emphasized that current avenues of professionalism are based on historical-sociological traditions which are founded in elitism and social processes, a hierarchy rather than a defined set of characteristics. Thomas Englund (2001) argues that professionalism in teaching will focus teachers on personal gains rather than developing a professional culture for future teachers to follow and build upon. This individuality among the teaching profession could leave future teachers unprepared and without any collegial assistance.

Talbert and McLaughlin (2001) conclude current teacher professionalism is largely described by external conditions, such as public expectations and governmental agencies. The conjecture continues that professionalism is driven by local school traditions and norms rather than a collective body of teachers attempting to become more effective educators. Since the schools are icons of communities, current professional standards include characteristics of the localities rather than a larger body of teacher professionals.

In contrast, Ann Lieberman (2008) argues placing teachers in a professional role, in charge of their own growth and development, allow teachers to “focus on relationships among principals, teachers, peers, students and content.” This leadership role placed on teachers produces more joint efforts, critical reflection and problem solving situated in improving the curriculum and instruction. According to Lieberman (2008), this process creates teachers moving from isolation as just a teacher using traditional methods to a more creative professional teacher, leading a community of learners focused on determining best practices.

With the increased presence of public scrutiny on teachers in terms of accountability for student learning the lack of a consistent definition of the professional teacher, places teachers in a negative light. However, numerous authors offer suggestions for professionalizing education, For example, Pedder (2005) suggests teachers need collegial interaction in order to develop professional relationships. Cwikla (2004) notes the importance of the professional teacher to collaborate with researcher in the field, especially mathematics, thus increasing subject matter pedagogical understanding and embracing new theories and practices. Popkewitz (1994) specifically defines mathematics teacher professionally as containing collegiality, teacher knowledge and traditions. Lieberman (1988, 2008) advocates for a shared membership group such as NCTM as a basis for professional growth. Personal reflection for the improvement and development of mathematics content and delivery is included in the debate by Vacc and Bright (1999).

Characteristics of a Professional Teacher

In the public arena, education is often overlooked as a profession and often viewed as “those who can do and those who can’t teach” (Noddings, 1992). Wallace (1995) states obvious examples of workplaces of professionals including medical clinics, research institutes, architectural offices, accounting firms, and law firms. If not openly recognized, then what is teaching professionalism? In looking into mathematics education, specifically, three areas identified earlier from educational leaders will be considered: interactions, knowledge, and common practices.

Interactions

Collegial Interaction with peers

A report by the Holmes Group (1986) notes, a majority of teachers lack the opportunity to engage in professional collaboration with colleagues. Little (1982) found school climate and teacher effectiveness higher within educators involved in collegial relationships. The development of collegiality as a part of professionalism within mathematics educators is rarely established (Noddings, 1992). Increased collegiality within mathematics teachers develops with a goal not only to improve the instruction of the mathematics educator but to build a culture of professionalism among colleagues (Maloy, 1993).

The professional teacher is engaged and supportive of an environment in which teachers collaborate (Louis, Kruse & Bryk, 1995; Talbert & McLaughlin, 2001, Hayton & Spillane, 2005). With collegiality as a professional trait, teachers can effectively

manage challenges occurring within schools and communities, thus possibly improving student achievement (Louis, Kruse, & Byrk, 1995; Hayton & Spillane, 2005). Talbert and McLaughlin (1994) write that teachers participating in collegiality, especially within subject matter, have higher levels of professionalism. Refinement of classroom practices occurs more often when supported by collegiality (Clarke and Hollingsworth, 2002).

In a stark contrast to the collegiality development of educators in the United States, Marge Scherer (2009) contributes the following statistics:

More than 85 percent of schools in Belgium, Denmark, Finland, Hungary, Ireland, Norway, Sweden, and Switzerland provide time each week for teachers' professional collaboration. And in South Korea, Japan, and Singapore, teachers spend only about 35 percent of their working time in the classroom; the rest is for sharing, planning and working together.

Collegiality as a professional trait does have short comings. The time for increased collegiality often deters from time spent developing other traditional areas of mathematics teachers, such as student-teacher rapport and communication with community memberships (Bucher, 1961; Romberg, 1988; Noddings, 1992). Thus, as Noddings (1992) suggests, collegiality is a characteristic open to criticism.

Many teachers view collaboration with others, especially when within the same setting, more of a "lighten the load" characteristic rather than a "share the wealth" trend (Ellinger, 2008). Ellinger (2008) also points to a growing trend in the United States of using lesson study, to foster the development of a collaborative characteristic. Ma and

Ellinger (2008) discussed the effect of a set of teachers engaging in this type of collaboration. Mathematics teachers should be directly exposed to the richness of the mathematics in which they were never exposed, in order to become teachers (Ellinger, 2008). This learning process is more easily accessible by the professionally- developed teacher. The professional teacher will make the commitment to use collaboration, not as a load bearing tool, but to make teaching better (Ellinger, 2008).

Lieberman and Miller (2008) made note of a project headed by Liping Ma, engaging teachers in collaboration. The findings in this project shed light upon certain processes mathematics teachers embodied within an environment of collaboration:

1. Teachers were motivated to analyze students' mistakes and collect evidence for colleagues' review.
2. Teachers made more proactive and thoughtful decisions about their own classroom
3. Teachers had more mathematically- accurate conversations with students and colleagues.
4. Teachers related mathematics concepts and sequencing more seriously.
5. Teachers considered innovative processes, once thought to be of little use.

These processes outlined by Ma, represent the collaborative professionalism within mathematics education that Lieberman (2008) attempts to describe. Vernice James (2009) cites collaboration as the iterative process that drives teacher learning since group interaction and self reflection are part of the process. Little (1982) found collegial relationships lead to a greater effectiveness, producing a more professional environment. Teachers allowed to plan together, observe each other and evaluate students together have a greater sense of professionalism and are more likely to stay involved in the profession (Noddings, 1992).

Collegial Interaction with Researchers

Teachers working with researchers develop the capacity to extend beyond the classroom. In Abraham Flexner's (1910) report on the state of medical education, he found one of the areas weak in the medical community was professionalism. Making research a priority within medical training was one of Flexner's steps for improving education. Flexner's belief in research eventually leads to his phrase "More thinking, less publishing." Cochran-Smith and Lytle (1993) found that teachers working with researchers became scholars who challenged long held notions of what research are and by whom it is conducted. Within the same study, the teacher-researcher became role models with the educational community and focused more on reflecting on instruction. These teacher-researchers developed new curriculum and began mentoring fellow educators (Cochron-Smith & Lytle, 1993). Lieberman & Miller (2004) concluded teachers working with researchers were better equipped with theoretical and practical practices and were able to disseminate the research to fellow teachers. This produced a repertoire of ideas rather a list of ready-made procedures.

"Almost no researchers are likely ever to be in as good a position to gain such well-rounded an expertise—a professionalism that comes both through close familiarity with researchers as colleagues and through years of experience," writes Kate Maloy (1993) when speaking of the relationship teacher and educators can potentially possess. Maloy concludes that the professional nature of the teacher-researcher is the crucial link between the intuitive and formal, between the students and the beneficial research.

Jill Adler (1997) argues that when teachers collaborate with researchers in the mathematics classroom; the teachers broaden their questioning, actions and reflections past the classroom into the overall educational process. The teacher-researcher extends professional development by not only conducting useful and rigorous research but developing the knowledge and expertise of others (Mousley, 1992).

When researchers collaborate with pre-service teachers within the methodology coursework, results are beneficial. Moreira (1994) intertwined research within mathematics education courses and discovered the process not only improved the pre-service teachers' skills but also positively influenced the mathematics teacher preparation program. Pateman (1989) argues that the time involved in implementing the teacher and researcher process is too consuming, leading Adler (1997) to state the process should be facilitated and supported by university faculty.

Bill Ferreter (2009) states of teachers "adult learning is often pushed aside in schools as educators sprint through the day." Ferreter suggests one way to combat this disenfranchisement is to join an educational community or organization.

Professional Organizations

Subject-area teacher networks, such as NCTM, can provide support for innovation and change, and thus new developments in curriculum and instruction, furthering the educator as a learner and professional (Little & McLaughlin, 1991; Lichtenstein et al 1992; Lieberman and McLaughlin, 1992). Organizational membership can connect educators with new technologies, expose them to new content and

different conceptions of pedagogy, and provide essential support in areas of serious challenge (Talbert & McLaughlin, 1996). By interacting within professional organizations, the teacher is both engaged and engaging others in the learning process (Lieberman, 2008). Mathematics teachers find varying degrees of differences when discussing pedagogy, even within the same schools. This phenomenon is greatly reduced with the interaction produced by professional organizations (Hayton & Spillane, 2005). Professional subject area organizations not only provide an avenue for socialization but more importantly they provide for the accumulation of shared knowledge. Becoming an effective teacher requires learning, not only by reflecting from what is already known, but with the conversations and relationships with others engaged in related work (Lieberman & Miller, 2008).

Knowledge

The Carnegie Task Force (1986), the Holmes Group (1986), and Shulman (1989) all conclude teacher knowledge is often defined through a liberal arts education.

Teacher knowledge is defined as the procedures fundamental to teaching in general.

Noddings (1992) concludes

All teachers need to know how to manage a classroom, discipline unruly students, evaluate students, report to parents, fill out forms, and fulfill other administrative expectations.

This type of practical knowledge is defined outside of the subject matter arena and into a general pedagogical knowledge characteristic. Universities are faced with a double-sided problem. The professors want to prepare students for the real world classroom but at the same time prepare pre-service teachers to become change agents, a characteristic of true professionalism (Noddings, 1992). Bishop (2001) points to the necessity of professional practical knowledge: knowledge defined as practical knowledge, teacher practical knowledge, personal practical knowledge, and knowing-in-action.

Pedagogical Knowledge

Pedagogical knowledge translates the understanding of the sciences into useable moments (experiences) and is a necessity in the education of pre-service teachers (Hudson, 2004). A professional teacher should build on teaching experiences and pedagogical knowledge constantly transforming from a beginning educator to the consummate professional (Allsop & Benson 1996; Moran, 1990).

One of the most daunting tasks at defining the professional teacher is the description/definition of the knowledge needed by teachers (Holmes Group, 1986). The concepts and information mathematics texts contain are remade through the use of new pedagogical contexts within a refined professional teacher (Beijarrd, 1999). Noddings (1992) even challenges the importance subject matter knowledge has on teaching. In 1983, Druva and Anderson concluded research produced little support to back the necessity of extensive subject matter knowledge.

Because current mathematics teachers, especially in the elementary schools, are not viewed as mathematicians nor have the subject matter understanding to feel confident, mathematics teachers tend to define mathematics only from a cognitive sense as opposed to a constructivist ideology (Noddings, 1992; Lieberman, 2008). In the field of mathematics education, the undergraduate education of future mathematics teachers lags far behind in developing mathematical understanding needed to teach with the rigor expected in today's schools, thus putting pre-service teachers in quite a disadvantage (Noddings, 1992). Noddings also notes mathematics departments are unwilling to provide rigorous courses designed to meet the deep understanding of basic mathematics needed for the pedagogical content knowledge of the professional teachers.

Universities are challenged to develop the pedagogical content knowledge of teachers. Hill, Schilling and Ball (2004) conjectured that specific measures of such subject-matter knowledge were not in place in mathematics education. Julia Cwikla (2004) states that when teachers are challenged to understand and problems solve mathematics at a deeper level than their own, they are confronted with the situations their students are placed in and this allows the teachers to explore their own thinking and development.

Reflective Learning

Kitty Kwakman (2003) describes the professional teacher as a self-directed learner that investigates many projects and is responsible for these learning opportunities throughout the process of planning, executing, and evaluating. Reflection

within the individual educator is viewed as a “cornerstone” of a professional (Schon, 1983). Through reflection, a professional teacher unlearns routines and improves the quality of their teaching by adapting and evaluating best practices (Kwakman, 2003).

Caffarella (1993) found contradictory evidence in research about the use of reflection. His study concluded a lack of motivation and personal preference as possible variables defining confusing results. Results for the importance of motivation in relation to reflective learning are stressed throughout literature (Clardy, 2000; Eraut, Alderton; Farr & Middlebrooks, 1990; Scribner, 1999; Kwakman, 1999, 2003).

To the contrary, Kwakman’s 2003 study revealed the majority of teachers describing themselves as professionals, participated in reflective practices quite often. McIntyre (1993) concludes reflection is the primary tool teachers use to mold and sustain learning. In the absence of reflection, teachers lack a key characteristic enabling them to change their practice (Peddler, 2005).

Eraut (1994) argues that a vast amount of knowledge used by teachers is derived from personal experience. Huberman (1993) describes reflection as follows:

Unlike, say, an engineer, a teacher works seldom with predesigned materials or tools. Nor does a teacher start with a blueprint, but rather reaches for some scrap or surplus material from previous jobs as a project takes shape....he or she develops an increasingly differentiated and integrated set of procedures, representations, and algorithms for reading the next task to be accomplished.

Hoyle and John (1995) identified reflection and inquiry as a main characteristic of the professional. Considerable research has established

systematic reflection by teachers as a professional activity poised at enhancing a teachers' practice and thereby a characteristic of a professional (Day, 1985; Elliott, 1991, Edwards 1997, Peddler, 2005).

Common Practices

Teachers are conflicted about what it means to be a professional. Current teachers' fears about professionalism relate most closely to the ministry and nursing. Some see professionalism diminishing the role of the caring nature and devotion which enticed them into the field (Noddings, 1992). This presents a limited view of professionalism; traditional teacher characteristics, such as curricular issues and classroom management skills, need not be ignored when defining the professional teacher.

Teachers should foster communication skills both inside and outside of the school and be able to establish an appropriate rapport with students, parents and colleagues (Beijarrd, 1999; Noddings, 1995). As a matter of fact, moral and ethical decisions are more scrutinized in teaching than any other profession (Fenstermacher, 1994). Beijarrd (1999) concludes the professional teacher should understand that all educational choices reflect the personal aspects of the educator and those of the students.

McIntyre (1992) referred to this traditional knowledge of the teaching traditions as necessary craft for the professional teacher. Popkewitz (1994) challenges universities to develop traditions of teacher practice.

Teacher Control

Professionalism of teachers and the ability of teachers to manage vital pieces of the educational process are closely related. The control of curriculum issues, pedagogical decisions and other daily rituals are directly linked to teacher professionalism (Hensley, 1996). According to Gerald Grace (1987), the professionalism of teachers began to disintegrate in the mid 1980's during the push of state controlled curriculum. State mandated curriculum issues enforced by building principals and directors of schools force a power struggle with teachers. Problems occur from different opinions and interpretations of such curricular matters, often leaving teachers to compete against authority figures and peers (Hensley, 1996). Teachers may feel forced to standardize education by administrators creating tension in classrooms as teacher exert what control they have on students (Noddings, 1992).

How and what teachers actually teach inside the classroom walls ties directly with the teachers' commitment to professionalism (Eisenmann, 1991). Ball and Bowe (1992) specifically point to teacher professionalism as a resistance to the effort to establish a national curriculum. Hensley (1996) concludes that a teacher's control of educational facets in which they were trained to manage, such as curriculum issues and pedagogical applications, is a defining source of professionalism. As noted earlier by Noddings (1992), the push for standardization of educational assessments creates a resistance in teachers. The forced standardization of curricular matters create a climate of teacher unprofessionalism (Carnegie Task Force, 1986)

Role of Higher Education

Professionalism is defined as a necessary learning outcome in the medical field. However, most of the teaching of professionalism remains informal, or part of a hidden curriculum (Van de Camp, 2004). Cruess (1997, p1674) states “professionalism must be taught.” “Changing teacher professionalism means challenging the skills and knowledge of which new teachers are exposed” (Furlong, 2000). Cruess, Johnston, and Cruess (2004) suggests professionalism should include educational activities aimed at teaching the role and behavior of professionalism and should begin with a firm definition of the word. Because specialized professors were becoming rare and budgets cuts limiting the resources available to higher educational institutions, traditional teacher education has lost some curricular aspects of professionalism in a need to graduate more teachers (Furlong, 2000). Furlong et al. (2000) coincidentally conclude that implementing professionalism requires a change in the content of initial training. This change in initial training, according to Furlong, is required in higher education due to the need to develop knowledge-based professional skills over longer periods of time prior to entering the classroom.

Implications

With the continued push to establish more and more accountability for teachers, especially in mathematics, the importance of educators to establish themselves as professionals and continue to build upon that professionalism is necessary. Using perquisite standards laid out by business, medicine and law, professionalism, the status

of “professional” goes beyond being labeled by merely meeting experience standards in governmental eyes; teachers must yield a repertoire of characteristics. These characteristics defining a professional teacher are ambiguous and debatable.

As the movement to establish more subject knowledgeable mathematics teachers continues, so does the pressure for universities to graduate more-prepared educators. In the midst of this endeavor, colleges and universities can only require a maximum amount of credits for graduation, thus forcing key components of the educational process to be combined or cut from the required curriculum. The amount of preparation teachers receive varies from university to university and state to state. The development of professionalism and the professional characteristics, interaction, knowledge, and common practices, are commonly left to the discretion of subject-matter methods courses and even more commonly abandoned during the course of teacher preparation programs.

Chapter 3

METHODS

As discussed in Chapter 2, vast differences abound in defining a professional teacher. With several characteristics consistently noted, this study aims to collect data that would define teacher professionalism in mathematics education. Surveys are to be designed using existing questionnaires to elicit opinions on the characteristics of professional teachers from not only mathematics teachers, but those educators who are responsible for teacher preparation programs. Data from each survey will be analyzed to identify consistencies among teachers and teacher educators on the development of teacher professionalism. These two sets of data will also be paired together in an attempt to explore interactions among teachers from different geographic regions and the teacher educators responsible for preparing teachers in order to analyze any differences in what is viewed as professional by practitioner and what is being taught by mathematics teacher educators.

Research Paradigm

The ideas of French philosopher August Comte define the paradigm I will be following. Positivists' paradigms explore social behaviors, such as those found in education, and emphasize observation and reason as principles in understanding human behavior (Dash, 2005). Hatch (2004) adds that the positivist captures knowledge in order to study and understand realities. Dash (2005) concludes in a

positivist paradigm, the ultimate goal of science is to integrate and systemize findings into a meaningful pattern that is generalizable and quantify theories and relationships. Pickering, (2006) adds a Comte quote “from science comes prediction, from prediction comes action.” This study begins with surveys leading to predictions and finalizes with a definitive set of traits for professionalism in mathematics education.

Research Design

This study was designed to investigate characteristics current mathematics teachers believe define professionalism in mathematics educators. Further, data collected on mathematics teacher educators’ views on professionalism and the level of preparation incorporated into the mathematics education curriculum, enable future mathematics teachers to see the meaning and value of striving to be a professional. These data sets were used to frame a generalized picture of the traits a teacher needs to possess in order to be considered professional by peers. A comparison was established between the level mathematics teachers felt they were prepared to be professionals and the level mathematics teacher educators felt they were preparing beginning teachers. The study outlined was a mixed-method body with the majority of data consisting of Likert scaled scores with Strongly Agree (5) being the highest and Strongly Disagree (1) the lowest scores. Within selected scaled questions, an opportunity was given to comment or add explanations in order to defend the score. These data were analyzed in order to establish a deeper understanding of the scaled score.

This type of questioning provided both qualitative and quantitative data to increase both the validity and reliability of the study. The triangulation of the research began with an initial question in which the participant answered to a scaled score. That scaled score was followed by an explanation, or reasoning, of the scaled score, giving the participant a chance to communicate the thought process behind their rankings. Finally, a follow-up question pertaining to the same initial question was asked in terms of actual day-to-day examples rather than definition style, thus concluding the process and increasing the validity of the scaled score. The mixed-method process coincided well with the positivist's paradigm in that it enabled the strengths and weaknesses of single methods to be off-set by each other (Katsulis, 2003). The approach also enhanced careful observation and measurement of objectives that are influential in reality (Katsulis, 2003). In order to improve validity and reliability through the triangulation process, mixed-methods research provided an avenue in which the data can be viewed under different microscopes and then compared in order to strengthen knowledge claims or explain a lack of convergence (Cresswell, 2003). Mixed-method research gave the researcher an opportunity to explore outlying data to gain insight on why certain cases diverged from the sample and examine data at multiple levels (Katsulis, 2003, Cresswell, 2003).

After data collection, each question's scale score was used to compute the mean of each item. After taking scale scores and comparing means, the findings were compared to the qualitative explanations the participants provided by coding key words teachers used to support the initial rankings. This additional analysis strengthened

results and validated the findings. In this study, the use of both qualitative and quantitative data found in mixed-methods research complement each other in that information gained from one part of the survey instrument was used to clarify questions in other parts of the survey. The expansion across regions of the United States provided robustness to the conclusions drawn from the analysis and assisted in the generalization of mathematics teacher professionalism.

Through the mixed-method research, the qualitative data consisted of geographical information along with explanations to various survey answers, allowing participants to provide additional insight and the researcher to deepen the understanding of the scale score and the intent behind the thinking of the participant. This insight provided a glimpse into the thinking and reasoning behind certain data points within the survey. The data was collected from on-line surveys. The administration process was as follows:

1. A brief letter/e-mail was sent to randomly selected mathematics teachers and mathematics teacher educators eliciting participants.
2. A request to participate was sent with appropriate IRB information.
3. The communication of the web address for the survey was sent to all willing participants.
4. A reminder e-mail was sent after 2 weeks to all non-responding participants.

5. A follow-up communication e-mail was sent to all participants thanking those that had completed the survey and asking those which had not to please take the time to complete the survey.

The data collected was used to define the following:

1. Information about the mathematics teachers' background such as years experience and highest degree held.
2. Information about the mathematics teachers' beliefs in regards to professionalism.
3. Information about the mathematics teachers' preparedness to be successful in gaining professional characteristics.
4. Information about the mathematics teacher educators' beliefs in regards to professionalism instilled with the curriculum.
5. The amount of actual time mathematics teacher educators spend introducing and refining skills needed to become a professional mathematics teacher.

The data were collected by an on-line survey of mathematics teachers and mathematics teacher educators in the spring 2010. The mathematics teachers were randomly identified through the regional accreditation offices for colleges and schools and contacted via e-mail. A total of 2575 invitations were sent to mathematics teachers and 222 surveys were completed. Mathematics teacher educators were randomly

identified using the AMTE (Association of Mathematics Teacher Educators) website and also contacted via e-mail. A total of 535 invitations were delivered to these educators, with 77 surveys being completed.

Identifying Mathematics Teachers

In order to enroll participants in this study, the websites of the regional accreditation (such as Southern association of Colleges and Schools (SACS)) commissions was used. In navigating the websites of the regional accreditation agencies, a search was conducted, by state, identifying schools. The searches were conducted by state for secondary public schools. Once the list of accredited schools was produced per state, a random selection of the schools was conducted using a random number table. Once schools were selected, another random determination was used via the random number table to identify possible mathematics teachers within those schools for participation in the survey. Once the teachers were identified, an e-mail was sent to the selected mathematics teachers within the schools. E-mail containing information about the purpose of the survey, information regarding the website and process of the survey, a completion deadline of approximately one month was released. Those teachers requesting not to participate were noted in order to exclude them from follow-up information.

Identifying Professors of Mathematics Educators

The AMTE website was used to identify faculty participants. Since the membership of AMTE is mathematics teacher educators, a randomly selected list of

members was created from the directory using a random number table and an e-mail was generated asking for participation in the survey, *Professionalism Defined and Taught in Mathematics Education Survey*. Within this e-mail was the purpose of the study, deadline for completion of the survey, and a link for the survey instrument.

Survey Instrument

The surveys for both the mathematics teachers and mathematics education faculty were designed based on two existing surveys. The first from the Standing Committee for the Education and Training of Teachers (SCETT) and the second from the Centre for Professional Practice in Leadership, Education and Training School of Professional Studies. The SCETT survey was designed to primarily elicit general response from teachers to determine what teacher professionalism means today. Thus far, the SCETT survey, outside the confines of this study, has garnered nearly 300 responses in an online format. The Centre for Professional Practice survey was used to define the relationship between school reform and teacher professionalism in Pakistan. This survey encompassed 450 teachers. These two separate surveys were analyzed and questions relative to the characteristics of teacher professionalism were incorporated into one survey for this study. Since both surveys used different wording for similar characteristics, a basis to design the main form was determined.

In addition to using these two pieces, the surveys were administered to a pilot group of local mathematics teachers to increase the reliability and validity of the responses. Also, before introduction to the participants, the surveys were analyzed by Dr. Nel Noddings from Stanford University, in order to insure an unbiased set of

questions (Williams, 2008). The pilot group of mathematics teachers was administered the survey in an attempt to maintain reliability and insure the validity of the survey instrument (Creswell, 2007). Both the teacher survey and the teacher educator surveys were piloted within a small section of both bodies and feedback taken (Creswell, 2007). Within the pilot groups, only small wording changes were made to clarify intended responses. Once Dr. Noddings reviewed the final draft of the instrument, she suggested adding a question to gather data on community trust of teachers since national surveys suggest people distrust schools outside their own communities. Dr. Noddings also suggested adding a qualitative piece to a Praxis question, allowing participants to expand on the expectation that the praxis is regarded similar to the BAR and medical exam. The survey items are rated using a five point Likert scale of strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree. A selection of the survey items asked for elaboration in order to allow the participant to give feedback regarding certain questions.

Professional Definition and Preparedness in Mathematics Teachers' Survey

A survey was administered to question mathematics teachers' beliefs in regards to characteristics important to the teaching profession (Appendix 1). The survey was designed to take no longer than 20 minutes. The survey included questions within three areas of professionalism identified by Noddings (1992): interactions, knowledge, and common practices.

The first three questions gathered background information about the participant; state of current teaching employment, years of teaching experience and degree level.

This information assisted in comparing groups of participants within same geographic regions, years experience and degree level along with a cross section of each category.

Questions four and five evaluated the importance the participant feels about being recognized as a professional in the teaching profession. These questions assisted in analysis of the remainder of the survey since those feeling professionalism is not important may skew the results, thus allowing for further insight.

A common thread through the fields of medicine, law and education are standardized exams at the end of preparation programs. Question six asked the participant about the relationship of such tests. The seventh question provided a follow-up asking the relationship between teachers, doctors and lawyers in terms of professional standing.

The next questions, eight and nine, guide the participants through a ranking process for the three areas of characteristics. Interaction, knowledge and common practices were all addressed in both questions. Question eight specifically addressed the characteristics and had the respondent rank each in terms of a professional mathematics teacher using strongly agree through strongly disagree. Question nine re-examined the characteristics through actual circumstances surrounding the teacher.

Questions ten and eleven addressed the teachers' pre-service curriculum into the survey. The participants were asked in which state they received their initial licensure, and a series of questions in which they responded using the same five point Likert scale as before. The purpose of the last two questions was to link the two surveys together,

mathematics teachers and mathematics education faculty, in order to identify any misconceptions about the curriculum focus on professionalism at the university level.

The final question introduced the lurking variable of tenure into the survey. Some teachers may have answered questions to this survey in regards to what is best to gain tenure rather than professional definition. Question twelve gave a data point in regards to tenure status.

Professionalism Defined and Taught in Mathematics Education Survey

In order to assess the level at which professionalism is being introduced into the mathematics education curriculum, a survey instrument was designed (Appendix 2). The survey was designed to take no longer than 20 minutes. The survey collected data on the state in which the faculty member currently prepares mathematics educators, the experience at the post-secondary level, the characteristics which define mathematics teacher professionalism, the curriculum design in relation to professionalism, and the level at which pre-service teachers are exposed to professionalism within the faculty member's courses.

Question one of the mathematics education faculty survey asked for the state in which they currently are teaching. Question two and three dealt with the years experience the faculty member maintained both in higher education and in K-12 settings. These three questions inquired background information about the participant.

Questions four through eight paralleled the survey for the mathematics teachers as mentioned earlier in the chapter. The remaining two questions requested thoughts

about the relevance and preparation of professionalism within the mathematics education curriculum currently in place at their university.

Analysis of Data

The data collected from both surveys described the current views of professionalism within mathematics education. The two surveys were analyzed independently by tallying the scores from each question using a Likert scale with a range score of one-to-five; one being associated with Strongly Disagree and five associated with Strongly Agree. Where appropriate, the mean score for each question, or characteristic within the question if more than one, was computed in order to generalize mathematics teacher's beliefs of professionalism and thoughts of their pre-service education in regards to professionalism. The faculty survey questions were independently analyzed in the same manner, averaging the scaled scores and collecting the qualitative data in order to conclude the ideas and importance mathematics teacher educators place on professionalism within their curriculum. The questions holding the same relationship on each survey were evaluated using the means of the scaled scores assisting in the identification of similarities and differences between the teacher and the students of mathematics education.

The data from both surveys were evaluated using descriptive statistics, and later in the comparison, specifically the Student $-t$ test for significance within each scaled mean and standard deviation. With ranked scored means, differences within each group of

participants, along with similarities can be identified. The statistical test for significance allowed for analysis between ranked scores on different questions in order to determine evidence of a commonality or differences not easily identifies with the mean scores individually.

Chapter Summary

Looking to gain an insight into the beliefs teachers hold true in regards to professionalism, a survey was designed and administered to teachers from regions representing the entire United States. In addition to these beliefs on professionalism, the survey assessed teachers' thoughts about their preparation regarding preparedness to achieve a professional status.

In the second survey, mathematics teacher educators were asked to comment on characteristics of teacher professionalism and the preparatory nature which universities should provide pre-service teachers in regards to becoming a professional teacher. This survey instrument along with the mathematics teachers' survey data were combined to look for possible avenues of discourse or similarities in defining a professional teacher. The next chapter will present the data collected through these surveys.

Chapter 4

Results

In this chapter, the findings from the two survey instruments are reported. The results of the participants' responses to the surveys are reported by question. Descriptive statistics are introduced to begin each section, followed by any qualitative responses.

Professional Definition and Preparedness in Mathematics Teachers' Survey

Demographic Results

The initial question of the survey asked the respondents to identify the state in which they are currently employed as a mathematics teacher. As a result of the sampling process, the employment data is reported using the regional accreditation agencies (Figure 1). All 50 states and the District of Columbia are represented with the largest contingent of respondents from Ohio (5%), Iowa (5%), New York (5%), Tennessee (5%), and Utah (5%). The percent of participants closely mirrored the make-up of the accreditation regions. Question two had the respondent classify themselves by teaching experience (Figure 2). The data was skewed right with 22% of the participants falling within the 0-5 year range. Eighteen percent checked into the 6-10 range, while 15% were in the 11-15 year range. The next two categories, 16-20 and 21-25 years, both capped at the 13% mark. Interestingly, the percentage fell to 6% in the 26-30 categories but rose sharply to the 13% for the 30+ area. Forty percent of the

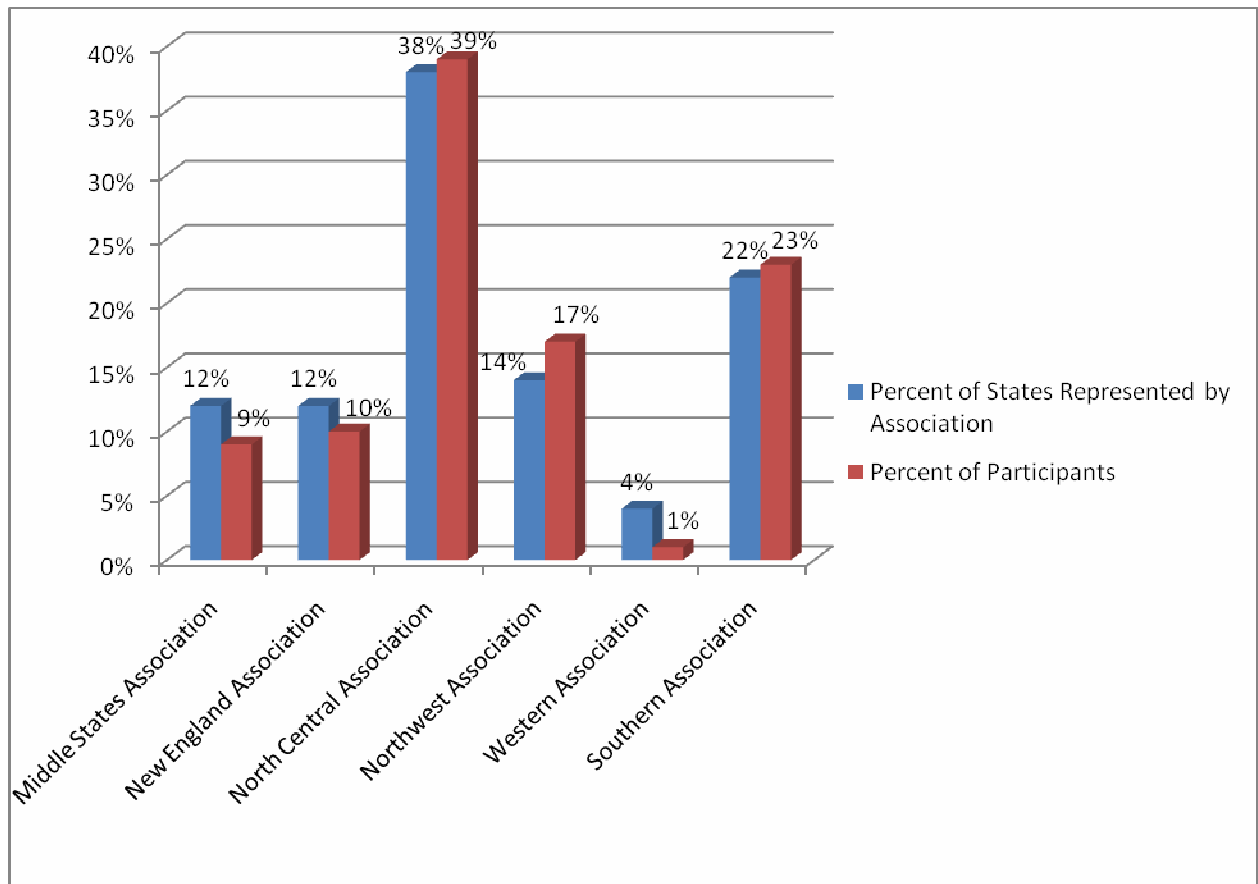


Figure 1: Mathematics Teachers' current employment state

respondents had 10 years or less teaching experience. The data did accumulate one “other” response but upon review of the data, one respondent answered twice within this question, one being the “other”, therefore, the extraneous response was ignored. This question asked the respondent for the highest degree held. The majority of teachers held a Master’s Degree (Figure 3). In fact, 59% of the responding teachers had obtained the Master’s Degree level. Thirty-six percent claimed a Bachelor’s Degree as the highest held degree. Educational Specialist and Doctorate rounded out the responses with three percent and one percent respectively.

Question 4

Question four aimed at gauging the perceived importance this collection of teachers placed on recognition as a professional. The question simply asked if they thought teachers should be concerned about being formally recognized as a professional. Eighty-one percent answered yes, teachers should be concerned while 19% disagreed (Figure 4).

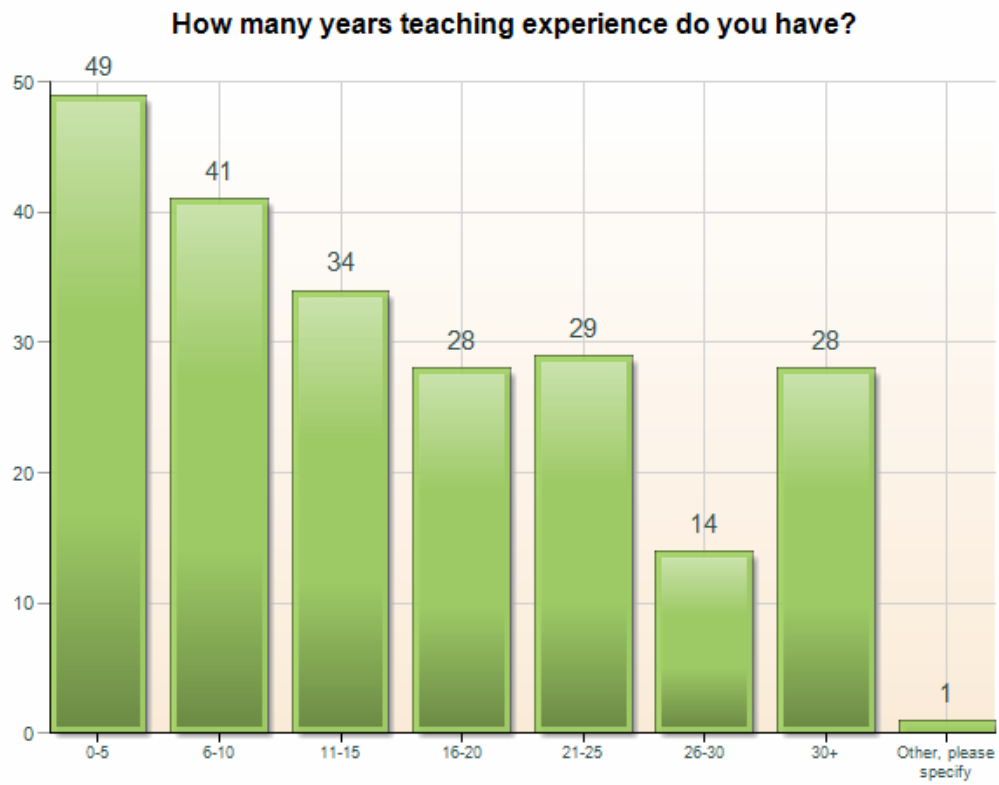


Figure 2. Years Teaching Experience

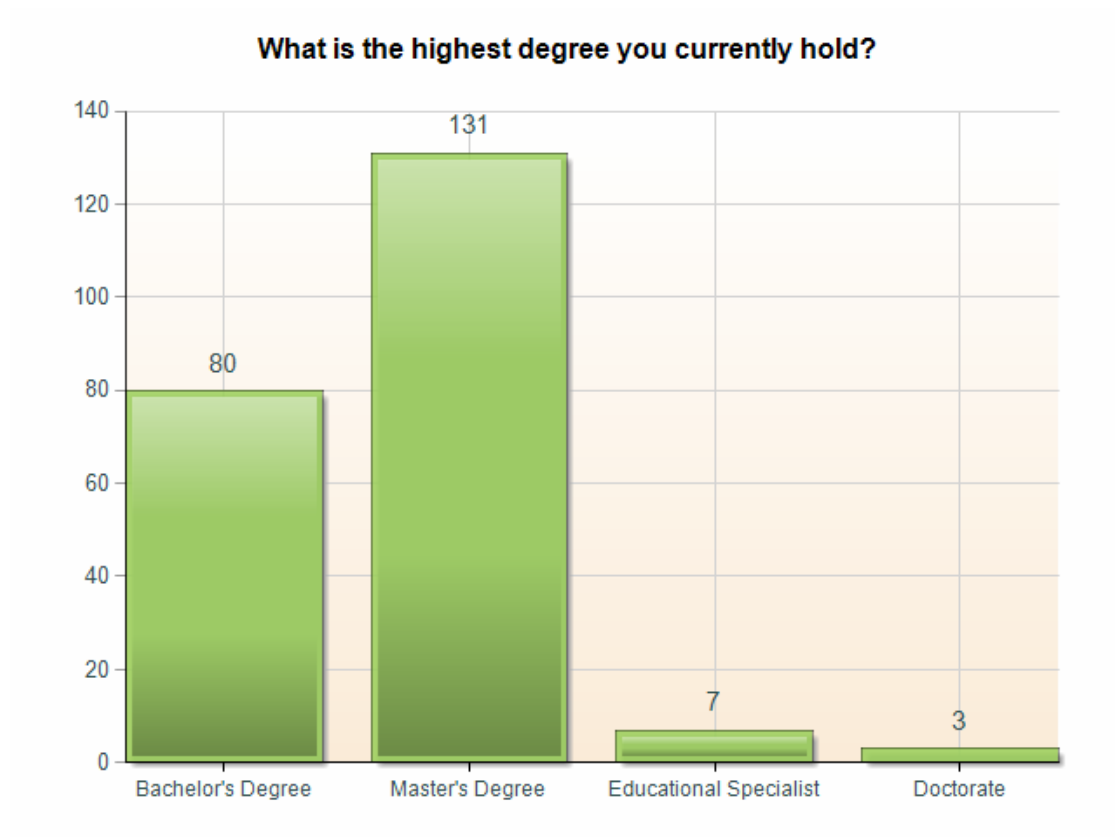


Figure 3. Highest Degree Held

Do you think teachers should be concerned about whether or not they are formally recognized as 'professionals'?

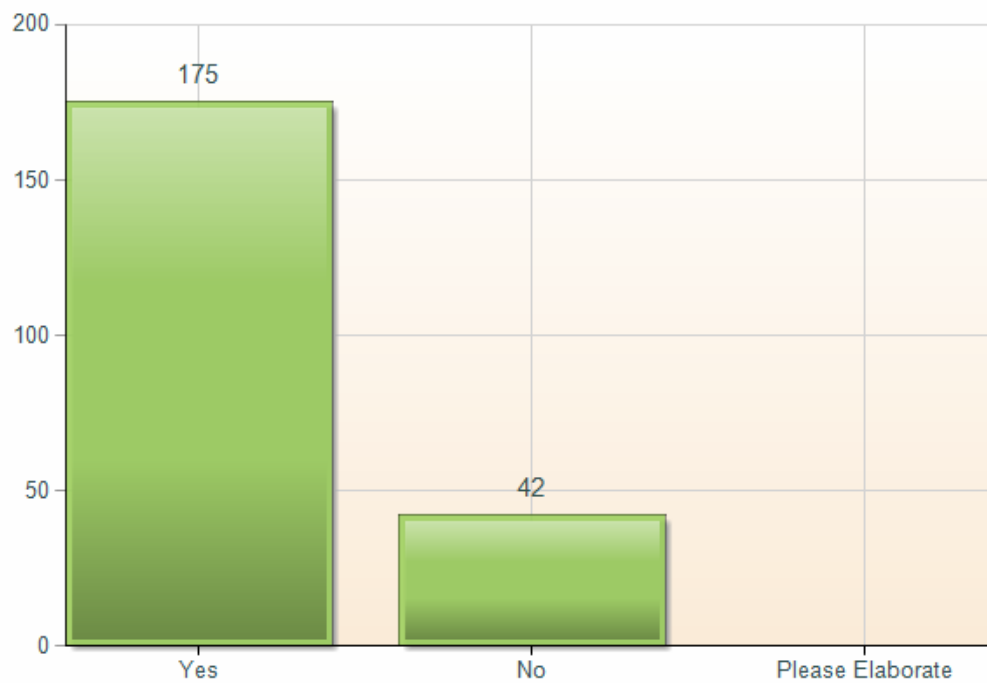


Figure 4. Teachers recognized as professionals

This question was also the first opportunity the responding teachers had to give an explanation, or comment, about their answer. Within the responses the divide between concern and discontent arose. The teachers voicing responses for concern cited community respect, skill level, and perception by the public as reasons for concern.

Perception seems to be everything these days. (MT)

In European and Asian countries are recognized as professionals, as are physicians, attorneys, etc. If we want our students to compete with other countries, we must respect education in the same way. (MT)

Due to the educational requirements to teach, educators are in the top 10% of people in the world intellectually. (MT)

Being a professional implies a degree of respect that teachers need to effectively do their job. (MT)

Yes, the amount of education that most teachers have, maintaining our certifications through professional development and continuing education, we are absolutely "professionals" and should be recognized as such. (MT)

We have to constantly stay on top of current educational statutes. We need to obtain degrees to get raises. I think we should strive to be recognized as professionals. (MT)

I believe that if and when teachers are recognized as professional, their work will be better supported by communities. In other words, parents will emphasize the importance of education to their children, communities will support the work of local schools and emphasize financial and community backing. I think then students will benefit as education will be seen as a priority. (MT)

With professionalism comes recognition by society of a valued profession. (MT)

Perception is often reality. If the public does not believe that we are "professionals," and if we don't conduct ourselves as

professionals, then our jobs will become increasingly regulated and dictated to us by those above us who are considered to be professionals in the field. (MT)

Of the 19% of the teachers not concerned with recognition of professionals, the lack of concern is voiced through the main point that teaching is about kids, not recognition.

Teaching is a job and even if others do not look at it as a profession, it is more of a calling. (MT)

What's important is how you think about yourself. In the public's eyes we will always be glorified babysitters. (MT)

The question was should we concern ourselves with whether we are formally recognized as professionals. I don't know when a teacher has the time to really concern themselves with this. (MT)

I don't need the designation of "professional" to do my job in a professional manner. I believe the way teachers dress and behave allows people to decide for them if we are "professionals." (MT)

In my opinion, concerning ourselves with our perceived status as "professionals" creates a natural juxtaposition with the unselfish reason that most teachers get into education in the first place, and that is to educate and help kids. (MT)

Formal recognition is irrelevant to me. It is the informal recognition that matters more. (MT)

Key comments also surfaced from question four relating directly to the research questions. As stated earlier, a recognizable definition of professional teacher does not exist and teachers also recognize this fact.

Define the word 'professionals'. (MT)

You must be recognized as a professional to be treated as a professional. (MT)

Not sure what the term means by definition. (MT)

What does it mean to be 'formally' recognized as professional? (MT)

I think there needs to be a formalized definition of the word "professional." (MT)

Question 5

Question five promotes the teachers' thoughts primarily through their opinion of trustworthiness, relating to the public views of teachers. Seventy-two percent of the teachers agreed that teachers have the people's trust (Figure 5). Fifteen percent were neutral in this thought, while 12% disagreed and claim teachers do not have people's trust. Within this question, teachers were also asked for further explanation regarding their answer. Overwhelmingly, the majority feel if parents allow children to attend school, then they must trust them.

I think that most parents' willing send their children to public schools and trust that they will receive an adequate education. (MT)

I agree because teachers spend as much time with peoples' children as they do. Parents have trust who they let teach their children. (MT)

I feel that most people trust teachers because teachers are looked at as being responsible for the future citizens of our country. If you can't trust those who are responsible for your future, who can you trust? (MT)

Everyone has been to school so everyone thinks they know what a teacher does and can do it as well as a teacher. They pass

judgment on the quality of a teacher based on this fact. Most of the time, it is a positive impression. (MT)

The 12% claiming teachers do not have the trust of the people make a couple of claims to support their opinions. The media and poor choices by a minority of teachers were often referred as the reasons the general public have a lack of trust for teachers.

People believe what they hear in the news media about the few teachers doing inappropriate things... It isn't news that the vast majority of teachers are working so hard, being innovative and flexible, and having success with students. (MT)

I believe that in the past teacher did have people's trust. Parents listened to what teachers said and worked with them for the best of the students. Teachers were allowed to do their jobs without a lot of outside interference. However, it seems that the same trust factor is going down. Teacher's actions are constantly being questioned and there constant criticism of teachers performance. (MT)

There appears to be an "anti-teacher" attitude by lots of people. (MT)

There are glaring exceptions to the trustworthiness of teachers, but these exceptions are shocking to most people because teachers are generally given a great deal of trust by the public. (MT)

There is a small segment of the profession that have tarnished the entire profession because of stories that hit the news about drug abuse, child porn, having affairs with their students, etc. I am sure that other professions have the same problems, but that does not make the 6 o'clock news. (MT)

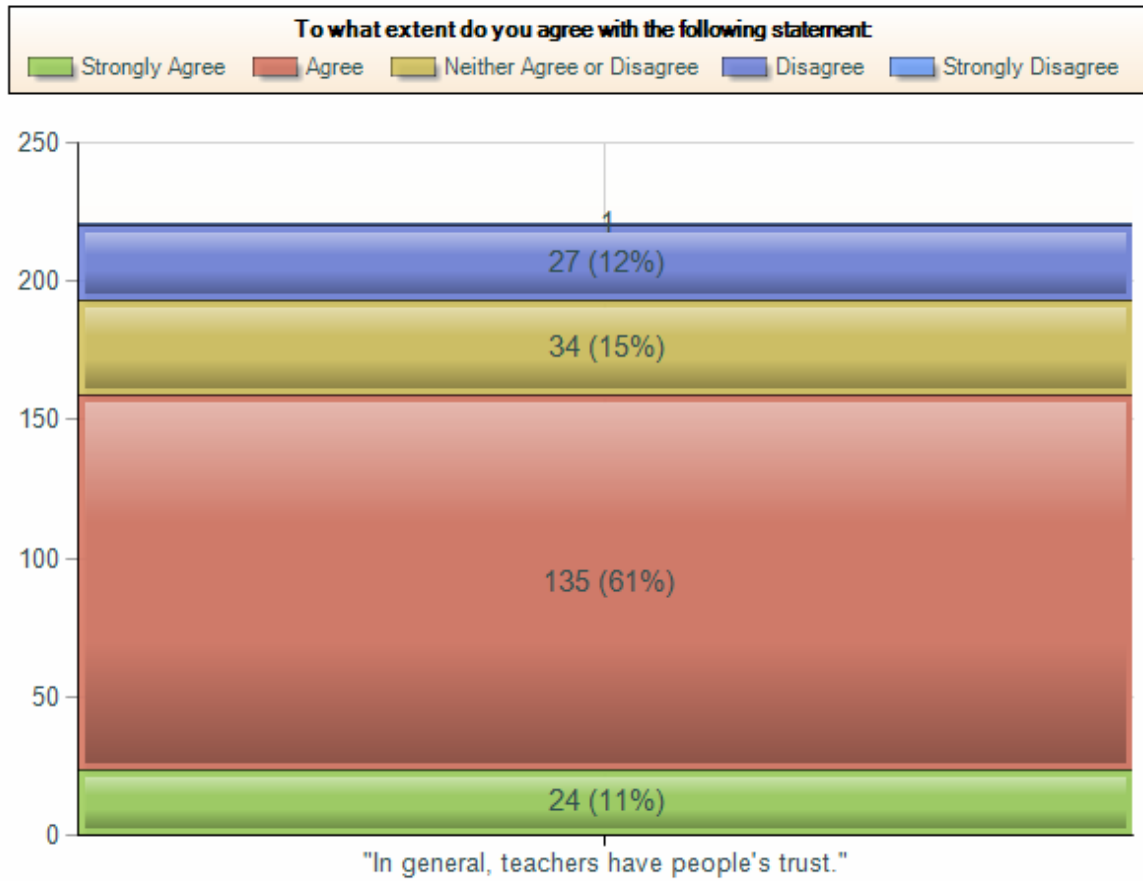


Figure 5. Teachers have peoples' trust.

Question 6

Do educators believe a standard test examining most aspects of the teaching profession, such as the Praxis Exam, make for a professional teacher? Of the respondents, 49% think teachers passing the Praxis Exam specialty areas should garner the same professional status as Doctors passing the United States Medical Licensing Exam and lawyers passing the Bar Exam (Figure 6). Countering the near majority was 22% of the respondents disagreeing that the exam makes one a professional. Twenty-eight percent maintained neutral on the Praxis Exam. According to one participant, the reason is simple.

When I took the praxis I was amazed at how simple it was. This low bar is our standard for teachers? I expected the praxis to be at least as difficult as the GRE. The Bar and the medical licensing examination are truly difficult exams, something I cannot say about the Praxis. Even the Praxis II's were easy compared to other post-graduate tests. (MT)

Question 7

Following upon the previous question, participants were then asked if teachers have the same standing as lawyers and doctors. A resounding 93% staked the claim that teachers do not have the same social standing (Figure 7). Although many comments were made regarding this question, the majority claimed the same common characteristics; lack of respect, teachers are community servants, and doctors/lawyers are more specialized in training and education.

A teacher passing the Praxis (National Teaching Exam (NTE)) and the required specialty area exams should garner the same professionalism as doctors and lawyers passing the United States Medical Licensing Examination and the Bar Exam?

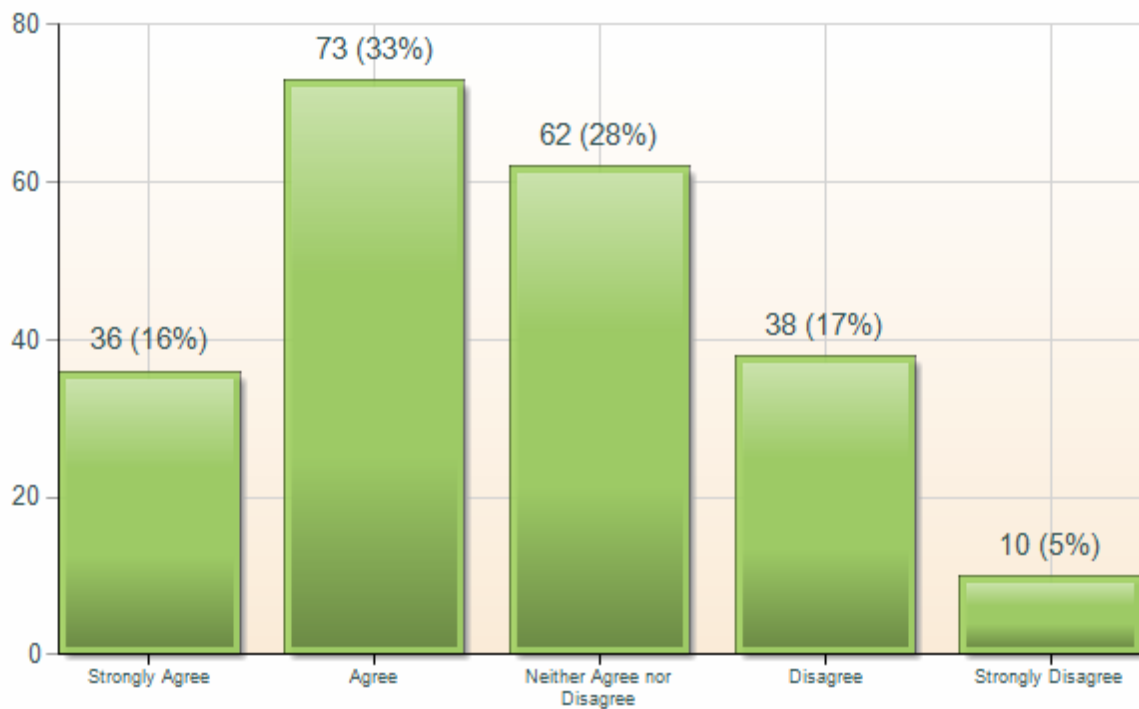


Figure 6. Passing the NTE in relation to the BAR exam

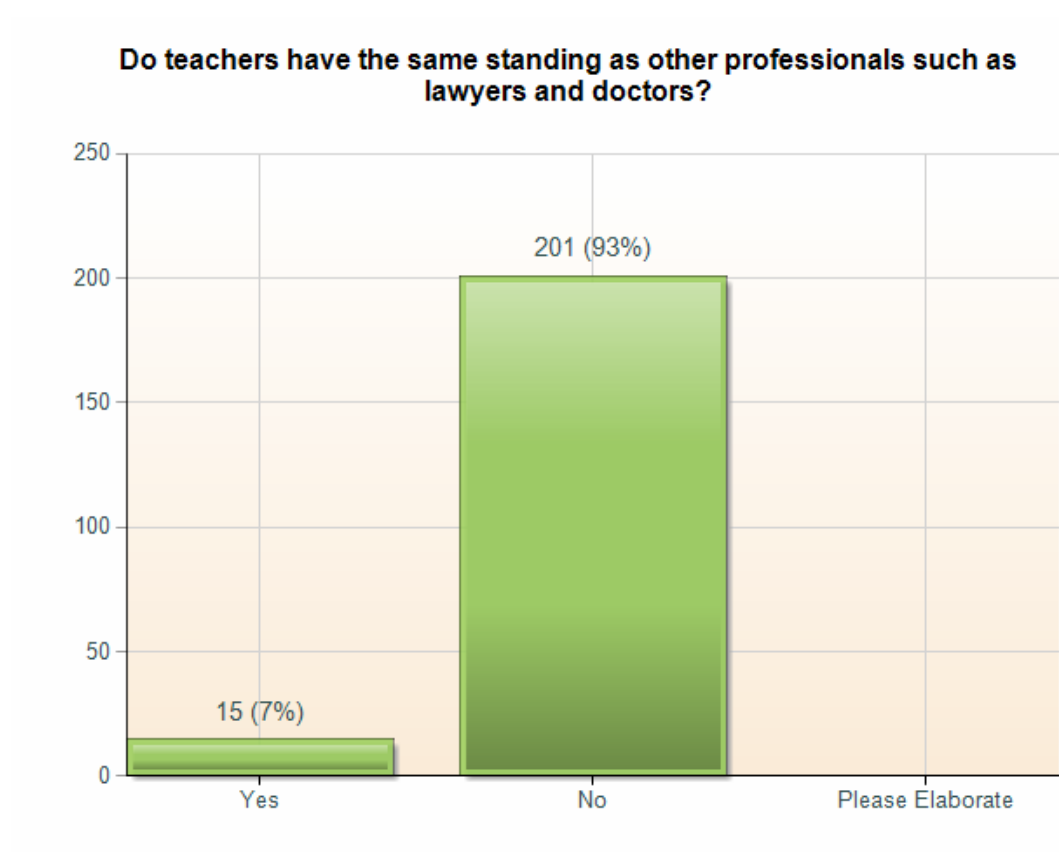


Figure 7. Teachers compare to doctors and lawyers

People in America do not have a strong value for education, so teachers are not as important as health care or legal help. We should be counted as professional as doctors and lawyers as we have a larger impact on society (children) than most other professions. (MT)

Doctors and lawyers are seen as more of a specialty area. A lot of people believe that anyone can walk into a classroom and be a teacher, while not everyone could walk into an operating room. (MT)

Lawyers and doctors currently have more required schooling and more strenuous licensing exams. They are also required to participate in more rigorous continuing education. (MT)

To be honest, it doesn't take nearly as much formal education to be a good teacher as to be a good doctor or lawyer. (MT)

In the public view, no. Should they, yes. However, teachers also need to establish guidelines to earn this standing. (MT)

My husband is a lawyer and he is NEVER asked - Are you still a lawyer while I am often asked - are you still teaching? (MT)

Question 8

Nine common attributes were discussed and the participants were asked to rate each (Figure 8). Each attribute was identified as a part of the necessity of professionalism but only a few ranked higher than others (Table 1). Subject matter knowledge ranked the highest on the Likert based scale with an average of 4.88 out of a possible 5. Knowledge of the Learning Process (4.77), Leads by Example (4.74) and Lifelong Learner (4.73) complete the top four rankings.

Table 1 Descriptive Statistics of Characteristic Rankings

	N	Minimum	Maximum	Mean	Std. Deviation
Reflective	221	3.00	5.00	4.3801	.63272
Collaborative	222	2.00	5.00	4.4009	.70332
Professional Organization	222	1.00	5.00	3.7342	.91077
National Board	221	1.00	5.00	3.2851	1.07247
Lifelong Learner	220	3.00	5.00	4.7318	.46414
Leader	221	2.00	5.00	4.7421	.51478
Research	218	2.00	5.00	4.1743	.69021
Subject Matter	219	4.00	5.00	4.8813	.32420
Learning Process	220	2.00	5.00	4.7727	.45146

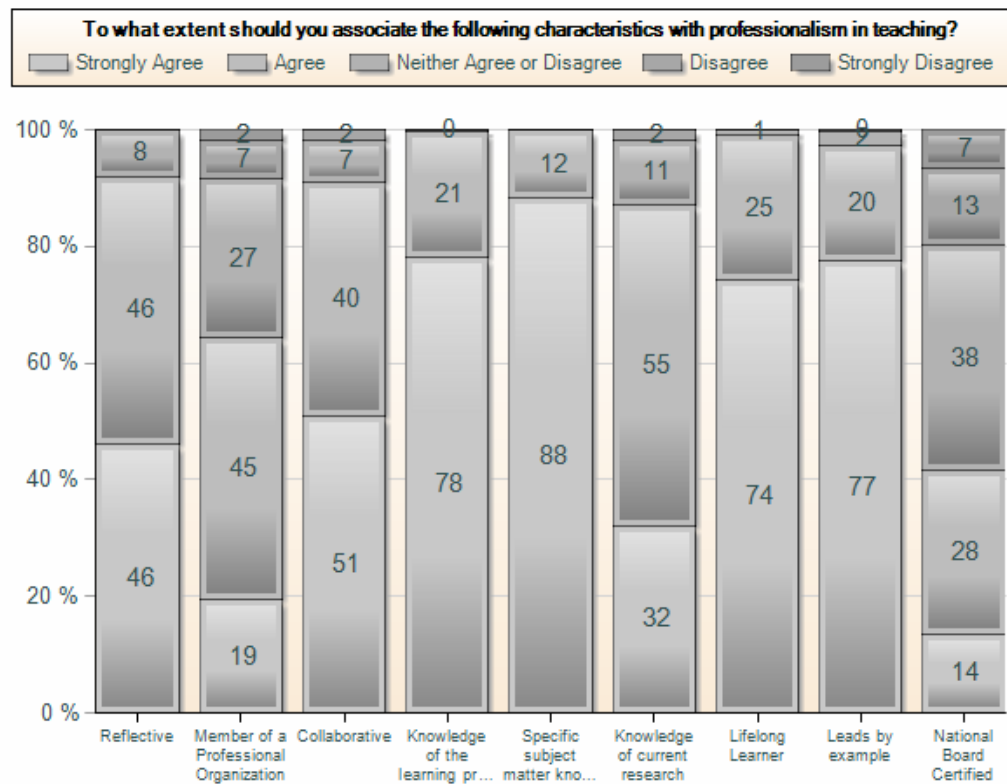


Figure 8. Association of characteristics with professionalism.

Question 9

Participants were given contextual examples in question 9, each referring to a characteristic from Question 8 (Figure 9). Again, subject matter knowledge ranked the highest (4.91) with Lifelong Learning (4.87), Reflective (4.81), and Knowledge of the Learning Process (4.77) in the top four. The answers closely resembled the same rankings from the previous question with the Praxis Exam and National Board Certification being the lowest ranked characteristics (Table 2).

Question 10

To assist in drawing conclusions in later sections, question ten collected the state in which the teacher received their initial teaching certification. Not every state was represented, with Alaska, Connecticut, Hawaii, and Washington D.C not having any participants receiving initial certification in their states. New York (7%) was the most represented, followed closely by Iowa (5%), Ohio (5%), Tennessee (5%), and Utah (5%). With the exception of the New England Association, the participants' percentages aligned with the states representation among the accreditation regions (Figure 10).

Question 11

Respondents ranked their initial teacher training in question 11 with respect to the characteristics discussed in this study as defining professionalism. Of the eight possibilities, the participants ranked feeling comfortable with the subject matter knowledge (4.61) as the highest (Figure 11). Overall, the participants ranked their preparation to become a professional teacher as a 3.92 (Table 3).

Table 2 Question 9 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
A teacher should have strong knowledge base in the areas in which they teach.	222	4.00	5.00	4.9099	.28696
A teacher should be continually learning and seeking new ideas to improve teaching	220	4.00	5.00	4.8727	.33404
A teacher should have a strong knowledge of the learning process.	221	4.00	5.00	4.7647	.42515
A teacher should evaluate their performance to improve their teaching	217	3.00	5.00	4.8065	.40752
A teacher should have discussions on teaching/learning issues with other teachers.	222	3.00	5.00	4.7252	.48618

Table 2 continued	N	Minimum	Maximum	Mean	Std. Deviation
A teacher should believe that their work can help to bring about change in their school.	220	3.00	5.00	4.6136	.57402
A teacher should explore the possibility of becoming National Board Certified.	220	1.00	5.00	3.6136	1.02070
A teacher should be involved in decision-making about the school curriculum	220	1.00	5.00	4.6227	.63994

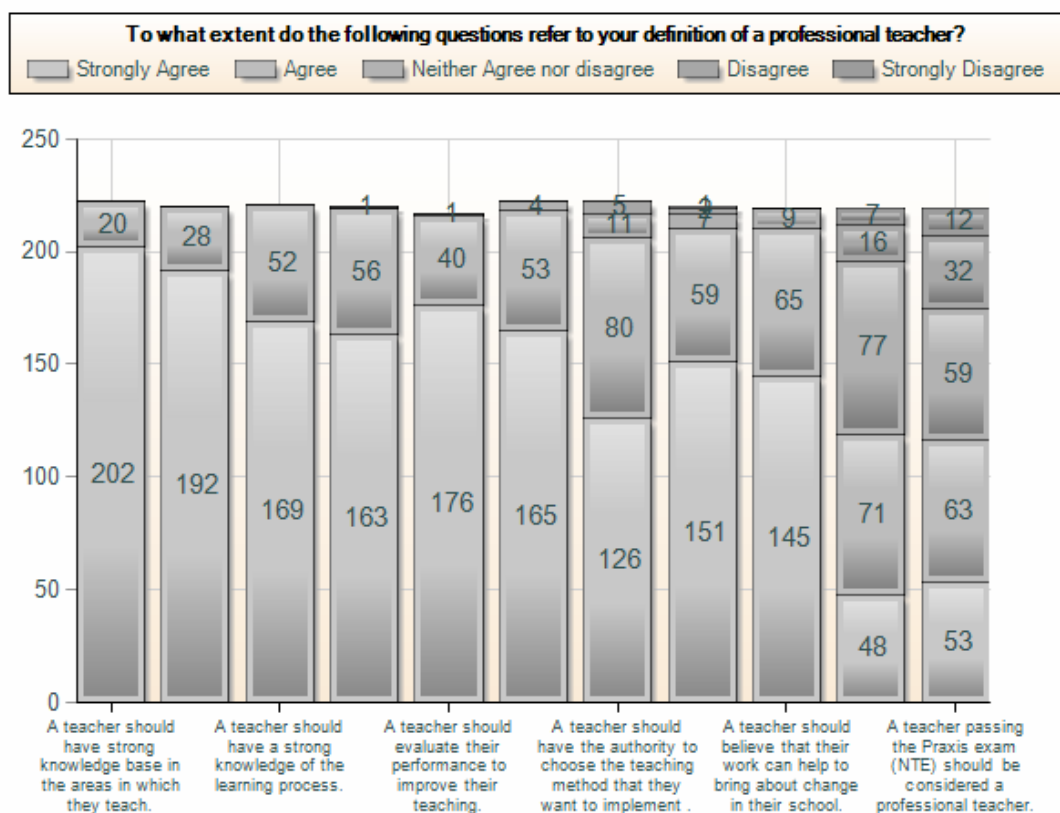


Figure 9. Ranking professionalism characteristics.

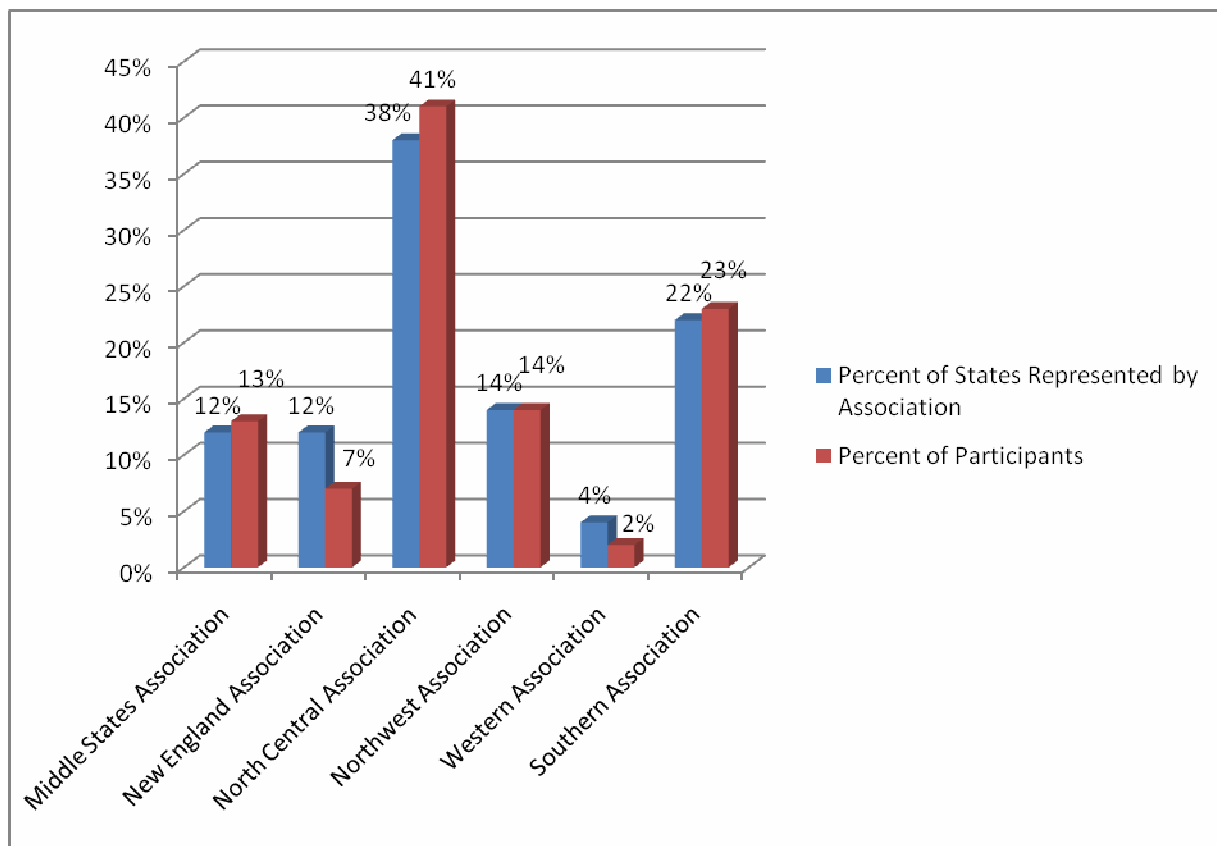


Figure 10. State teachers received initial teacher training.

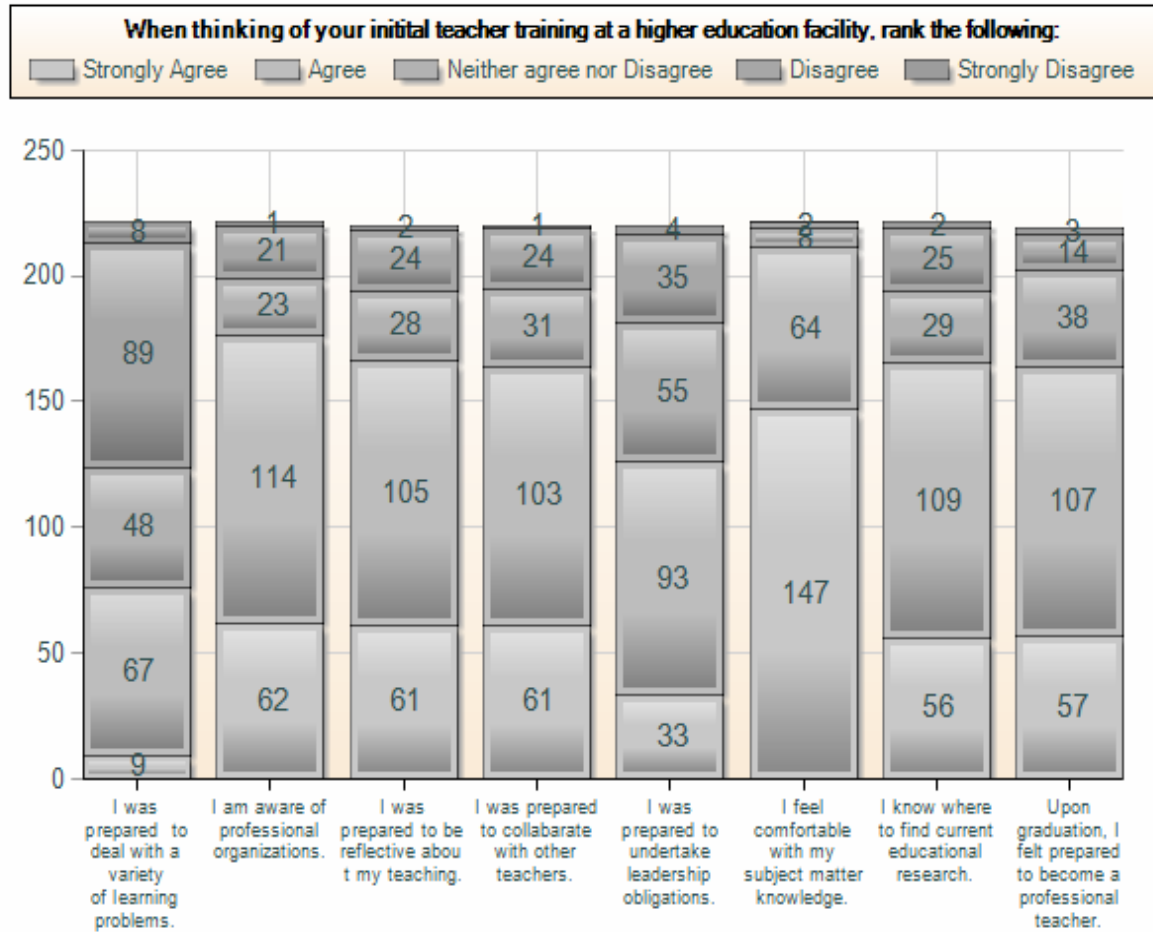


Figure 11. Professionalism preparation.

Table 3 Question 11 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Question 11: I was prepared to deal with a variety of learning problems.	221	1	5	2.91	1.005
Question 11: I am aware of professional organizations.	221	1	5	3.97	.899
Question 11: I was prepared to be reflective about my teaching.	220	1	5	3.90	.958
Question 11: I was prepared to collaborate with other teachers.	220	1	5	3.90	.944
Question 11: I was prepared to undertake leadership obligations.	220	1	5	3.53	.990
Question 11: I feel comfortable with my subject matter knowledge.	221	2	5	4.61	.605

Table 3 continued	N	Minimum	Maximum	Mean	Std. Deviation
Question 11: I know where to find current educational research.	221	1	5	3.87	.952
Table 3 continued					
Question 11: Upon graduation, I felt prepared to become a professional teacher.	219	1	5	3.92	.900

Question 12

When asking a survey with opinions about the teaching profession, the tenure attribute is hard to overlook. Teachers can answer questions based on the perceived answers for the interviewer rather than with tenure opinions. In this survey, 66% of the responders currently have tenure (Figure 12).

Professional Defined and Taught in Mathematics Education Survey

Question 1-3

The states represented by the mathematics teacher educators covered 51% of the nation. Mississippi (12%) and Texas (10%) were the most represented followed closely by Indiana (8%) and Illinois (6%) (Figure 13).

In regards to experience at the post-secondary level, 59% of the participants have 10 years or less experience (Figure 14). Of the post-secondary responders, 64% had 10 years or less at the elementary, middle, or high school levels (Figure 15). In fact, years of experience in elementary through secondary schools were skewed right.

Question 4

The mathematics teacher and mathematics education professors were asked to rank the level of trust the general public had for mathematics teachers. On the Likert based scale, these respondents ranked the level of trust at 3.7 of a possible 5.0 (Figure 16). The majority (68%) felt they agreed with the statement, "In general, teachers have people's trust."

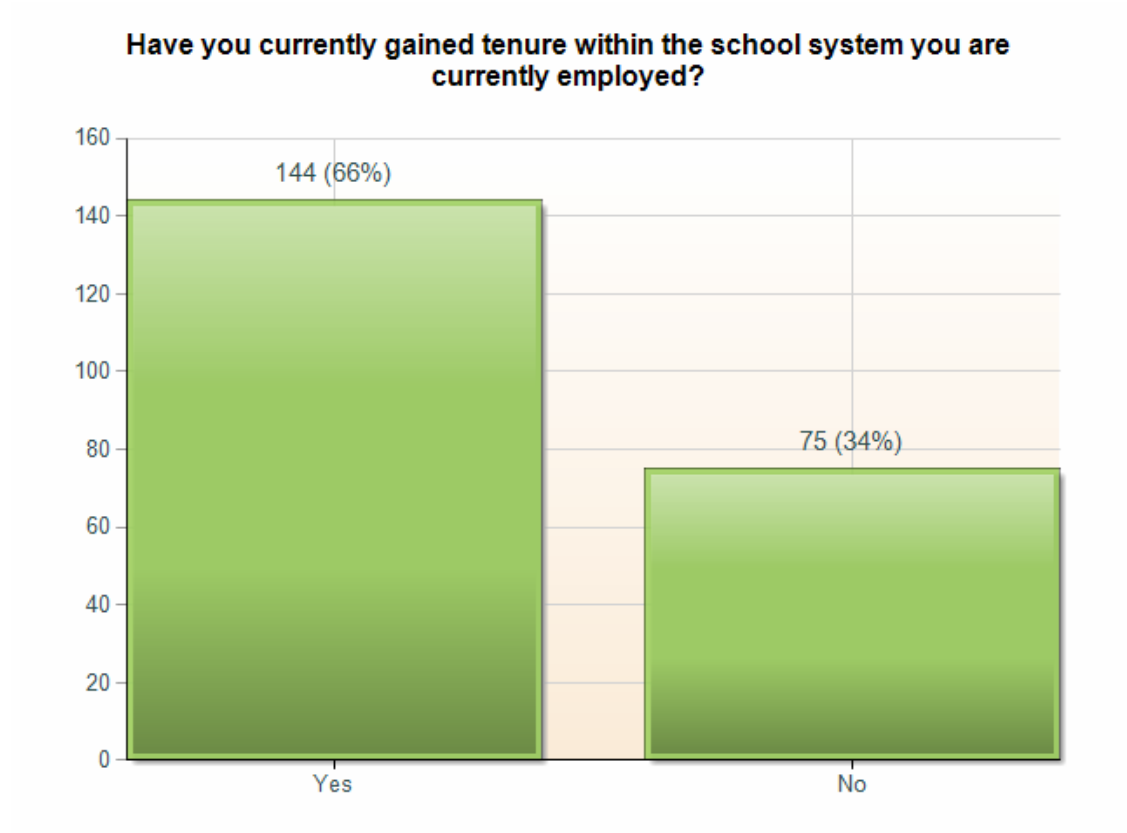


Figure 12. Tenure

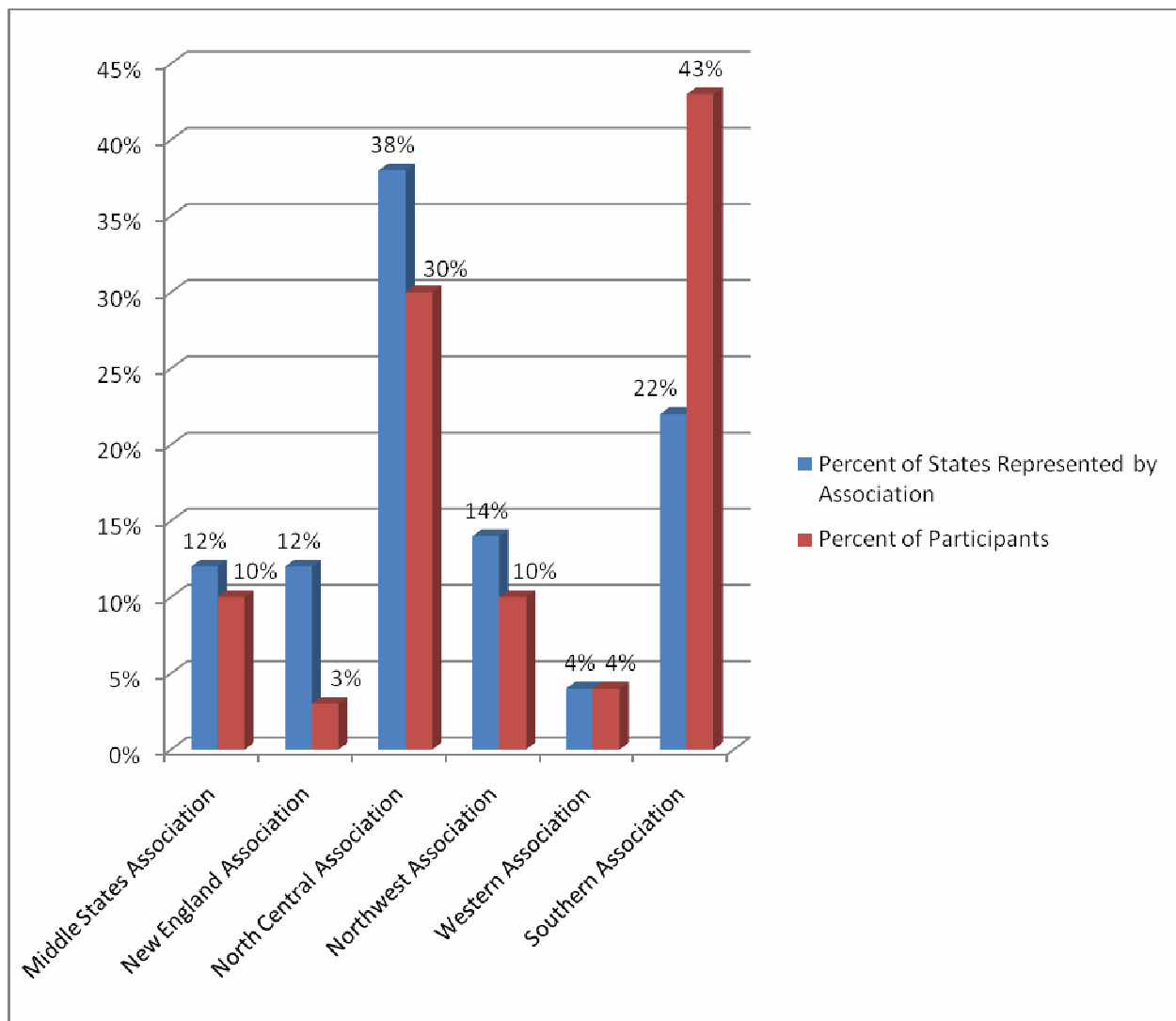


Figure 13. Mathematics teacher educators' employment state.

How many years experience do you have at the post-secondary level?

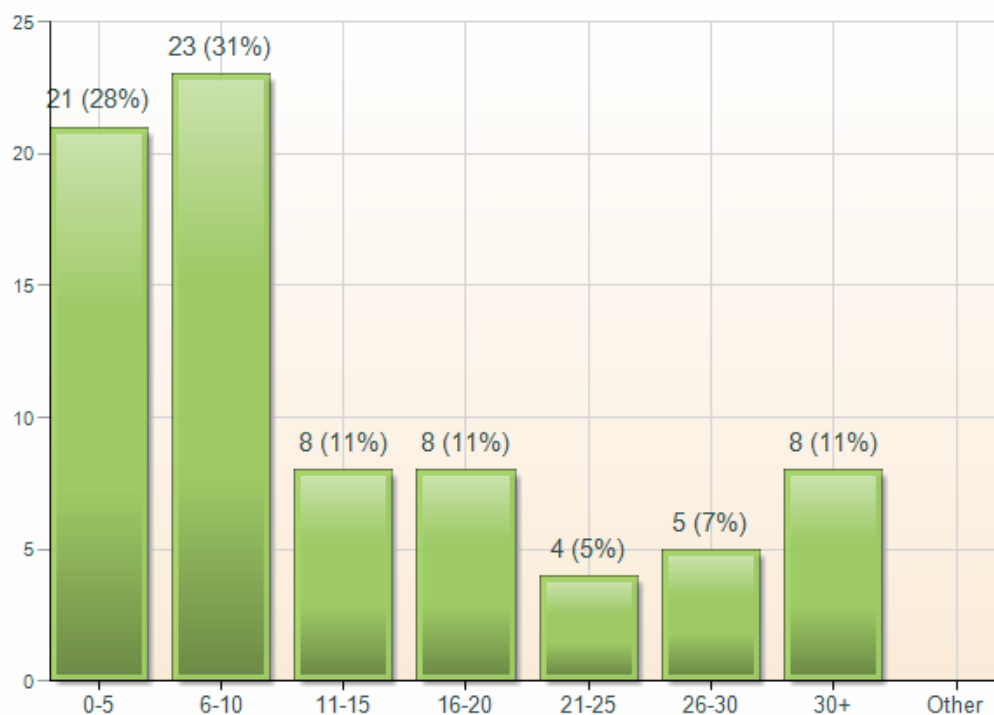


Figure 14. Post-secondary teaching experience.

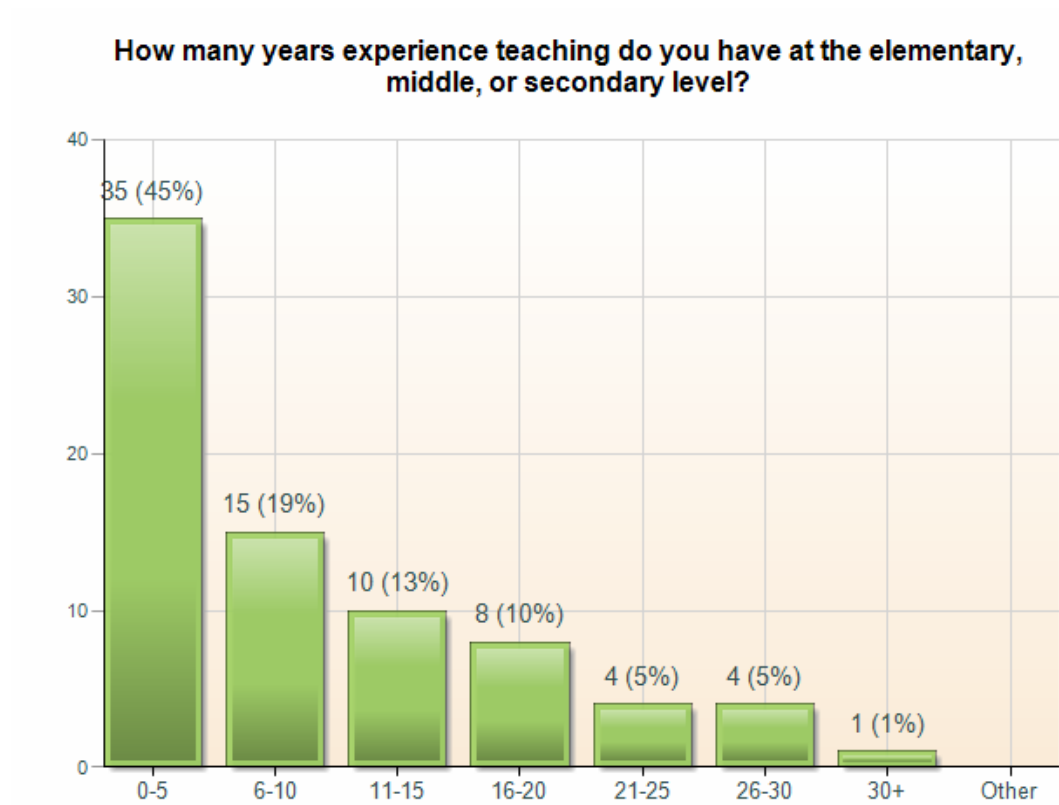


Figure 15. Teaching experience at the elementary, middle, high school.

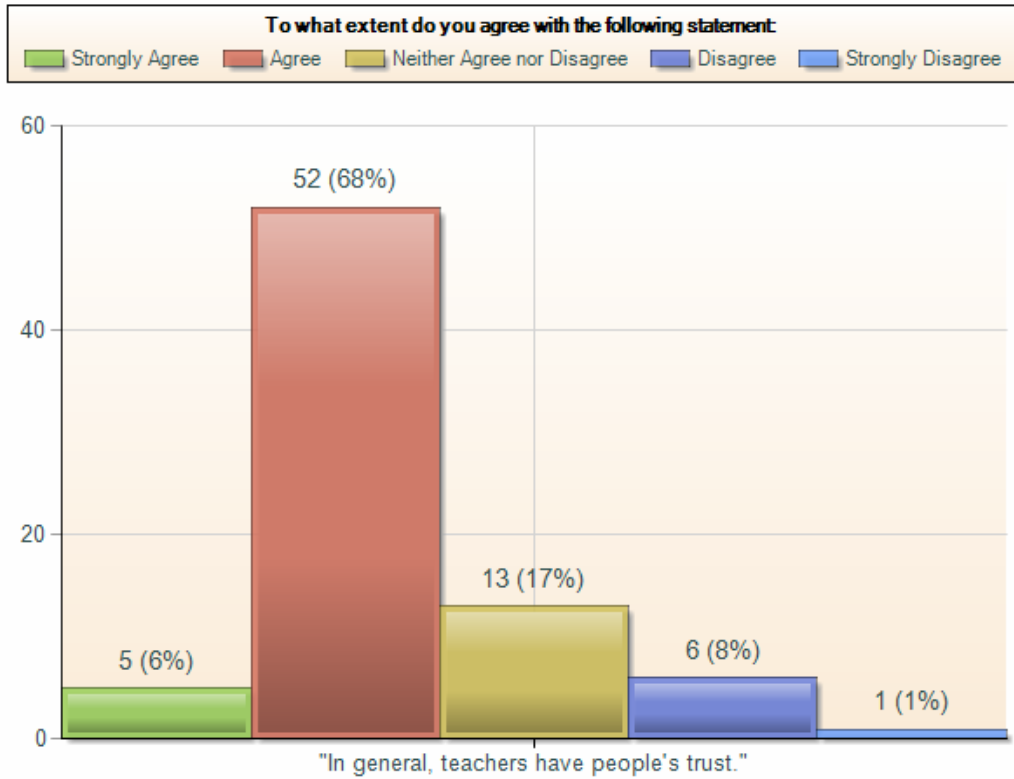


Figure 16. Do Teachers have peoples' trust?

Question 5

Ninety-seven percent of the responders concluded that teachers are not in the same standing as other professionals such doctors and lawyers (Figure 17). Points including level of education, residency requirements, public versus private employment, and a body of peers to establish professional requirements (certification) were introduced in the discussion.

First, teachers do not receive the same amount of respect as the other two professions identified. Since non-teachers have been students in K-12 classrooms, many of them feel like they know what it means to be an effective teacher (even when they have no experience as teachers). That is very different than the fields of law and medicine. Second, teachers are not compensated in similar ways (e.g., salary). Third, politics tend to make decisions about what happens in classrooms (schools are funded through governments, therefore individuals outside the profession make decisions about what happens in classrooms). Fourth, teachers are required to have a 4 year degree to teach and the other professions need more education. (MP)

The requirements and training for teachers is much less than that of doctors. I have never heard of a teacher discussing how their two year residency made it extremely difficult on their family life. (MP)

Their work is not valued or respected to the same degree. (MP)

Teachers in the United States do not enjoy the same standing as other professionals such as lawyers and doctors. Evidence of this fact can be found in lower standards of educational preparation - teachers are required to complete 4 years of post secondary education whereas doctors and lawyers 6 to 8 years are required. Also the economic rewards associated with teaching are substantially less. I believe that the public views teaching as relatively easy, almost prescriptive job and fails to recognize the complexities of the job. (MP)

The term "teachers" refers to educators at levels early childhood to post-secondary. While college/university professors are

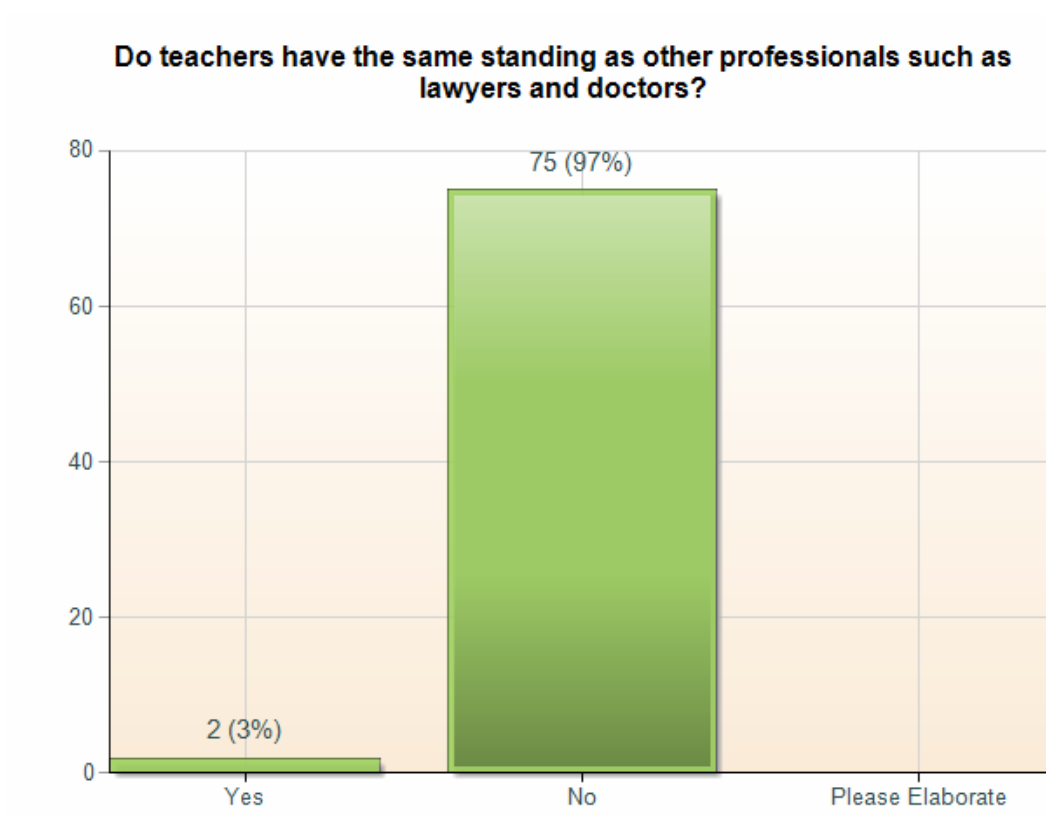


Figure 17. Teachers versus doctors and lawyers

respected for their content knowledge, teachers from early childhood to secondary are not respected in the US. Many people from outside the field of education (parents, policymakers, business people, next-door neighbors) feel qualified to advise these teachers on how to perform their job. (MP)

It's easy to get into education major but extremely challenging to get into law school and medical school. (MP)

Everyone understands why doctors and lawyers are needed. Not many people understand why mathematics is needed, let alone mathematics teachers. (MP)

Teachers have unions, and they do not have boards of their own ranks that credential them. (MP)

Question 6

Perceived as professionals or not, the post secondary participants were asked if teachers should concern themselves with being recognized as professional. Seventy-nine percent responded positively about being concerned (Figure 18). Some responses included a respect factor teachers should be striving to achieve, while others pointed out opinions on ways to garner professionalism.

It is important for teachers to gain respect for the challenging work they do. It is also important for teachers to develop habits that align with what it means to be a professional, and I'm not sure that the collective groups of teachers have reached that stance towards practice. (MP)

I think it is important not only that they are perceived as professionals, but if they see themselves as professionals. (MP)

If teachers want to make a difference, they need to be taken seriously. They need feel that their expertise counts and that their views are considered. They need to be involved in professional organizations and groups, staying abreast of current researched classroom methods. (MP)

Do you think teachers should be concerned about whether or not they are formally recognized as 'professionals'?

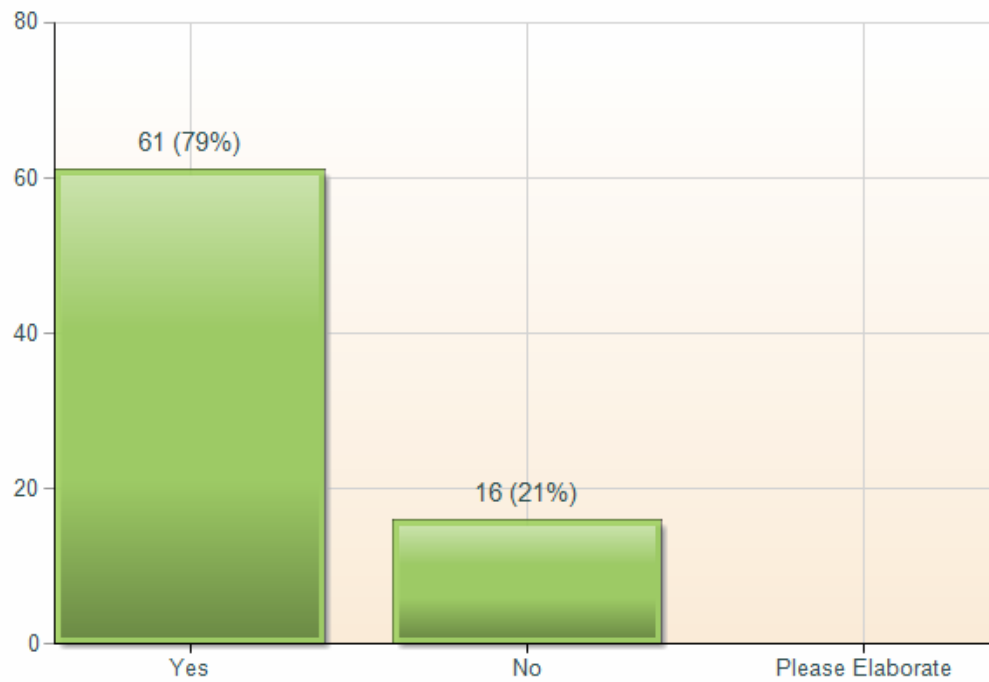


Figure 18. Concern about being recognized professional.

The definition of professionalism would require teachers' to do much more paperwork, portfolios, etc that is for the most part a waste of time. (MP)

I believe you must be a professional as a teacher. However, your actions as a teacher must constitute others recognizing you as a professional. (MP)

If teachers intend to be "treated" as professionals in terms of pay and respect, they must act "professionally". This may entail passing certain exams, performing a certain amount of real Continuing Education in their chosen field of study - and not just general education. It will also require behaving professionally with students, parents, and administrators. (MP)

Many people have the belief that anyone can teach. Recognizing teachers as professionals suggests that particular expertise is needed to do the job well. (MP)

Question 7

Respondents placed a smaller emphasis on a teacher passing the Praxis specialty area in respect to the Bar Exam and Medical Licensing Board Exams. The scaled response was 2.84 on the five point scale. Close to 50% disagreed that teachers passing the specialty area should garner professional status.

Question 8

Ranking professional characteristics (Figure 19), the mathematics and mathematics education professors placed subject matter knowledge (4.77) slightly ahead of lifelong learning (4.73). Collaboration (4.43) and reflective (4.62) both ranked high in this stage of the survey. National Board Certification (3.09) and being involved in research (3.69) ranked the lowest according to this sample (Table 4).

Table 4. Descriptive statistics-rankings of professional characteristics

	N	Minimum	Maximum	Mean	Std. Deviation
Question 8: Leader	77	2	5	4.25	.830
Question 8: Lifelong Learner	77	2	5	4.73	.621
Question 8: Researcher	77	2	5	3.69	.892
Question 8: Subject matter knowledge	77	3	5	4.77	.456
Question 8: Traditional teacher knowledge	77	1	5	4.00	.946
Question 8: Collaborative	77	2	5	4.43	.677
Question 8: Member of a Professional Organization	77	2	5	4.16	.875
Question 8: Reflective	77	3	5	4.62	.563

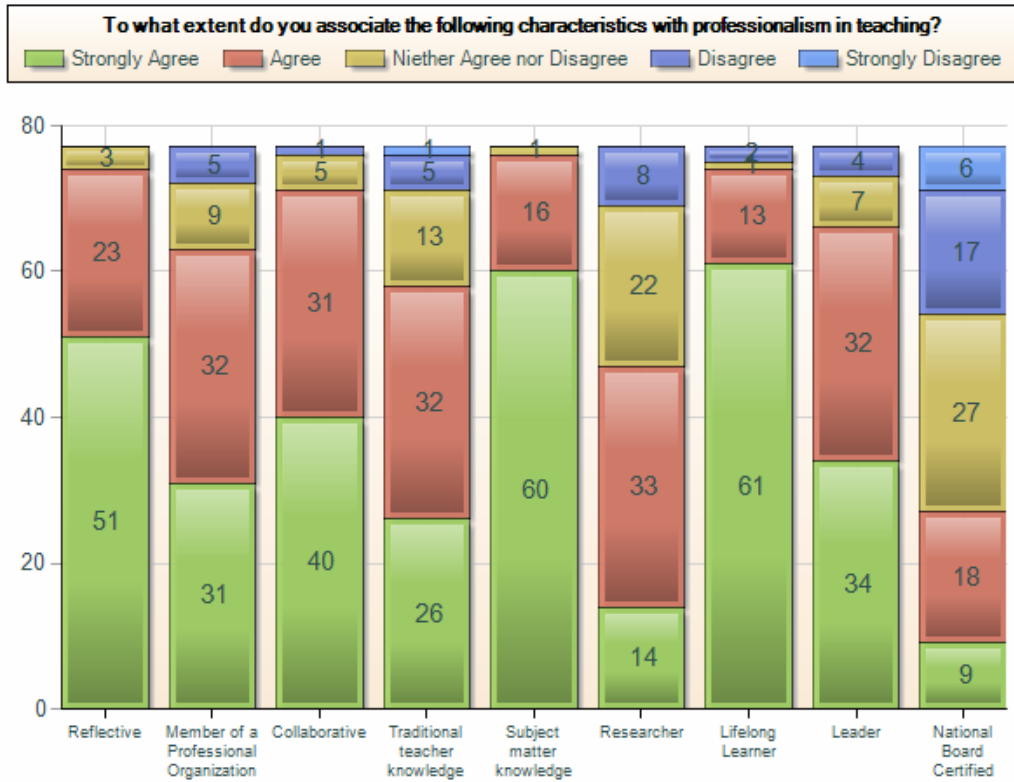


Figure 19. Characteristics of professionalism

Question 9

Looking into defining the professional teacher, these participants ranked a strong subject knowledge base and lifelong learning at the top with a 4.87 scaled rank (Figure 20, Table 5). Reflective and collaborative both ranked high as well with a 4.82 and 4.77 respectably. The characteristic of school leader also ranked high with a 4.64 average. National Board Certification (3.36) and Praxis Exam (2.91) both scored below the agree level (4).

Question 10

When asked about course time devoted to developing professionalism, the participants concluded that 27% of them spend only one class session, 33% devote 2-4 class sessions, and 40% of the responses contribute more than four class sessions to professionalism (Figure 21).

Question 11

The final question asked participants to rank the level they felt students finished the teacher education curriculum prepared to be professional (Figure 22). With five being strongly agree, only two of eight items ranked four or above. The ability to reflect (4.17) and the ability to collaborate (4.03) were the highest ranking attributes (Table 6).

Table 5 Descriptive Statistics-Contextual rankings

	N	Minimum	Maximum	Mean	Std. Deviation
Question 9: A teacher should have a strong knowledge base in the areas in which they teach.	77	4	5	4.87	.338
Question 9: A teacher should be continually learning and seeking new ideas in order to improve teaching.	77	3	5	4.87	.375
Question 9: A teacher should evaluate their performance to improve their teaching.	76	4	5	4.82	.390
Question 9: A teacher should have discussions on teaching/learning issues with other teachers.	77	3	5	4.77	.456
Question 9: A teacher should have the authority to choose the teaching method they want to implement.	77	2	5	4.35	.739

Table 5 continued	N	Minimum	Maximum	Mean	Std. Deviation
Question 9: A teacher should be involved in decision-making about the school curriculum.	77	4	5	4.64	.484
Question 9: A teacher should believe that their work can help to bring about change in their school.	75	2	5	4.67	.553
Question 9: A teacher should explore the possibility of becoming National Board Certified.	76	1	5	3.36	1.140
Question 9: A teacher passing the Praxis exam (NTE) should be considered a professional teacher.	77	1	5	2.91	1.161

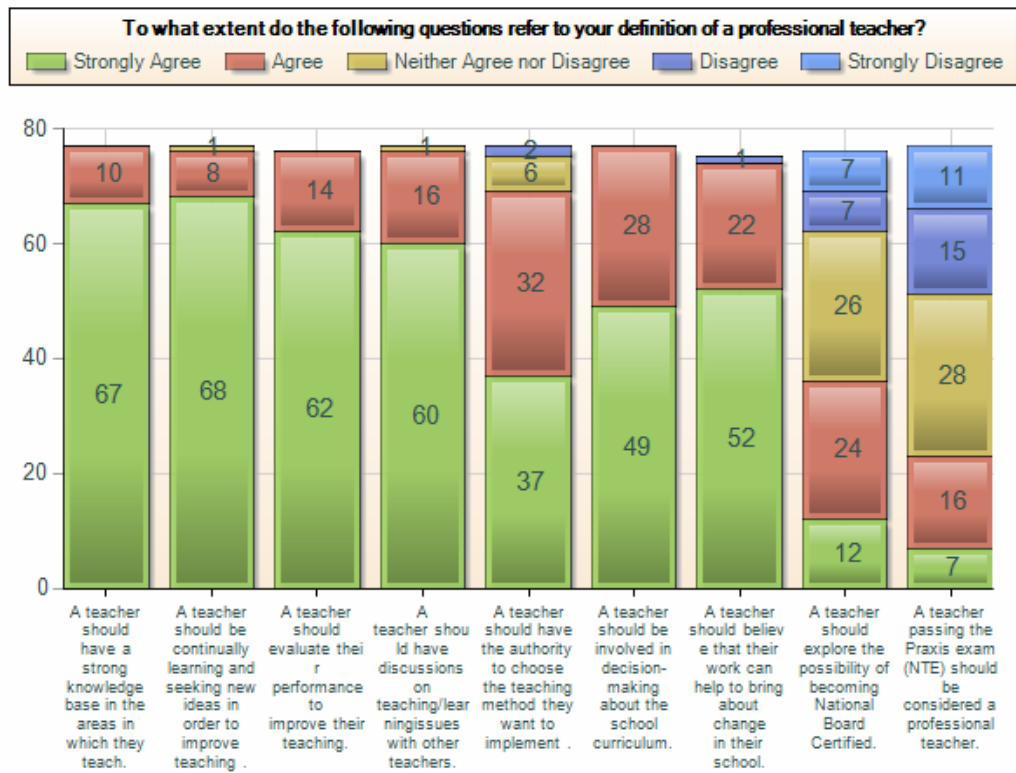


Figure 20. Contextual definition rankings

Table 6 Descriptive Statistics Question 11	N	Min	Max	Mean	Std Dev
Students are prepared to deal with any learning problem.	77	1	5	2.87	0.957
Students are aware of professional organizations.	77	1	5	3.99	1.045
Students are prepared to be able to reflect on their teaching.	77	1	5	4.17	0.951
Students are prepared to collaborate with other teachers.	77	1	5	4.03	0.917
Students are prepared to be able to undertake leadership obligations.	77	1	5	3.18	0.956
Students feel comfortable with their subject matter knowledge.	77	1	5	3.74	1.044
Students know where to find current educational research.	75	1	5	3.63	1.024
Upon graduation, students feel prepared to become a professional teacher.	77	1	5	3.81	1.014

Which of the following best describes the amount of time your curriculum includes for developing math teachers' professionalism?

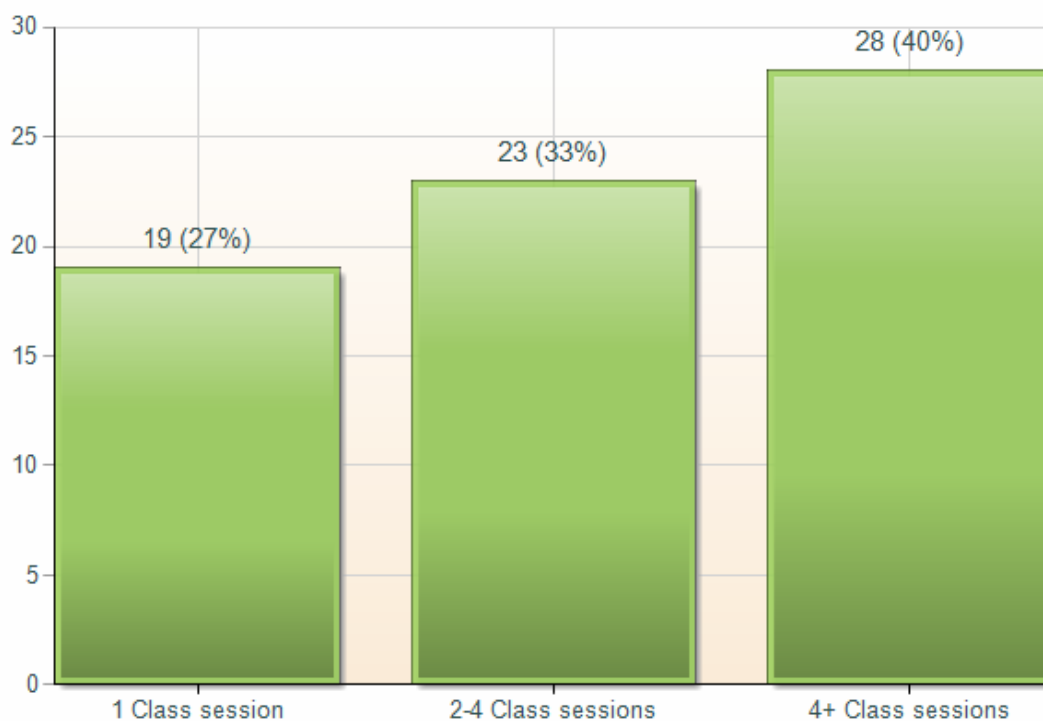


Figure 21. Time spent on professionalism.

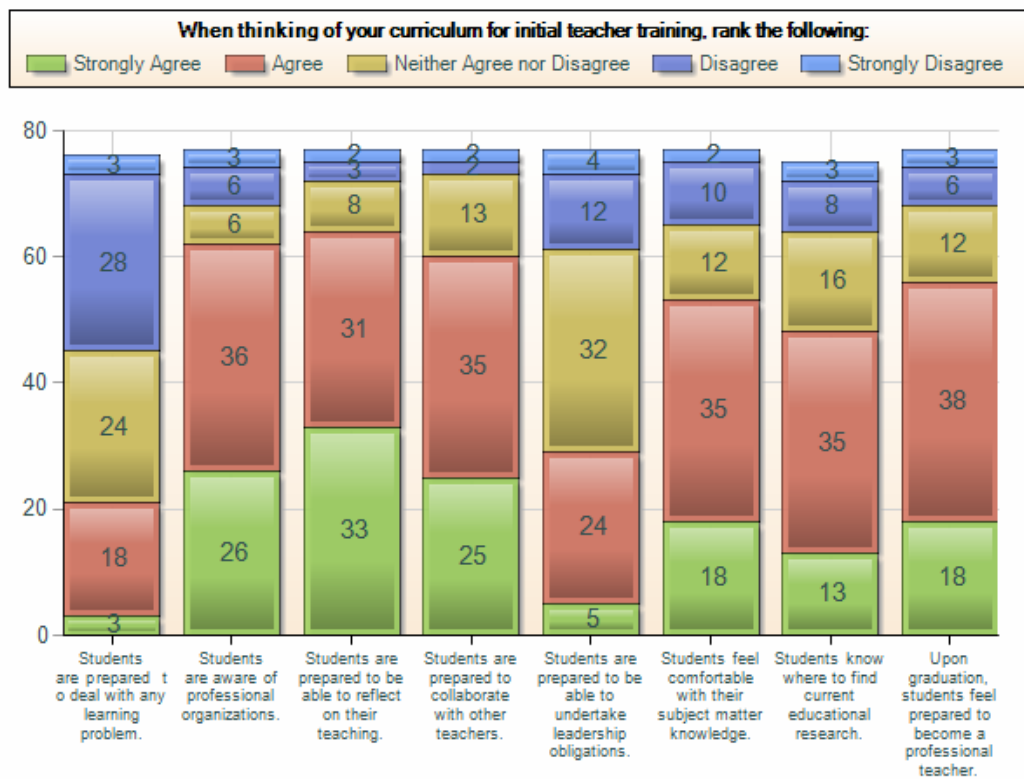


Figure 22. Teacher preparedness in characteristics of professionalism

Analysis

Characteristic Summary-Mathematics Teachers (MT)

Mathematics teachers' placed subject matter knowledge at the top of their list of characteristics for a professional teacher. In question 8, where the characteristic is specifically named, the participants ranked this area the highest with a 4.88 average. In the follow-up question, question 9, the characteristic is described rather than specifically named and the result for the top ranked trait was the same, subject matter knowledge received a 4.91 average (Table 7).

Although slight differences occurred after the highest rankings, the responses among the concrete and contextual questions remained consistent. Lifelong learner received an initial ranking of 4.73, while obtaining a 4.87 on the follow-up question. Knowledge of the learning process scored a 4.78 in the first question and 4.77 on the follow-up. Leadership ranked a 4.74 and was followed by a 4.62. National Board Certification continued to rank the lowest, 3.29 initially and 3.63 on the reciprocal question nine.

When applying a *paired t*-test scaled mean scores from the concrete and contextual responses, only two highest ranked characteristics emerged as statistically significant (Appendix 3). Subject matter knowledge correlated with a .439 coefficient, resulting in a moderate positive relationship. The *t*-statistic with the subject matter knowledge questions resulted in a -1.463, yielding a .145 p-value, leading me to fail to reject the null hypothesis at the $\alpha=.05$ level, signifying the two means are not different.

With this data, I conclude subject matter knowledge is a viable characteristic mathematics teachers' are looking for in a professional.

In examining the same testing data, knowledge of the learning process data correlated at the .453 level, giving this characteristic a moderate positive association between the two questions, concrete and contextual. The *t-statistic* calculated to be .457, converting to a p-value of .648. Again at the $\alpha=.05$ level, I fail to reject the null hypothesis that the means are different, resulting in a conclusion that the means are similar. Therefore, knowledge of the learning process is also viewed as a necessary characteristic when mathematics teachers define professionalism.

Lifelong learner did not test significant in relation to the *t*-test. Yet, the characteristics ranked high and the correlation coefficient result was a .337 giving a positive association among the concrete and contextual responses.

Of the remaining characteristics, none received a correlation of .300 or greater, with the exception of National Board Certification (.619). Neither did any show any statistically significant relationships when conducting the *t*-test (Appendix 3). National Board Certification ranked the lowest in the initial data, but a high correlation coefficient resulted in the highest positive association; thus, ruling this characteristic out of the defining traits of professionalism.

One characteristic, reflection, did display low on the first question and relatively high on the second. Reflective was ranked sixth with a 4.38 average when teachers ranked the characteristic only. However, when poised as a statement, a teacher should

reflect on their performance to improve their teaching, the mathematics teachers ranked this statement third highest with a 4.81 mean. One thought of the difference experienced here is the connotation of reflection. Through some teacher education programs, reflective practices are implemented and thought of as busy work, therefore the characteristic alone drew a lower rank than an actual statement where reflection is the centerpiece.

To this point, we can narrow the characteristics of professionalism to the top three ranked characteristics, subject matter knowledge, knowledge of the learning process, and lifelong learner.

Table 7 – Questions 8 and 9					
	N	Min.	Max	Mean	Std. Deviation
A teacher should have strong knowledge base in the areas in which they teach.	222	4	5	4.9099	0.28696
		4	5	4.8813	0.3242
Subject Matter	219	4	5	4.8727	0.33404
A teacher should be continually learning and seeking new ideas to improve teaching.	220				
		3	5	4.7318	0.46414
Lifelong Learner	220	4	5	4.7647	0.42515
A teacher should have a strong knowledge of the learning process.	220				
Learning Process	220	2	5	4.7727	0.45146
A teacher should evaluate their performance to improve their teaching.	217	3	5	4.8065	0.40752
Reflective	221	3	5	4.3801	0.63272

Table 7 continued	N	Min	Max	Mean	Std. Deviation
A teacher should have discussions on teaching/learning issues with other teachers.	222	3	5	4.7252	0.48618
Collaborative	222	2	5	4.4009	0.70332
A teacher should believe that their work can help to bring about change in their school	220	3	5	4.6136	0.57402
Leader	221	2	5	4.7421	0.57148
A teacher should explore the possibility of becoming National Board Certified.	217	1	5	3.6136	1.0207
National Board	221	1	5	3.2851	1.07247
A teacher should be involved in decision-making about the school curriculum	215	1	5	4.6227	.63994
Research	218	2	5	4.1743	.69021

Characteristic Summary-Mathematics Teacher Educators (MP)

Mathematics teacher educators were also exposed to two questions asking them to rank characteristics of professionalism. The first question was the characteristic specifically named and the second question was a statement concerning the characteristic. The sample of mathematics teacher educators ranked subject matter knowledge the highest in each question, 4.77 and 4.87 respectively.

The mathematics teacher educators were very consistent as the second highest ranked trait was lifelong learner, achieving a 4.73 on the first question and 4.87 on the control question. Reflective maintained the third highest ranking on both sets of questions, garnering a 4.62 and 4.82. Rounding out the middle of the rankings were collaboration (4.43, 4.77), leader (4.25, 4.64) and traditional teacher knowledge (4.10, 4.00). Interestingly all the characteristics remained very consistent in the rankings. Knowledge of current research and National Board certified both fell to the bottom of the rankings (Table 8).

The strongest correlation coefficient characteristics was collaboration with a .585; a relatively strong positive association. However, when the matched pair *t*-test was performed the results concluded no statistical significance in the means. Data regarding Reflection calculated to a correlation coefficient of .463, a moderate positive association. Likewise, the *t*-test concluded not statistically *significance*.

The two higher ranking characteristics, according to the means, were subject matter knowledge and lifelong learner. Subject matter knowledge data resulted in a correlation coefficient of .483; a moderate positive relationship. The *t*-test resulted in a test statistic of $t=-2.190$ and a *p-value* =.04 for a two tailed test. Therefore at the $\alpha=.05$ level, we can fail to reject the null hypothesis of equal means, giving us evidence to include subject matter knowledge as a trait mathematics teacher educators would include in defining professionalism (Appendix 4).

Lifelong learning's computed correlation coefficient was .354, a positive relationship but not as strong as the other three. Coincidentally, *t*-test resulted in an attest statistics of -2.087 and a *p-value* =.040 (two tailed). Again using the $\alpha=.05$ level, we can fail to reject the null of a difference in means, therefore concluding the means are similar (Appendix 4).

As with the mathematics teachers, the mathematics teacher educators highest correlated characteristic was the lowest ranked, that being National Board Certification. National Board Certification's correlation coefficient computed to be .778, a relative strong positive correlation. The *t*-statistic was -2.904 with a *p-value* of .005. Although not significant enough to conclude the means are similar, the high correlation coefficient and low mean ranking, allowed elimination of this characteristic from consideration.

The characteristics subject matter knowledge and lifelong learner are statistically relevant in defining professionalism. However, reflection and collaboration warrant some focus as defining traits of professionalism in mathematics teachers.

Table 8 – Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Question 8: Reflective	N 77	3	5	4.62	0.563
Question 9: A teacher should evaluate their performance to improve their teaching.	77	4	5	4.82	0.39
Question 8: Collaborative	77	2	5	4.43	0.677
Question 9: A teacher should have discussions on teaching/learning issues with other teachers.	77	3	5	4.77	0.456
Question 8: Traditional teacher knowledge	77	1	5	4	0.946

Table 8 continued	N	Minimum	Maximum	Mean	Std. Deviation
Question 9: A teacher should have the authority to choose the teaching method they want to implement.	77	2	5	4.35	0.739
Question 8: Subject matter knowledge	77	3	5	4.77	0.456
Question 9: A teacher should have a strong knowledge base in the areas in which they teach.	77	4	5	4.87	0.338
Question 8: Researcher	77	2	5	3.69	0.892
Question 9: A teacher should be involved in decision making about the school curriculum.	77	4	5	4.64	0.484
Question 8: Lifelong Learner	77	2	5	4.73	0.621

Table 8 continued	N	Minimum	Maximum	Mean	Std. deviation
Question 9: A teacher should be continually learning and seeking new ideas in order to improve teaching.	77	3	5	4.87	0.375
Question 8: Leader	77	2	5	4.25	0.83
Question 9: A teacher should believe that their work can help to bring about change in their school.	75	2	5	4.67	0.553
Question8: National Board Certified	77	1	5	3.09	1.114
Question 9: A teacher should explore the possibility of becoming National Board Certified.	76	1	5	3.36	1.14

Characteristic Summary-Combined

What characteristics do mathematics teachers and mathematics teacher educators share in defining professionalism? In combining both surveys, the subject matter knowledge is a key point in defining professionalism. Both groups ranked the knowledge of subject matter at the top of the list. Ironically, both sections of participants rejected the idea of standardized testing as a characteristic of professionalism—a direct measurement of subject matter knowledge. Lifelong learner also makes the list of characteristics. This trait was the only other characteristic to be ranked in the top four on both surveys.

Examining question 8 from both surveys, the most relevant characteristics to this point, subject matter knowledge, lifelong learner, and traditional teacher knowledge, only subject matter knowledge and lifelong learner had significant data results to provide any relevance through the *t*-test for the difference between means.

With the exception of National Board Certification which has already been eliminated, subject matter knowledge and lifelong learner are the only pair to show statistical significance in the two tailed *t*-test at the $\alpha=.05$. Lifelong learner rated almost identical with a *t*-test statistics of $-.06$ and a *p-value* $=.953$. This is definite statistical sign that the two means are extremely similar. For validity purposes a *t*-test for the difference of the two means was conducted, subject matter knowledge data included a *t*-test statistics of $t=-2.04$ with a *p-value* of $.044$, resulting in a conclusion to fail to reject the hypothesis of equal means, showing support of the consistency in mean rankings between the two groups.

An argument for including reflection in the definition can be made. Although the p -value calculated to be a mere .002, rejecting the possibility of the means equality, the mathematics teacher educators ranked reflection third. Mathematics teachers' reflection was ranked second on the control question survey. Because of the possible negative overtones to the reflective process, the term itself may be confounding. Based on these statistics, although weaker than desired, and the strong support from the literature, reflection is included in the definition.

Professionalism Preparation Indications

Question 11 of both surveys collected data regarding teacher preparation towards professionalism, which includes the characteristics from literature in the curriculum. Even though no question directly discussed lifelong learning, the connection of knowledge of current research was substituted with the thought of current research knowledge is an indication of lifelong learning.

An overall statement regarding the level of confidence the mathematics teachers felt after initial teacher training and the level of which mathematics teacher educators' felt their graduates were confident was rated in the final portion of the question. The two-sample t -test for difference in means performed, resulted in a p -value=.39. With the alpha level =.95, the mean of weak agreement, was statistically significant.

Lifelong learning with a mean value between 3.6 and 3.8 (in the neither agree nor disagree area), was statistically significant in respect to similar ranked means with a p -value=.07. Leadership was ranked neither agree nor disagree (3.18, 3.52). A p -

$value=.008$ led me to conclude the two means in this case of different, therefore resulting in the first characteristic to show disconnect between the groups.

Collaboration with means of 3.91, and 4.0 fell into the agree area in both samples. The t -test formulated a $p-value=.323$, marking another agreement between the two groups. Both groups ranked awareness of professional organizations on the edge of the agree point (3.99, 3.97) and the t -test affirmed the similarity in means with a $p-value=.916$. Both groups scored the ability to deal with a variety of learning problems in the disagree level. A $p-value=.087$ from the t -test confirmed the agreement in both groups.

Mathematics teachers and mathematics teacher educators felt strongly on the ability to reflect. Both groups ranked reflection with a mean of about 4, placing a label of agree. Once the t -test produced a $p-value=.390$, I could conclude the two were in agreement.

Throughout this research, subject matter knowledge has been the dominant figure in defining professionalism. Both groups rank this characteristic the highest and the correlation was the strongest. However, in terms of preparation a major gap was revealed. The mathematics teachers ranked mean for confidence in their preparation in subject matter as a 4.6, almost a strongly agree level on the Likert scale. Mathematics teacher educators ranked initial teacher preparation in subject matter a 3.74. Basically in the neither agree nor disagree level of the Likert scale.

This perceived disconnect shows statistical significance in that the two-sample t -test rendered a test statistic=6.92 and a p -value<.000. I then conclude to reject the null in the similarity of the means and state a very noted difference in the means of the two groups. Ironically, the highest ranked and statistically proven characteristic defining professionalism by mathematics professionals also had the largest deficit in perceived preparedness.

Chapter 5

The mathematics educators in this research overwhelmingly voiced a need for a formal recognition of teachers as professionals. As one participant simply stated “perception seems to be everything these days.” Eighty-one percent of those surveyed responded with a need for teacher professionalism. Another response included the following:

Perception is often reality. If the public does not believe that we are "professionals," and if we don't conduct ourselves as professionals, then our jobs will become increasingly regulated and dictated to us by those above us who are considered to be professionals in the field. (MT)

This study focused on establishing a definition for professionalism within mathematics education using the viewpoint of mathematics teachers and mathematics teacher educators. The instrument used collected data ranking various characteristics of professionalism and certain demographical information. Although a large number of selected participants responded and each state was represented and the regional differences were initially of interest, the demographical analysis was not conducted due to a high variability in sample size from region to region. Data points related to teaching experience were also collected and closely resembled the national averages in each range (Appendix 7). While looking at differences within years experience would have been interesting, the lack of numbers within each sample size would have resulted in inconclusive comparisons. In order to generalize the definition, the characteristics in question were constrained into three identifiable areas; interaction, knowledge, and common practices.

Research Question One: Research Characteristics

Within this research, membership in a professional organization received favorable values (3.73 on a scale of 5). Professional interaction among mathematics teachers takes place within the school, the district, and through professional organizations such as the National Council of Teachers of Mathematics (NCTM). Popkewitz (1994) addresses mathematics education as a profession which contains collegiality and teacher knowledge.

Building upon the conclusions of Peddler (2005), teachers derive a range of benefits from social networking including learning new material, new teaching techniques and emotional support. The mathematics teachers surveyed indicated the need for collaboration ranking it among the “agree” choice (4.40 out of 5). This suggests teachers are aware of the importance of collaboration in the professional development of teachers and subscribe to the belief described by Lieberman (2008) and Cwikla (2004) that collegial interaction, which can be gained through collaboration, is a vital in teacher professionalism.

Knowledge of current research, which was used to assist in the development of the idea teachers working with researchers, ranked in the “agree” category. While not one of the strongest characteristics of professionalism, the mathematics teachers surveyed conveyed the need to at least be knowledgeable of current research. Mathematics teacher educators interestingly, ranked the current research knowledge nearly last with a neutral rating. These results contradict Cwikla (2004), who suggest

the professional teacher should collaborate with researchers to increase the subject matter knowledge, pedagogical understanding, and derive new and innovative theories.

Subject matter knowledge drew the highest ratings within both groups of participants. Mathematics teachers ranked this characteristics with the highest overall ranking (4.88 out of 5) followed by the mathematics teacher educators also ranking this the highest quality with a 4.77. When comparing the two different groups, a positive relationship ($r=.483$) supported the conclusions of similar rankings. Professionals base their careers on the use of specialized knowledge (Furlong, 2000). For teachers of mathematics, this consists of a deep understanding of mathematics, a wide range of pedagogical tools and the ability to apply psychology and learning theory to promote the highest achievement possible for their students. Schulman (1987) refers to this specialized knowledge in mathematics education as “pedagogical content knowledge (PCK).” PCK fits as a descriptor for professionalism since the teacher is prepared in such a manner as to have the ability to differentiate instruction in order to reach all students.

The participants were asked to rank the importance of lifelong learner as a characteristic of professionalism. Both groups felt this characteristics was another necessary trait, with a ranking of strongly agree. This confirmed a Darling-Hammonds and Richardson 2009 presentation in which they reported that teachers need to be prepared to take control of their own learning, in order to grow in the teaching profession through the expansion of their knowledge base. Vacc and Bright (1999) suggest the professional teacher, especially in the area of mathematics, should engage

in personal reflection in order to improve the development of mathematics PCK. This personal reflection together with collegial interaction, demonstrates a teacher's dedication to constant improvement. Lieberman (2008) notes the ability to professionalize an organization rests upon the "questions of theory, research, policy, and practice" (pg. 82), all of which are driven by the constant quest for knowledge.

Reflection was also considered a piece in defining professionalism (Vacc and Bright, 1999). Mathematics teachers ranked reflective practices close to "agree" at 4.38. However, within the follow-up question when the mathematics teachers were asked about reflective practices within the context of evaluating their teaching in order for improvement, they ranked reflection higher at a 4.82 (strongly agree) on the five point scale. Mathematics teacher educators followed the same trend. When asked to directly rank reflection, the ranking averaged to a moderate 4.62. As with the mathematics teachers, when asked within the context of reflection for improving teaching, the rankings rose to 4.87(strongly agree). During the reshaping of medical education into a respected profession, Flexner (1910) argued reflection as a key component in development as a professional.

Generalized practices are needed on top of specialized knowledge. Teachers need to understand how to deal with disruptive students, manage everyday administrative tasks, communicate with parents, evaluate students subjectively, and various other rituals encumbered in the day-to-day operations of the classroom (Noddings, 1992). Teachers are often deeply committed to students, a common practice in education (Biklen, 1987). Relationship building is a vital link in

professionalism and developing the rapport needed with students (Comer, 1988). As Noddings (1992) concludes:

Mathematics teachers may need to give more attention to the moral conduct of their teaching. In a time when “They don’t care” is the number one complaint heard from student dropouts, it may be necessary to cultivate a trusting relationship with students.

Mathematics teachers and mathematics teacher educators were asked to rank the extent learning process knowledge (Noddings, 1992; Biklen, 1987) plays in the defining of professionalism. Both as a direct question and a contextual question, the mathematics teachers ranked this knowledge nearly as strong as subject matter knowledge. Mathematics teacher educators, while not ranking this particular characteristic as high, also viewed learning process matters important with an “agree” ranking (4.35). The importance of this learning process knowledge assists in explaining the hypothesis Berry (2004) puts forth. Teachers who are ill-prepared in the basic knowledge of the teaching process may be choosing to leave the profession after only of brief career in education.

When questioned about teachers as instructional leaders, both groups of participants ranked this characteristic high. Both groups felt professionalism included the ability to become curricular leaders and change agents within their respective schools. Mathematics teachers and mathematics teacher educators are in agreement with issues mentioned by Berry (2004). Berry concluded educators are forced to make decisions on content, assessments, and overall curricular issues without always having access to direct data. Without direct access to make data-driven decisions, teachers are

forced to maintain a process rather than become instructional leaders, allowing data to drive instructional decisions. Berry (2004) contends this inadequate access to data, or lack of knowledge on where to find the data, creates a void in assessing a course of action in curriculum development and assessment inside the classroom.

Research Question Two: Professionalism Preparedness

Mathematics teacher educators were asked if their graduates were prepared to develop professionally based on the given characteristics within this study. The mathematics teacher educators only ranked two characteristics above the neutral level, those being collaboration (4.03) and reflection (4.17), indicating a lack of perceived preparation. Mathematics teachers, when posed with the same evaluation of teacher preparation, only ranked subject matter knowledge (4.61) above the neutral ranking. With both groups of participants ranking most characteristics neutrally, the attributes of professionalism may be receiving short shift in the curriculum pre-service mathematics are receiving.

For the past fifty years, colleges and universities have prepared the vast majority of teachers licensed in the United States. Working in conjunct with state departments of education, licensure requirements have been established in each content area and for each level. These standards vary from state to state further complicating the task for defining professionalism. A review of the standards from various states shows a consistent attention to subject matter knowledge with some attention to pedagogy but little if any attention to professionalism (University of Kentucky, 2010). Although like the

varying theories of learning and the ensuing debate on the “best” practices for teaching, professionalism has a much more complex description.

Discussion

This study attempted to define the term of professionalism in terms of those characteristics, as defined by the literature as related to professionalism, most valued by mathematics teachers and mathematics teacher educators. Professionalism is an ambiguous term. The research showed that professionalism is more easily explored than defined. While doctors and lawyers are viewed by society as professionals, mathematics teachers, and teachers in general, do not garner the same level of respect. Education levels, the political/public placement of the roles and pay scales can be factors in this perception but certain characteristics do follow all professionals.

In mathematics education, subject matter knowledge, as discovered in this research, stands atop the defining characteristics. Obvious as this seems in mathematics education, teachers are not always viewed as the content specialist. The perception is everyone took mathematics courses in school but not everyone had law or medical courses; therefore everyone can pass judgment on mathematics and mathematics teachers but merely accept opinions passed on by lawyers and doctors. The role of content specialist is to be taken seriously if mathematics educators are to be viewed as professionals by the majority of society.

Knowing the content only comprises a part of the professionalism definition. Being able to look internally and change for the betterment of the students involved also plays a key role. Reflection, when used correctly, is an invaluable tool in mathematics education. Reflection involves adapting to a changing environment and elicits the use of other minor characteristics, such as collaboration and knowledge of current research, mentioned throughout the paper.

Being able to reflect also brings on a constant need to gain knowledge. Lifelong learning may be the glaring sign of professionalism. Teachers looking internally and identifying areas in need of strengthening, while finding opportunities outside the classroom to become a better mathematics educator, is a true sign of a professional. Lifelong learning, similar to reflection, involves other minor characteristics such as professional organizations and leadership roles.

When analyzing the data in comparing mathematics teachers with mathematics teacher educators, a potential problem in mathematics education begins to surface. The teachers, upon graduation and receiving initial licensure, ranked only subject matter knowledge as a trait with which they felt competently prepared. On the opposite side, the mathematics teacher educators' data concluded they felt students were prepared for collaborative and reflective practices alone.

This disconnect assists in explaining the difference of scaled scores within the reflection characteristic among both sets of participants in this study. The mathematics teachers' variance between the two reflection questions possibly has an underlying

condition. Higher education educators feel they prepare students to be reflective. However, the mathematics teachers did not rank reflection as a strong point. In addition, mathematics teachers felt they were prepared in relation to subject matter but mathematics teacher educators had less confidence in the subject matter knowledge of their student. This discrepancy warrants further research.

Implications on Mathematics Education

A disconnect between those striving for professional status and those not wanting the recognition exists. Some teachers view members of professional organizations as elitists, while others find the networking and collaboration opportunities of professional memberships vital to personal and professional growth. As one respondent so eloquently noted,

Everyone understands why doctors and lawyers are needed.
Not many people understand why mathematics is needed, let
alone mathematics teachers. (MP)

The underlying objective of mathematics education is to teach the understanding of mathematics. Algorithms and memorization of facts no longer suffice. In defining professionalism in mathematics education, we are also capitalizing as change agents to assist every student to see why we need mathematics and especially why we need the best mathematics teachers. Mathematics education as a community needs to address the fact that, as professionals, subject matter knowledge, lifelong learning, reflection, and knowledge of the learning process need be developed. Certain criteria need be

met in relation to these characteristics defining professionalism. Only then can we make a plea to be recognized as professionals.

The recognition as a professional gives much more to the profession than respect within local communities. With professional respect, organizations, such as NCTM, gain more leverage on national issues. Teachers developing professionalism become curriculum leaders and part of decision-making processes. Avenues to professional status, assists in eliminating the teaching stereotype; “those who can do, those who can’t teach.”

Future Research

Defining professionalism is not an exact science. Discovering characteristics to associate with the professional is attainable. If educators are to ever be addressed as professionals, more research needs to be completed. More precise definitions can begin to form from these three robust characteristics. A closer look into standardized testing by teachers, doctors, and lawyers need to be examined. The fact that National Board Certification fell to the lowest ranks but highest similarity between the two groups may be a sign that no one is interested in a standard exam. Yet, both groups agree subject matter knowledge is one of the most important defining characteristics in professionalism. Without the testing, can we and the public be confident in the subject matter knowledge? As Flexner (1910) discussed in his report on medical education, rigorous assessment has the potential to inspire learning and reinforce competence while reassuring the public. With National Board Certification ranking the lowest in the

surveys, further research is needed in order to develop an accepted method of determining subject matter knowledge. Can we rely on the Praxis exam as law relies on the BAR exam?

As most would agree, subject matter knowledge should be atop a list of professional characteristics. The implication is obvious. Teachers need to know the material they are conveying to students. Some states have addressed this issue adding a more rigorous curriculum within certain subject matter majors. Perhaps teachers with a more diverse knowledge of subject matter may provide a boost in the public perception of teachers.

A caveat among medical and law profession is continued professional development. Lifelong learning is constantly staying abreast of current issues within chosen fields. Teaching, however, has a stigma attached. Education likes to progress in fads that eventually make a return years after the initial integration. Within the parameters of this research, math teacher educators, those involved in current research, failed to rank familiarity of current research very high as a characteristics of professionalism. A definite area of research should look into the reasoning current professors are not employing research with pre-service teachers. Maybe in conjunction with lifelong learning, introducing teachers to current research within mathematics education would allow teachers to avoid fads and use methods to improve their teaching and the learning inside the classrooms. This combination of lifelong learning with current research may also bring professional development opportunities which teachers view as necessary rather than needless. Giving rigor to professional

development will not only assist in public perception of teachers but the perception internally as well.

Using current research could also aid in the reflective characteristic. Teachers looking at current teacher methodology and making adjustments to fit the students may account for the biggest shift in the public's perception of teaching. In order to be considered a professional, teachers must convince the public they are the experts within their classroom. The ability to reflect on teaching and make necessary changes, then communicate the reasoning behind the changes to parents and the public will begin to give those outside education a glimpse of how professional teaching can be. With the important role reflection could have in the classroom, why to teachers not value reflective practices. Perhaps reflection is misused or overused in pre-service training. Further research needs to be conducted in order to drive the proper introduction into the uses of reflective practices. Again in the reformation of the medical community, Flexner's report charges medical students and universities to spend time in self-reflection in order to grow in professionalism.

Another sign of professionalism is the ability to share and connect with those inside the same profession. Collaboration with other teachers gives opportunity to build upon the knowledge of common practices, subject matter, and current research, and also assists in becoming a reflective lifelong learner. In the confines of the same school or outside the school walls within professional organizations, teachers can build themselves up professionally by networking with others. New research can shed understanding on the uses and implications of collaboration within the school setting.

Finally, being able to believe in the decisions made within the classroom not only builds professional status but leadership qualities as well. Teachers need to be known as curriculum specialists, leaders within the field. Teachers need not be leaders in an administrative manner, but leaders in that they build a methodology based on knowledge gained through the characteristics of a professional teacher.

The amount of education needed to be a professional educator should be considered. The role of higher education is simply making these pre-service teachers aware of their abilities and equipping them with the necessary traits to become professionals. Perceptions in the public about teaching needs to be transported from the “those who can— do, those who can’t—teach” to the respect the true professional educator deserves. True professionalism lies with adequately preparing teachers for emerging roles. Defining professionalism as three general characteristics is but a start. Only when teachers decided to become professionals will others deem them professionally. Finally, why do we care about being looked upon as professionals? In order to control our own profession and not be mandated and dictated on how to teach should be reason enough. A mathematics teacher educator answers this from the survey,

Teachers are not considered in the same professional category as doctors; the perception exists that teachers could do nothing else. (MP)

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Appendices

Appendix 1

Professional Definition and Preparedness in Mathematics Teachers' Survey

Professional Definition and Preparedness in Mathematics Teachers' Survey

Page 1 - Heading

During the past two decades, the description of teacher professionalism has varied depending on the individual or organization. This survey explores the aspects of teacher professionalism. The results will be used to assist in the development of a clearer definition of teacher professionalism. The survey also includes questions regarding teacher preparation programs. These results will be used to assist colleges and universities in evaluating curriculum with regards to teacher professionalism.

Page 1 - Question 1 - Choice - One Answer (Drop Down)

In which state do you currently teach mathematics?

- ☐ Alabama
- ☐ Alaska
- ☐ Arizona
- ☐ Arkansas
- ☐ California
- ☐ Colorado
- ☐ Connecticut
- ☐ Delaware
- ☐ Florida
- ☐ Georgia
- ☐ Hawaii
- ☐ Idaho
- ☐ Illinois
- ☐ Indiana
- ☐ Iowa
- ☐ Kansas
- ☐ Kentucky
- ☐ Louisiana
- ☐ Maine
- ☐ Maryland
- ☐ Massachusetts
- ☐ Michigan
- ☐ Minnesota
- ☐ Mississippi
- ☐ Missouri

- ☐ Montana
- ☐ Nebraska
- ☐ Nevada
- ☐ New Hampshire
- ☐ New Jersey
- ☐ New Mexico
- ☐ New York
- ☐ North Carolina
- ☐ North Dakota
- ☐ Ohio
- ☐ Oklahoma
- ☐ Oregon
- ☐ Pennsylvania
- ☐ Rhode Island
- ☐ South Carolina
- ☐ South Dakota
- ☐ Tennessee
- ☐ Texas
- ☐ Utah
- ☐ Vermont
- ☐ Virginia
- ☐ Washington
- ☐ West Virginia
- ☐ Wisconsin
- ☐ Wyoming
- ☐ District of Columbia

Page 1 - Question 2 - Choice - Multiple Answers (Bullets)

How many years teaching experience do you have?

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ 21-25
- ☐ 26-30
- ☐ 30+
- ☐ Other, please specify

Page 1 - Question 3 - Choice - One Answer (Drop Down)

What is the highest degree you currently hold?

- ☐ Bachelor's Degree
- ☐ Master's Degree
- ☐ Educational Specialist

☐ Doctorate

Page 1 - Question 4 - Yes or No

Do you think teachers should be concerned about whether or not they are formally recognized as 'professionals'?

☐ Yes

☐ No

Please Elaborate

Page 1 - Question 5 - Rating Scale - Matrix

To what extent do you agree with the following statement:

Strongly Agree **A g r e e** Neither Agree or Disagree **Disagree** Strongly Disagree

"In general, teachers have people's trust."

☐

☐

☐

☐

☐

 P l e a s e E l a b o r a t e

Page 1 - Question 6 - Rating Scale - One Answer (Horizontal)

A teacher passing the Praxis (National Teaching Exam (NTE)) and the required specialty area exams should garner the same professionalism as doctors and lawyers passing the United States Medical Licensing Examination and the Bar Exam?

Strongly Agree **A g r e e** Neither Agree nor Disagree **D i s a g r e e** Strongly Disagree

☐

☐

☐

☐

☐

Page 1 - Question 7 - Yes or No

Do teachers have the same standing as other professionals such as lawyers and doctors?

☐ Yes

☐ No

Please Elaborate

Page 1 - Question 8 - Rating Scale - Matrix

To what extent should you associate the following characteristics with professionalism in teaching?

Strongly Agree **A g r e e** Neither Agree or Disagree **Disagree** Strongly Disagree

R e f l e c t i v e

☐

☐

☐

☐

☐

Member of a Professional Organization	☐	☐	☐	☐	☐
C o l l a b o r a t i v e	☐	☐	☐	☐	☐
Knowledge of the learning process	☐	☐	☐	☐	☐
Specific subject matter knowledge	☐	☐	☐	☐	☐
Knowledge of current research	☐	☐	☐	☐	☐
L i f e l o n g L e a r n e r	☐	☐	☐	☐	☐
L e a d s b y e x a m p l e	☐	☐	☐	☐	☐
National Board Certified	☐	☐	☐	☐	☐

Page 1 - Question 9 - Rating Scale - Matrix

To what extent do the following questions refer to your definition of a professional teacher?

	Strongly Agree	A g r e e	Neither Agree nor disagree	D i s a g r e e	Strongly Disagree
A teacher should have strong knowledge base in the areas in which they teach.	☐	☐	☐	☐	☐
A teacher should be continually learning and seeking new ideas to improve teaching.	☐	☐	☐	☐	☐
A teacher should have a strong knowledge of the learning process.	☐	☐	☐	☐	☐
A teacher should employ several teaching strategies.	☐	☐	☐	☐	☐
A teacher should evaluate their performance to improve their teaching.	☐	☐	☐	☐	☐
A teacher should have discussions on teaching/learning issues with other teachers.	☐	☐	☐	☐	☐
A teacher should have the authority to choose the teaching method that they want to implement.	☐	☐	☐	☐	☐
A teacher should be involved in decision-making about the school curriculum.	☐	☐	☐	☐	☐
A teacher should believe that their work can help to bring about change in their school.	☐	☐	☐	☐	☐
A teacher should explore the possibility of becoming National Board Certified.	☐	☐	☐	☐	☐
A teacher passing the Praxis exam (NTE) should be considered a professional teacher.	☐	☐	☐	☐	☐

In what state did you receive your initial teacher training (education degree)?

- ☐ Alabama
- ☐ Alaska
- ☐ Arizona
- ☐ Arkansas
- ☐ California
- ☐ Colorado
- ☐ Connecticut
- ☐ Delaware
- ☐ Florida
- ☐ Georgia
- ☐ Hawaii
- ☐ Idaho
- ☐ Illinois
- ☐ Indiana
- ☐ Iowa
- ☐ Kansas
- ☐ Kentucky
- ☐ Louisiana
- ☐ Maine
- ☐ Maryland
- ☐ Massachusetts
- ☐ Michigan
- ☐ Minnesota
- ☐ Mississippi
- ☐ Missouri
- ☐ Montana
- ☐ Nebraska
- ☐ Nevada
- ☐ New Hampshire
- ☐ New Jersey
- ☐ New Mexico
- ☐ New York
- ☐ North Carolina
- ☐ North Dakota
- ☐ Ohio
- ☐ Oklahoma
- ☐ Oregon
- ☐ Pennsylvania
- ☐ Rhode Island
- ☐ South Carolina
- ☐ South Dakota
- ☐ Tennessee
- ☐ Texas
- ☐ Utah

- ☐ Vermont
- ☐ Virginia
- ☐ Washington
- ☐ West Virginia
- ☐ Wisconsin
- ☐ Wyoming
- ☐ District of Columbia

Page 1 - Question 11 - Rating Scale - Matrix

When thinking of your initial teacher training at a higher education facility, rank the following:

	Strongly Agree	A g r e e	Neither agree nor Disagree	D i s a g r e e	Strongly Disagree
I was prepared to deal with a variety of learning problems.	☐	☐	☐	☐	☐
I am aware of professional organizations.	☐	☐	☐	☐	☐
I was prepared to be reflective about my teaching.	☐	☐	☐	☐	☐
I was prepared to collaborate with other teachers.	☐	☐	☐	☐	☐
I was prepared to undertake leadership obligations.	☐	☐	☐	☐	☐
I feel comfortable with my subject matter knowledge.	☐	☐	☐	☐	☐
I know where to find current educational research.	☐	☐	☐	☐	☐
Upon graduation, I felt prepared to become a professional teacher.	☐	☐	☐	☐	☐

Page 1 - Question 12 - Yes or No

Have you currently gained tenure within the school system you are currently employed?

- ☐ Yes
- ☐ No

Appendix 2

Professionalism Defined and Taught in Mathematics Education Survey

Professionalism Defined and Taught in Mathematics Education Survey

Page 1 - Heading

During the past two decades, the description of teacher professionalism has varied depending on the individual or organization. This survey explores the aspects of teacher professionalism. The results will be used to assist in the development of a definition of teacher professionalism using a set of characteristics. The survey also includes questions regarding teacher preparation programs. These results will be used to assist colleges and universities in evaluating curriculum with regards to teacher professionalism.

Page 1 - Question 1 - Choice - One Answer (Drop Down)

In which state do you currently teach?

- ☐ Alabama
- ☐ Alaska
- ☐ Arizona
- ☐ Arkansas
- ☐ California
- ☐ Colorado
- ☐ Connecticut
- ☐ Delaware
- ☐ Florida
- ☐ Georgia
- ☐ Hawaii
- ☐ Idaho
- ☐ Illinois
- ☐ Indiana
- ☐ Iowa
- ☐ Kansas

- ☐ Kentucky
- ☐ Louisiana
- ☐ Maine
- ☐ Maryland
- ☐ Massachusetts
- ☐ Michigan
- ☐ Minnesota
- ☐ Mississippi
- ☐ Missouri
- ☐ Montana
- ☐ Nebraska
- ☐ Nevada
- ☐ New Hampshire
- ☐ New Jersey
- ☐ New Mexico
- ☐ New York
- ☐ North Carolina
- ☐ North Dakota
- ☐ Ohio
- ☐ Oklahoma
- ☐ Oregon
- ☐ Pennsylvania
- ☐ Rhode Island
- ☐ South Carolina
- ☐ South Dakota
- ☐ Tennessee
- ☐ Texas
- ☐ Utah
- ☐ Vermont
- ☐ Virginia
- ☐ Washington
- ☐ West Virginia
- ☐ Wisconsin
- ☐ Wyoming
- ☐ District of Columbia

Page 1 - Question 2 - Choice - Multiple Answers (Bullets)

How many years experience do you have at the post-secondary level?

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ 21-25
- ☐ 26-30
- ☐ 30+
- ☐ Other

How many years experience teaching do you have at the elementary, middle, or secondary level?

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ 21-25
- ☐ 26-30
- ☐ 30+
- ☐ Other

To what extent do you agree with the following statement?

Strongly Agree A g r e e Neither Agree nor Disagree D i s a g r e e Strongly Disagree

"In general, teachers have people's trust."

☐ ☐ ☐ ☐ ☐

Do teachers have the same standing as other professionals such as lawyers and doctors?

- ☐ Yes
- ☐ No
- Please Elaborate

Do you think teachers should be concerned about whether or not they are formally recognized as 'professionals'?

- ☐ Yes
- ☐ No
- Please Elaborate

A teacher passing the Praxis (National Teaching Exam (NTE)) and the required specialty area exams should garner the same professionalism as doctors and lawyers passing the United States Medical Licensing Examination and the Bar Exam?

Strongly Agree A g r e e Neither Agree nor Disagree D i s a g r e e Strongly Disagree

☐ ☐ ☐ ☐ ☐

To what extent do you associate the following characteristics with professionalism in teaching?

	Strongly Agree	A g r e e	Neither Agree nor Disagree	Disagree	Strongly Disagree
R e f l e c t i v e	☐	☐	☐	☐	☐
Member of a Professional Organization	☐	☐	☐	☐	☐
C o l l a b o r a t i v e	☐	☐	☐	☐	☐
Traditional teacher knowledge	☐	☐	☐	☐	☐
Subject matter knowledge	☐	☐	☐	☐	☐
R e s e a r c h e r	☐	☐	☐	☐	☐
L i f e l o n g L e a r n e r	☐	☐	☐	☐	☐
L e a d e r	☐	☐	☐	☐	☐
National Board Certified	☐	☐	☐	☐	☐

To what extent do the following questions refer to your definition of a professional teacher?

	Strongly Agree	A g r e e	Neither Agree nor Disagree	Disagree	Strongly Disagree
A teacher should have a strong knowledge base in the areas in which they teach.	☐	☐	☐	☐	☐
A teacher should be continually learning and seeking new ideas in order to improve teaching.	☐	☐	☐	☐	☐
A teacher should evaluate their performance to improve their teaching.	☐	☐	☐	☐	☐
A teacher should have discussions on teaching/learning issues with other teachers.	☐	☐	☐	☐	☐
A teacher should have the authority to choose the teaching method they want to implement.	☐	☐	☐	☐	☐
A teacher should be involved in decision-making about the school curriculum.	☐	☐	☐	☐	☐
A teacher should believe that their work can help to bring about change in their school.	☐	☐	☐	☐	☐
A teacher should explore the possibility of becoming National Board Certified.	☐	☐	☐	☐	☐
A teacher passing the Praxis exam (NTE) should be considered a professional teacher.	☐	☐	☐	☐	☐

Which of the following best describes the amount of time your curriculum includes for developing mathematics teachers' professionalism?

- ☐ 1 Class session
- ☐ 2-4 Class sessions
- ☐ 4+ Class sessions

When thinking of your curriculum for initial teacher training, rank the following:

	Strongly Agree	A g r e e	Neither Agree nor Disagree	D i s a g r e e	Strongly Disagree
Students are prepared to deal with any learning problem.	☐	☐	☐	☐	☐
Students are aware of professional organizations.	☐	☐	☐	☐	☐
Students are prepared to be able to reflect on their teaching.	☐	☐	☐	☐	☐
Students are prepared to collaborate with other teachers.	☐	☐	☐	☐	☐
Students are prepared to be able to undertake leadership obligations.	☐	☐	☐	☐	☐
Students feel comfortable with their subject matter knowledge.	☐	☐	☐	☐	☐
Students know where to find current educational research.	☐	☐	☐	☐	☐
Upon graduation, students feel prepared to become a professional teacher.	☐	☐	☐	☐	☐

Appendix 3

Paired Samples Test (MT)										
		Pair 1	Pair 2	Pair 3	Pair 4	Pair 5	Pair 6	Pair 7	Pair 8	
		Reflective	Collaborative	Learning Process Knowledge	Subject Matter Knowledge	Current Research	Lifelong Learner	Leadership	National Board Certification	
		Question 8: Reflective –	Question 8: Collaborative –	Question 8: Knowledge of the learning process –	Question 8: Specific subject matter knowledge –	Question 8: Knowledge of current research –	Question 8: Lifelong Learner –	Question 8: Leads by example –	Question 8: National Board Certified –	
		Question 9: A teacher should evaluate their performance to improve their teaching.	Question 9: A teacher should have discussions on teaching/ learning issues with other teachers.	Question 9: A teacher should have a strong knowledge of the learning process.	Question 9: A teacher should have a strong knowledge base in the areas in which they teach.	Question 9: A teacher should be involved in decision-making about the school curriculum.	Question 9: A teacher should be continually learning and seeking new ideas to improve teaching.	Question 9: A teacher should have the authority to choose the teaching method that they want to implement.	Question 9: A teacher should explore the possibility of becoming National Board Certified.	
Paired Differences	Mean	-0.431	-0.324	0.014	-0.032	-0.449	-0.142	0.271	-0.344	
	Std. Deviation	0.692	0.727	0.444	0.323	0.893	0.473	0.847	0.914	
	Std. Error Mean	0.047	0.049	0.03	0.022	0.061	0.032	0.057	0.062	
	95% Confidence Interval of the Difference	Lower	-0.523	-0.42	-0.045	-0.075	-0.569	-0.205	0.159	-0.466
		Upper	-0.338	-0.228	0.073	0.011	-0.329	-0.079	0.384	-0.222
t		-9.144	-6.651	0.457	-1.463	-7.391	-4.437	4.767	-5.559	
df		215	221	218	218	215	217	220	217	
Sig. (2-tailed)		0	0	0.648	0.145	0	0	0	0	
Correlation		0.173	0.297	0.453	0.439	0.105	0.337	0.048	0.619	

Appendix 4

Paired Samples Test (MP)										
		Pair 1	Pair 2	Pair 3	Pair 4	Pair 5	Pair 6	Pair 7	Pair 8	
		Reflective	Collaborative	Traditional Teacher Knowledge	Subject Matter Knowledge	Lifelong Learner	Leader	Researcher	National Board Certified	
		Question 8: Reflective -	Question 8: Collaborative -	Question 8: Traditional teacher knowledge -	Question 8: Subject matter knowledge -	Question 8: Lifelong Learner -	Question 8: Leader -	Question 8: Researcher -	Question 8: National Board Certified -	
		Question 9: A teacher should evaluate their performance to improve their teaching.	Question 9: A teacher should have discussions on teaching/ learning issues with other teachers.	Question 9: A teacher should have knowledge of the learning process.	Question 9: A teacher should have a strong knowledge base in the areas in which they teach.	Question 9: A teacher should be continually learning and seeking new ideas in order to improve teaching .	Question 9: A teacher should believe that their work can help to bring about change in their school.	Question 9: A teacher should be involved in decision-making about the school curriculum.	Question 9: A teacher should explore the possibility of becoming National Board Certified.	
Paired Differences	Mean		-0.197	-0.338	-0.766	-0.104	-0.143	-0.427	-0.948	-0.25
	Std. Deviation		0.517	0.553	1.012	0.416	0.601	0.888	0.944	0.751
	Std. Error Mean		0.059	0.063	0.115	0.047	0.068	0.103	0.108	0.086
	95% Confidence Interval of the Difference	Lower	-0.315	-0.463	-0.996	-0.198	-0.279	-0.631	-1.162	-0.422
		Upper	-0.079	-0.212	-0.537	-0.009	-0.007	-0.222	-0.734	-0.078
t			-3.329	-5.36	-6.646	-2.19	-2.087	-4.161	-8.808	-2.904
df			75	76	76	76	76	74	76	75
Sig. (2-tailed)			0.001	0	0	0.032	0.04	0	0	0.005
Correlation			0.463	0.585	0.092	0.483	0.354	0.234	0.161	0.778

Appendix 5

Two-sample T for MP Question 8 Lifelong Learner vs. MT Question 8 Lifelong Learner				
	N	Mean	St.Dev	SE Mean
MP Question8 Lifelong Learner	77	4.727	0.621	0.071
MT Question8 Lifelong Learner	220	4.732	0.464	0.031
Difference = μ (MP Question 8 Lifelong Learner) - μ (MT Question 8 Lifelong Learner)				
Estimate for difference: -0.004545				
95% CI for difference: (-0.157862, 0.148771)				
T-Test of difference = 0 (vs not =): T-Value = -0.06 P-Value = 0.953 DF = 107				

Two-sample T for MP Question 8 Traditional teacher knowledge vs MT Question 8 Knowledge of the learning Process				
	N	Mean	StDev	SEMean
MP Question 8 Traditional Knowledge (Learning process)	77	4.000	0.946	0.11
MT Question8 Knowledge of the learning process	220	4.777	0.428	0.029
Difference = μ (MP Question 8 Traditional teacher knowledge) - μ (MT Question8 Knowledge of the learning process)				
Estimate for difference: -0.777273				
95% CI for difference: (-0.999067, -0.555479)				
T-Test of difference = 0 (vs not =): T-Value = -6.97 P-Value = 0.000 DF = 87				

Two-sample T for MP Question 8 Reflective vs MT Question 8 Reflective				
	N	Mean	StDev	SE Mean
MP Question 8 Reflective	77	4.623	0.563	0.064
MT Question 8 Reflective	221	4.380	0.633	0.043
Difference = μ (MP Question 8 Reflective) - μ (MT Question 8 Reflective)				
Estimate for difference: 0.243286				
95% CI for difference: (0.091156, 0.395417)				
T-Test of difference = 0 (vs not =): T-Value = 3.16 P-Value = 0.002 DF = 147				

Two-sample T for MP Question 8 Subject matter knowledge vs Question 8 Specific subject matter knowledge				
	N	Mean	StDev	SE Mean
MP Question 8 Subject matter knowledge	77	4.766	0.456	0.052
MT Question 8 Specific subject matter knowledge	219	4.881	0.324	0.022
Difference = μ (MP Question8 Subject matter knowledge) – μ (Question 8 Specific Subject matter knowledge)				
Estimate for difference: -0.115045				
95% CI for difference: (-0.226846, -0.003244)				
T-Test of difference = 0 (vs not =): T-Value = -2.04 P-Value = 0.044 DF = 104				

Two-sample T for MP Question 8 National Board Certification vs MT Question 8 National Board Certified				
	N	Mean	StDev	SE Mean
MP Question 8 National Board Certification	77	3.09	1.11	0.13
MT Question 8 National Board Certified	221	3.29	1.07	0.072

Difference = μ (MP Question 8 National Board Certification) – μ (MT Question 8 National Board Certified)				
Estimate for difference: -0.194159				
95% CI for difference: (-0.483136, 0.094818)				
T-Test of difference = 0 (vs not =): T-Value = -1.33 P-Value = 0.186 DF = 128				
Two-sample T for MP Question 8 Leader vs MT Question 8 Leads by example				
	N	Mean	StDev	SE Mean
MP Question 8 Leader	77	4.247	0.830	0.095
MT Question 8 Leads by example	221	4.742	0.515	0.035
Difference = μ (MP Question 8 Leader) - μ (MT Question 8 Leads by example)				
Estimate for difference: -0.495328				
95% CI for difference: (-0.695167, -0.295489)				
T-Test of difference = 0 (vs not =): T-Value = -4.92 P-Value = 0.000 DF = 97				

Two-sample T for MP Question 8 Research vs MT Question 8 Knowledge of current research				
	N	Mean	StDev	SE Mean
MP Question 8 Research	77	3.688	0.892	0.10
MT Question 8 Knowledge of current research	218	4.174	0.690	0.047
Difference = μ (MP Question 8 Research) - μ (MT Question 8 Knowledge of current research)				
Estimate for difference: -0.486000				
95% CI for difference: (-0.707830, -0.264171)				
T-Test of difference = 0 (vs not =): T-Value = -4.34 P-Value = 0.000 DF = 109				

Two-sample T for MP Question 8 Member of a Professional Organization vs MT Question 8 Member of a Professional Organization				
	N	Mean	StDev	SE Mean
MP Question 8 Member of a Professional Organization	77	4.156	0.875	0.10
MT Question 8 Member of a Professional Organization	222	3.734	0.911	0.061
Difference = μ (MP Question 8 Member of a Professional Organization) - μ				

(MT Question 8 Member of a Professional Organization)				
Estimate for difference: 0.421610				
95% CI for difference: (0.190413, 0.652807)				
T-Test of difference = 0 (vs not =): T-Value = 3.61 P-Value = 0.000 DF = 137				

Appendix 6

Two-sample T for MT Question 11 I feel comfortable with my knowledge of the specific subject matter vs MP Question 11 Students feel comfortable with my knowledge of the specific subject matter				
	N	Mean	StDev	SE Mean
MT Question 11 Subject Matter confidence	221	4.611	0.605	0.041
MP Question 11 Student subject matter confidence	77	3.74	1.04	0.12
Difference = μ (MT Question 11 Subject Matter confidence) - μ (MP Question 11 Student subject matter confidence)				
Estimate for difference: 0.870600				
95% CI for difference: (0.620974, 1.120226)				
T-Test of difference = 0 (vs not =): T-Value = 6.92 P-Value = 0.000 DF = 94				

Two-sample T for MP Question 11 Students are prepared to be able to reflect on teaching vs MT Question11 I was prepared to be reflective				
	N	Mean	StDev	SE Mean
MP Question 11 Students are prepared to be reflective	77	4.169	0.951	0.11
MT Question11 I was prepared to be reflective	220	3.905	0.958	0.065
Difference = μ (MP Question 11 Students are prepared to be able to reflect on teaching) - μ (MT Question11 I was prepared to be reflective)				
Estimate for difference: 0.264286				
95% CI for difference: (0.014644, 0.513927)				

T-Test of difference = 0 (vs not =): T-Value = 2.09 P-Value = 0.038 DF = 133

**Two-sample T for MT Question 11 upon graduation I felt prepared to be a professional teacher vs
MP Question 11 upon graduation students feel prepared to be a professional teacher**

	N	Mean	StDev	SE Mean
MT Question 11 Preparation	219	3.918	0.900	0.061
MP Question 11 Preparation	77	3.81	1.01	0.12
Difference = μ (MT Question 11 upon graduation I felt prepared to be a professional teacher) - μ (MP Question 11 upon graduation students feel prepared to be a professional teacher)				
Estimate for difference: 0.112613				
95% CI for difference: (-0.145837, 0.371064)				
T-Test of difference = 0 (vs not =): T-Value = 0.86 P-Value = 0.390 DF = 120				

**Two-sample T for MP Question 11 Students know where to find current research vs
MT Question 11 I know where to find current research**

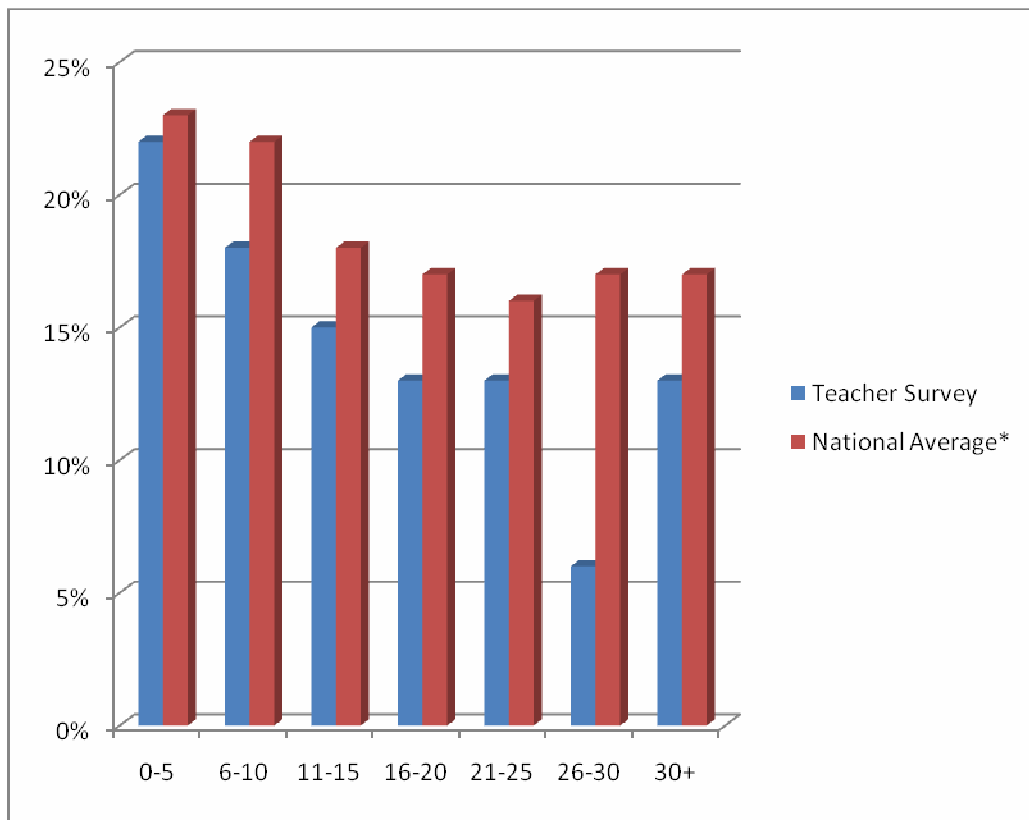
	N	Mean	StDev	SE Mean
MP Question 11 Students know where to find current research	75	3.63	1.02	0.12
MT Question 11 I know where to find current research	221	3.869	0.952	0.064
Difference = μ (MP Question 11 Students know where to find current research) - μ (MT Question 11 I know where to find current research)				
Estimate for difference: -0.242112				
95% CI for difference: (-0.508258, 0.024035)				
T-Test of difference = 0 (vs not =): T-Value = -1.80 P-Value = 0.074 DF = 120				

Two-sample T for MP Question 11 Students are prepared to undertake leadership vs MT Question 11 I was prepared to undertake leadership				
	N	Mean	StDev	SE Mean
MP Question 11 Students are prepared for leadership	77	3.182	0.956	0.11
MT Question 11 I was prepared for leadership	220	3.527	0.990	0.067
Difference = μ (MP Question 11 Students are prepared to undertake leadership) - μ (MT Question 11 I was prepared to undertake leadership)				
Estimate for difference: -0.345455				
95% CI for difference: (-0.598129, -0.092780)				
T-Test of difference = 0 (vs not =): T-Value = -2.70 P-Value = 0.008 DF = 137				
Two-sample T for MP Question 11 Students are prepared to collaborate vs MT Question 11 I was prepared to collaborate				
	N	Mean	StDev	SE Mean
MP Question 11 Students are prepared to collaborate	77	4.026	0.917	0.10
MT Question 11 I was prepared to collaborate	220	3.905	0.944	0.064
Difference = μ (MP Question 11 Students are prepared to collaborate) - μ (MT Question 11 I was prepared to collaborate)				
Estimate for difference: 0.121429				
95% CI for difference: (-0.120569, 0.363426)				
T-Test of difference = 0 (vs not =): T-Value = 0.99 P-Value = 0.323 DF = 136				
Two-sample T for MP Question 11 Students are aware of professional organizations vs MT Question 11 I am aware of professional organizations				
	N	Mean	StDev	SE Mean
MP Question 11 Students are aware of pro.organizations	77	3.99	1.04	0.12
MT Question 11 I am aware of pro. organizations	221	3.973	0.899	0.060

Difference = μ (MP Question 11 Students are aware of professional organizations) - μ (MT Question 11 I am aware of professional organizations)
Estimate for difference: 0.014162
95% CI for difference: (-0.250349, 0.278674)
T-Test of difference = 0 (vs not =): T-Value = 0.11 P-Value = 0.916 DF = 117

Two-sample T for MP Question 11 Students are prepared to deal with a variety of learning problems vs MT Question 11 I was prepared to deal with a variety of learning problems				
	N	Mean	StDev	SE Mean
MP Question 11 Students are prepared/learning problems	76	2.868	0.957	0.11
MT Question 11 I was prepared/learning problems	221	3.09	1.00	0.068
Difference = μ (MP Question 11 Students are prepared to deal with a variety of learning problems) - μ (MT Question 11 I was prepared to deal with a variety of learning problems)				
Estimate for difference: -0.222077				
95% CI for difference: (-0.477019, 0.032866)				
T-Test of difference = 0 (vs. not =): T-Value = -1.72 P-Value = 0.087 DF = 136				

Appendix 7



***National Center for Education Statistics**

VITA

Brian K. Tate was born in Kingsport, Tennessee on September 17, 1969, the son of Glenda and Kenneth Tate. After completing high school at Volunteer Comprehensive High School, Church Hill, Tennessee in 1987, he attended East Tennessee State University in Johnson City, Tennessee. He graduated with a Bachelor of Science degree in 1991, received a secondary teaching certificate the same year, and added an administrative endorsement after receiving his Masters of Education degree in Educational Leadership and Policy Analysis from East Tennessee State University in 1997. Brian taught mathematics nine years at his alma mater, Volunteer High School, before agreeing to serve as the school's assistant principal in 2000. In 2005, he received his Educational Specialist degree in curriculum and instruction from Lincoln Memorial University, Harrogate, Tennessee. In 2005, Brian enrolled in the Mathematics Education program at the University of Tennessee, working toward completion of his Doctor of Philosophy Degree. He left Volunteer High School in 2007 to serve as an adjunct professor of education and mathematics coordinator for East Tennessee State University's College of Education. In 2008, Brian accepted a mathematics teaching opportunity for Dobyns-Bennett High School, Kingsport, Tennessee. Brian is married to Tonya Johnson Tate and has three children: Mackenzie, Kendrick, and Zoe.