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National Board for Professional Teaching Standards Certification: Does It Impact Student Learning?

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**National Board for Professional Teaching Standards Certification:
Does It Impact Student Learning?**

Patricia E. Falaney

February 2, 2006

**A dissertation submitted to the Doctoral Faculty of the College of Education and
Human Services in partial fulfillment of the requirements for the degree of**

Doctor of Education

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Abstract

Patricia E. Falaney

The present study measured student gains in learning using the Florida Comprehensive Assessment Test pre and post-test mean scale scores in reading comprehension and math problem solving. The project involved classes of students in fourth and fifth grade in six north Florida counties. Thirty class sets of students were taught by a National Board Certified teacher, and a comparable set of thirty class sets of students of the same grade level and at the same school were taught by a teacher who was not National Board Certified. The analysis indicated if National Board Certified teachers produced a higher mean gain score for their students than teachers not certified by National Board.

Did National Board Certification make the needed difference in student learning?

The results of the main effect of the study did not indicate a statistically significant difference in the average reading comprehension and math problem solving achievement of students whose teachers were National Board Certified as compared to those whose teachers were not National Board Certified. There was a statistically significant main effect for grade level. In follow up testing there was a statistically significant difference between reading at the fourth and fifth grade levels. A small statistically non-significant difference was found in the math gain score means (favored fifth grade) and a larger difference in reading gain scores (favored fourth grade). There was a statistically non-significant effect for the grade level by teaching status two-way interaction.

CHAPTER 1

INTRODUCTION TO THE STUDY

The present study examined National Board Certification for teachers and the possible effect it has on the gain scores of students. The National Board was created in 1987 and its mission is embodied in the following 5 core propositions:

- #1 Teachers are committed to students and their learning
- #2 Teachers know the subjects they teach and how to teach those subjects to their students
- #3 Teachers are responsible for managing and monitoring student learning
- #4 Teachers think systematically about their practice and learn from experience
- #5 Teachers are members of learning communities

The commitment of the classroom teacher and his or her influence on the learning of students is well documented. Darling-Hammond (1997a) stated the number one factor in enhancing student learning is the capability of the teacher. Teachers who know their content area and also know the cognitive abilities of the students they teach are able to be more effective in structuring lessons for students. This study will attempt to connect cognition and metacognition of teachers as stimulated by the National Board process with student achievement outcomes.

In order to engage students in learning teachers must first be able to use varying methods of engagement, ensuring goals and objectives for each student are being met. Effective teaching is an absolute essential for optimal learning and for students to compete in the global marketplace. According to McCain and Jukes (2001) schools that do not change to meet the needs of the learners and of society will not continue to exist.

Teachers' reflection on their practice allows for continuous improvement. Teacher self-analysis entails making choices about what works and what does not work with students. These teacher judgment choices are a necessary component of perfecting the craft of teaching. A truly reflective teacher is one who makes decisions consciously and flexibly. These teachers are seeking evidence in results and are ready to modify their teaching accordingly. A teacher who is continually improving his or her practice can do this (Davis, Wolf, & Borko, 1999).

As members of learning communities teachers draw on the advice of others. This collaboration within a learning community engenders two-way communication about students and how they learn. All the community's resources are used and become partners in the students' education. As McCain and Jukes (2001) stated, "We must do what is necessary to prepare students for their tomorrows rather than our yesterdays" (p.125). In order to accomplish this we need the most effective teachers.

Purpose

The purpose of the present study was to determine if there is a connection between National Board Certification for teachers and increased learning gains of students. Darling-Hammond (1999) indicated that the investment in education for the 21st century has to include an increased effort to prepare and develop teachers to teach more challenging content to a more diverse mix of students. Teaching must be more diagnostic and prescriptive to provide the best opportunity for students to achieve at higher levels (Darling-Hammond, 1999; Rotherham, 2004). Are National Board Certified teachers better able to diagnose and prescribe for their students?

Higher learning gains are expected as politicians call for reform (Pool, Ellett, Schiavone, & Carey-Lewis, 2001). Expectations for the 21st century are high and will become higher as new technologies emerge. We must do better nationally to prevent irreparable damage to learners and to stop perpetuating learning inequity. Pool et al. referred to the assumption that advanced credentials will create better teaching and subsequently better student learning. National Board Certification can be that advanced credential.

Linquanti and Peterson (2001) and Darling-Hammond (1997a) wrote convincingly of the need to provide low-performing schools with the highest level teachers and suggested using National Board Certified teachers as an untapped potential to achieve this end. As Darling-Hammond stated, "By the year 2006, America will provide every student with what should be his or her educational birthright: access to competent, caring and qualified teaching" (p.1).

The ultimate teaching methods incorporate motivation and student knowledge gained in a social setting (Pintrich, 1990). Sato (2000) and Tracz et al. (1995) concurred that teachers who continuously assess student learning and modify and adjust accordingly provide the best learning environment for students. These are the teachers who are constantly devising new teaching and assessment practices that change their classroom methods as the learners change (Heller & Gordon, 2002). Twenty-first century students need teachers with clear learning goals and even clearer expectations of where students are and need to go next in their learning. National Board Certified teachers may be the answer.

Teaching has been called an activity of enormous size and diversity with increasingly complex depth and breadth (Doyle, 1990; Kauchak & Eggen, 2005; Schwartz, 1986; Shapiro, 1994). Because each teacher is at varying levels of expertise, teacher development and assessment must parallel these levels. A codified system of knowledge skills such as a standards-based assessment would allow each teacher to be measured against agreed-upon criteria.

The National Board for Professional Teaching Standards (NBPTS) has developed standards in more than 30 teaching fields (Bailey & Helms, 2000; Rotherham, 2004; Vandevort, Amrein-Beardsley, & Berliner, 2004). The type of assessment used for NBPTS involves the self-selection of the candidate, real-life teaching experiences, assessment exercises, mentoring, being a part of a learning community, and intensive reflection on practice. Analysis and reflection are the core of professional growth (Sparks & Loucks-Horsley, 1990). This is the basis of the National Board process.

Research indicates that teachers can learn as much from their peers as from expert trainers (Sparks & Loucks-Horsley, 1990). Mentoring is central to the National Board process as candidates complete all the tasks required for certification. Every model that Sparks and Loucks-Horsley proposed is included in National Board criteria for a candidate to complete as they attempt certification.

According to Schwartz (1986) and Rowan, Correnti, and Miller (2002) teachers need a body of knowledge to include social, physical, emotional, and the cognitive needs of a child. In addition they must know pedagogy, subject matter content, enactment strategies, and understand educational theory and clinical practice. National Board for Professional Teaching Standards states the certification process is an attempt at standardization, even though it is a vastly complex task (Vandervoort et al., 2004).

Research done up to this point has been mainly focused on the teacher and not on the achievement of the students in the teacher's class. There is a paucity of research according to Doyle (1990) and Vandervoort et al. (2004) in this area, and little is known about specific teaching skills, knowledge structures, or student achievement. The present study is based on the student achievement of students that are taught by National Board Certified teachers.

Rationale

Although many reasons can be given for the present study, the overall impetus is the goal for each student to gain as much learning as possible from their respective teachers. This is only possible with highly qualified precision teaching from knowledgeable professionals who could be identified as being experts in their field. In

determining if a teacher is highly qualified there needs to be a set of standards which can be used to measure these qualifications. The standards the National Board developed are a great beginning toward identifying and developing highly qualified teachers and making this dream a reality. However, there is little data available to substantiate whether the National Board standards identify teachers who are able to increase student achievement?

Presently, standards, accountability, and testing are being used as solutions to both educational and societal problems (Kauchak & Eggen, 2005; Vandevort et al., 2004). Candidates for public office use student achievement and teacher accountability as platforms when campaigning. Measuring how much students have learned by administering tests has become the norm. According to the Florida Department of Education the idea behind standardized testing is to raise educational expectations for students and to help them compete for jobs in the global marketplace. Even so, it is the teachers who choose the students' learning activities that match the state-mandated objectives (Ediger, 2000). Students' achievement will only improve if their teacher is instructing them effectively.

The National Board for Professional Teaching Standards has been criticized as receiving federal funding with no accountability (Archer, 2002). The Board, according to Wilcox (1999), pledged to submit reports to Congress every year, and audit accounts and spending. The claim was made that the Board would be self-sustaining by 2001 using only its application fees as funding; however, this has not occurred. Congress needs to know, if they are to continue financial support, if National Board Certification does really identify highly accomplished teachers. Even more importantly, if it does identify those

who will make the most impact on student learning, then more compensation for those teachers should be offered.

Discovering connections between student learning gains and what teachers are doing in their classrooms to achieve those gains is at the front of all educational initiatives. Politicians, businesses and community members want answers, but more importantly, teachers want answers. This study will hopefully add to the research in this area.

A description of how a teacher becomes involved in the certification process, and what components it entails, follows.

The preparation teachers must go through in order to be successful candidates for National Board Certification reinforces the notion that we can meet the challenges of the 21st century. The process has been refined since its initial inception and is now named the "Next Generation Model." It is as challenging and rigorous as the first model, but now the portfolio and assessment center exercises complement rather than duplicate each other. The process includes a portfolio that demonstrates specified tasks which meet the subject area standards and an assessment center exercise that demonstrates content knowledge and pedagogical content knowledge.

The portfolio consists of three different classroom entries. Two of these are videotaped portions and one is a collection of artifacts of student work. All of the sections require a teacher to write a detailed analysis of what was taught and how this impacted the learning of the students selected. The portfolio is designed to show longitudinal evidence of classroom practice that includes videotapes of teaching. The National Board

documents that candidates have reported a portfolio takes on average 200-400 hours to develop.

Along with all the classroom-based entries, there is a community involvement section attached to most of the certificate areas. This portion documents work done outside the classroom - working with families and the larger community, and also working with colleagues and the larger profession.

There are over 30 certificate areas available and more are being added each year. At the elementary level the two most common certificates are Early Childhood Generalist (ages 3-8) and Middle Childhood Generalist (ages 7-12). The former has nine standards: understanding young children; equity, fairness, and diversity; assessment; promoting child development and learning; knowledge of integrated curriculum; multiple teaching strategies for meaningful learning; family and community partnerships; professional partnerships; and reflective practice. The Middle Childhood Generalist has twelve standards: commitment to equity and access; knowledge of students; knowledge of content and curriculum; learning environment; respect for diversity; instructional resources; meaningful applications of knowledge; multiple paths to knowledge; assessment; family involvement; reflection; and contributions to the profession.

Assessment center exercises include six 30-minute sections. This is a change from the four 90-minute exercises that were originally required. This part of the entry is taken during the summer at computer locations throughout the country.

Eligibility to become a candidate includes holding a baccalaureate degree, having at least three years of teaching experience, and having held a valid teaching license from the state for those three years. The time frame involved for completion of all work to be

submitted is clearly delineated each year. Depending on the certificate area selected the portfolios are released on different dates. The average time for completion is eight months.

Scoring of candidate responses is based solely on the evidence submitted by the candidate. Videotapes, work samples, written analyses and the assessment center responses constitute the areas that are scored. All of the areas demonstrate the analytical and reflective abilities defined in the standards. Criteria for scoring the portfolio and the assessment center exercises are provided in advance to the candidate. Evaluators for the scoring are teachers who have been through rigorous training and have qualified as demonstrating an understanding of the National Board Standards. More than one assessor scores each candidate's entry independently. A scaled score of at least 275 is required for certification. In the event a candidate wishes to retake a portion of his or her assessment in order to score 275, either portfolio or assessment center scores already earned can be banked, and one section retaken.

Portfolio-based assessment has long been accepted as an optimal way to capture quality teaching and its effects on student learning. One part of the National Board process is to compose portfolios of student work that reflect teaching, assessing, and continued growth of students. Heller and Gordon (2002) indicated that portfolio requirements prompted almost all the candidates in their study to devise new practices and approaches in their teaching.

Videotaping teaching sessions is another profound aspect of the assessment. Sato (2000) interviewed a teacher in her research who stated this was the first time she had seen herself teach. This immediate feedback is a powerful growth opportunity for the

teacher and indicated that teachers no longer need to teach for fifteen years to perfect their craft. Videotapes give assessors the opportunity to look into the classroom setting and watch the interaction that is taking place. Teacher analysis of what teachers perceive from the taped sessions and the portfolios creates a web of support for student learning and indicates a teacher is reflecting on his or her practice and knows how to make decisions and judgments about the next steps in learning. Content knowledge is examined while attempting certification in situational vignettes through computer-based assessment center exercises. Tracz et al. (1995) reported that teachers going through this process paid better attention to individual students, linked student learning goals to standards, and assessed students more frequently.

The real impact of standards is yet to come (Darling-Hammond, 1999). Federal funds were set aside in 1997 to underwrite the costs of 100,000 candidate fees. The National Board is planning for more than 100,000 certified teachers within the next decade. In Connecticut, for example, the involvement of teachers in some capacity with National Board is predicted to be at nearly 80% of elementary teachers by the year 2010 (Pecheone & Stansbury, 1996).

By involving a number of teachers in the certification process throughout the system, a greater understanding is developed by the teaching community (Jaeger, 1995).

Recognition of teachers who attain this certification is varied according to the state in which the teacher resides. Individual states offer varying amounts of tangible awards to their Board Certified teachers. In Ohio, it is \$ 2,500 a year for the 10 years of the certificate, and Cincinnati pays \$1,000 a year in addition to that state's stipend of \$2,500. The Los Angeles Unified School District pays 15% above base pay for its

National Board Certified teachers. In Florida, through the Dale Hickman Excellent Teaching Program Act, legislation has increased the appropriation to pay for 90% of the certification fee, 10% salary increase for the life of the certificate, an additional 10% salary increase for mentoring others going through the process, and \$150 to defray the cost of portfolio preparation. In addition to this, Florida varies incentives by county. Duval County teachers receive a \$2,500 supplement for the 10-year life of the certificate and 120 inservice points (Bailey & Helms, 2000). Other support is offered through release time, differentiated responsibilities and assignments, and workshops. Although some states do a fair job in compensation, there is still no evidence that students of National Board Certified teachers do better academically than those whose teachers are not Board Certified (Wilcox, 1999). As Archer (2002) related, a line needs to be drawn or a connection made from certification back to student achievement.

The National School Board Association encourages local school boards to support teachers who seek National Board Certification. They also encourage school boards to offer financial and other incentives to teachers who become certified. Former National School Boards Association (NSBA) president and board member E. Harold Fisher (NSBA, 1997, p. 7). stated:

National Board Certification is important to school boards because we are interested in providing the highest quality education for our children. The quality of education is directly dependent on the quality of teachers. The teachers who have achieved National Board Certification have proved their ability to offer quality education.

The following are initiatives the National School Board Association (1997)

outlined as something local boards might want to consider:

- devise a means of supporting candidates with the \$2000 application fee
- provide specific compensation to NBCs on the salary schedule
- design professional development to support the standards and encourage faculty study groups
- encourage NBCs to remain in teaching while mentoring; or becoming lead teachers, curriculum specialists, etc.
- provide reciprocity of NBC teachers hired from out of state
- seek NBC teachers when recruiting
- define remuneration policies that recognize and reward teachers for their accomplishments
- provide successful NBC teachers with credits toward license renewal
- recognize these teachers by communicating to school staffs, parents, and the public how significant NBC is in strengthening teaching and learning.

The entire process of national certification has been costly. National Board Certified teachers are in all 50 states and the District of Columbia (NBPTS, 2006b). According to NBPTS (2006a) federal funds totaling \$ 90.8 million had already been appropriated which accounted for 55% of the National Board Certification project. More than \$75.5 million (45%) of the project's cost will be financed by non-governmental sources in the future.

On the state and local levels there is strong support from both Democratic and Republican governors and legislators, state and local school boards, the two largest teachers' unions, education organizations, teacher educators, and classroom teachers.

Incentives are provided to teachers in 544 school districts (NBPTS, 2006a). Florida is one state that endorses the portability of the license and allows the certification to be a part of license renewal.

For more than a decade teachers have been seeking and attaining National Board Certification. Research is still in its infancy on the effects this certification has on student learning. The impact of National Board Certification could be enormous but more research needs to be done. Individual reflection and collegiality with other teachers is a hallmark of the certification process as it now stands, but does this really impact student learning? According to Doyle (1990) teachers should be able to inquire into their teaching while thinking critically about their work. When this is done can it translate into teaching that makes a difference in student learning? There is a need to discover links between NBPTS and student learning.

The research question that will be explored is: Does National Board Certification for teachers improve student learning gains of fourth and fifth graders in reading comprehension and mathematics problem solving as measured by the Florida Comprehensive Assessment Test mean gain scores as compared to student learning gains of teachers who are not National Board Certified?

Limitations of the study include use of gain scores in the data collection. The reliability of gain scores is a potential limiting factor. At this time the delimitations of the study include using only grades four and five in the collection and analysis of data. Also, only using six counties in Florida limits generalizability to other counties or states.

In summary the purpose of this research is to investigate the possible positive impact of National Board Certification of teachers on student learning. Next follows a review of the literature that already exists on this topic.

CHAPTER 2

REVIEW OF THE LITERATURE

As was described in Chapter 1, the National Board for Professional Teaching Standards is developed around 5 core propositions. As related to the core propositions, the review of the literature is divided into four sections: cognition; teaching as a metacognitive practice; assessment of teaching; and teaching and student achievement. These four sections attempt to address the breadth of research already conducted on student learning and a teacher's role in its facilitation. Each section begins with a broad overview of the component; then it is connected more specifically with the National Board process and its five core propositions. These propositions are:

- Teachers are committed to students and their learning.
- Teachers know the subjects they teach and how to teach those subjects.
- Teachers are responsible for managing and monitoring student learning.
- Teachers think systematically about their practice and learn from experience.
- Teachers are members of learning communities.

Each of the sections, although treated separately for the review of the literature, is interrelated with each of the other sections and so forms a continual dialog of teaching, learning, and student growth. Although some research was found in each of these areas, additional empirical research is needed to form any links from National Board Certification to student learning growth. In 1974, Dunkin and Biddle spoke of an educational system whose procedures were governed by research and theories that were empirically based.

They believed that the study of teaching is the heartland of the research effort that should govern education (Bennett, 1978).

Cognition

As stated in the description for Core Proposition Number 2 of the National Board Standards, “Accomplished teachers understand how students develop, and they use accepted learning theory as the basis for their teaching” (NBPTS, 1994). Cognition is a cornerstone of knowing how students learn and how best to teach to their learning needs.

In the 1990s cognitive learning theories and the constructivist approach appeared in literature about the research on teaching (Danielson & McGreal, 2000). Cognitive theory embraces the fact that learners actively seek to make sense out of their environment. Goodlad (1984) described teaching as meaningful involvement of students who are in turn actively seeking meaning in the classroom. A teacher’s responsibility, therefore, is to select opportunities for all students to have access to knowledge. Constructing knowledge to be added to an existing knowledge base is at the heart of constructivist teaching. Connections or bridges need to be made by the learner from what is known to the new knowledge.

The literature review section on cognition contains three parts: learners are instinctively and cognitively active, learning is a constructed not a recorded process, and social interaction and knowledge construction.

Learners Are Instinctively and Cognitively Active

Core Proposition Number 3 states that teachers manage and monitor student learning. It is through this practice that teachers assure learners are connected to the learning that is taking place and are not passive bystanders. It is generally asserted that

as students learn they become actively engaged in taking information from their environment and constructing knowledge (Goodlad, 1984). This is an instinctive process that begins at birth and lasts a lifetime. Students construct their own knowledge based on background knowledge, new experiences, and the link between the two (Fuchs, Fuchs, Finelli, Courey, & Hamlett, 2004). To have effective learning the teacher needs to: use examples that are real-world, have many and varied concrete examples, and keep the learner as the focal point in the role of learning (Kauchak & Eggen, 2005).

A teacher's task is to promote the right conditions and sequences of events to connect the student to the next thing they need to know. Glaser and Lompscher (1982) summarized this as, "the task of instruction is the design of conditions for the acquisition of performance based on some theory of learning" (p.11). How to link students' learning and the goal of the lesson involves knowing what interests students, what knowledge they already possess in the subject, and how they learn (Darling-Hammond & Ball, 1998).

Keeping students actively engaged in their own learning is a visible key component in teaching assessment (Rowan et al., 2002; Vandevort et al., 2004). Engagement involves a great deal of planning and classroom organization to be effective. Students who are fully involved in their learning, and that of their peers, increase their learning growth (Bond, Smith, Baker, & Hattie, 2000; Goldhaber, Perry, & Anthony, 2003; Stone, 2002).

Effective teaching requires an in-depth knowledge of learners and how best they learn. Teachers who have gone through the National Board Certification process reported that students learn within a variety of domains, including student engagement (Harland & Rowland, 2002; Sato, 2000). In interacting with students, teachers need to know their

students and their background skills, the knowledge students bring to the classroom, and how to engage the student in learning (Donaldson & Stobbe, 2000; Gitlin & Smyth, 1989; Stronge, 1997; Uhlenbeck, Veerloop, & Beijaard, 2002).

For learning to take place learners must be connected to what is being taught. When students are engaged cognitively with the content being presented, learning connections can be made. It is at that time learners make links from what they already know to new knowledge. This process is defined as *constructivism*.

Learning Is a Constructed Not a Recorded Process

Core Proposition Number 3 covers two key elements in teaching: (1) teachers must know their content; (2) they must also know how to present that content so that students will understand new concepts and be able to apply this learning to real-world situations. Learning that is not connected seldom makes an impact on the learner and is often forgotten or misunderstood. Students construct their learning based on their past experiences and knowledge of the subject. This is called *constructivism* and is rooted in the teachings of Dewey, Piaget, and Vygotsky (Childers-Burpo, 2001; Ferguson, 1991; Lustick, 2002; Olebe, 1999). Students construct their own knowledge and add to it as they are instructed (Battista, 1999; Kauchak & Eggen, 2005; Shapiro, 1994). Students are active constructors and organizers of this stored information (Pintrich, 1990). Extensive studies report that traditional teaching methods do not give students the opportunities they need to interrelate ideas into an increasing store of knowledge. Instruction that is consistent with constructivism is a much more effective teaching model (Battista, 1999; Bennett, 1978; Stodolsky, 1988; Viadero, 1999).

In addition to learning experiences, teachers need to increase the total amount of active learning time spent on a topic. During the NBPTS candidacy process teachers are asked to study sample students' work over a multi-week period (approximately 4 to 8 weeks) and submit these as artifacts. The teacher then records the progress made in the learning of the students, and assesses how effective the teaching was that the student received. According to Bennett (1978) increasing the amount of time of active learning is the most important determinant of student success. Teachers need to be sensitive to the amount of time it takes to form schemas in the minds of students, the need for repetition, memory devices and automaticity of recall. We have a limited amount of working memory at any given moment to develop additional schemas. Due to this limited capacity new knowledge has to be learned and connected to existing knowledge to be recalled. Over the life span of a student, different interactions and situations make up a learner's constructed knowledge base (Kauchak & Eggen, 2005).

New knowledge gained is refined, shaped, and permanently stored in the brain for future retrieval through a social interaction process. It is in the sharing of the new knowledge with others and the reshaping of erroneous information that cements the new knowledge in the mind of the learner.

Social Interaction and Knowledge Construction

Managing and monitoring student learning is part of Core Proposition Number 3 and is linked directly to allowing students to interact while they construct their knowledge and check their perceptions against other learners. Knowledge construction is embedded in a student's social context that includes the individual and his or her interactions and relationships with others (Cohen, 1994; Pintrich, 1990). Enthusiastic

children in a group setting have been known to ignite the interest of even the most apathetic learner. In many studies it was reported that students responded positively to other students in the learning environment and were fully engaged when in cooperative learning activities. Students were given the opportunity to interact when being exposed to new material which helped them to realize their own strengths and weaknesses (Battista, 1999; Kramarski & Mevarech, 2003; Pressley & Woloshyn, 1995). Students made meanings clearer to each other by explaining to others. Opportunities to discuss materials helped students understand concepts more clearly. Vygotsky indicated that during this social interaction time, language played an important role in student's learning (Battista, 1999; Pressley & Woloshyn, 1995). This opportunity allowed students to voice their own opinions and compare them with others to see if they needed to change their understanding. This peer correction is a vital concept in learning and making connections. It provides students with the safe environment of trying out their ideas on a small group of students instead of in a more intimidating class setting.

Constructivism includes the concept that knowledge gained by a student does not remain solely in a student's mind; it becomes part of a system (Kauchak & Eggen, 2005). Moll (2001) related that there are three levels of activity in a classroom: the student who is actively engaged in constructing knowledge, the teacher who is also actively engaged in constructing knowledge about the learners, and the environment created between the student and the teacher. It has been noted by many researchers that in order for learning to be most effective for students they need: to have interaction with others, to have real-world connections, and to be provided with a variety of examples (Ferguson, 1991;

Olebe, 1999; Viadero, 1999). Knowledge has to be presented first, followed by high levels of interaction for students to construct their own knowledge.

Language embedded in a cultural context plays a crucial role in knowledge construction (Bennett, 1978; Cohen, 1994; Stodolsky, 1988). This language gives other learners access to each other's knowledge. Language also gives learners cognitive tools to think through problems and subsequently connect them to the real world (Pintrich, 1990; Pressley & Woloshyn, 1995). Language also provides a means for us to think about and reflect on our learning individually. Instructional strategies that teachers use to incorporate this application are: create opportunities for social interaction, promote student's use of language, create learning opportunities that are at the appropriate level, embed learning in a culturally authentic context, and provide instructional assistance to students. Combined, these are the basis of excellent teaching (Darling-Hammond & Ball, 1998; McRobbie, 2000).

Core Proposition Number 2 of NBPTS, besides indicating that accomplished teachers know the subjects they teach, also states that they know *how* to teach those subjects so that students gain maximum knowledge (NBPTS, 2006a). Teachers manage and control four different types of knowledge when working with students (Kauchak et al., 2002):

- Knowledge of content;
- Pedagogical content knowledge;
- General pedagogical knowledge;
- Knowledge of learners and learning;

A brief description of each knowledge area follows. In the area of knowledge of content, teachers must have an in-depth knowledge of learners and learning so they can link this knowledge effectively with learners' existing experiences. If teachers do not understand the content, they will be unable to teach that content to students. Pedagogical content knowledge involves knowing how to devise ways to connect the new knowledge so that students can make meaning out of it. Hard-to-comprehend topics are illustrated using examples and hands-on activities so they will make sense to the learner. Grouping students in discovery sessions where they are allowed to verbalize findings is another tactic to help the learner make sense of the material. General pedagogical knowledge is a broad understanding of instruction and classroom management. Teachers who employ these devices know how to engage students and keep them engaged in their knowledge construction. Effective questioning techniques engage all students and keep them focused on the learning at hand. Knowledge of learners and learning involves knowing how students learn and using that knowledge to devise the next lesson, this is critical to successful teaching (Darling-Hammond & Ball, 1998; Kauchak & Eggen, 2005). Teachers must know their students, know how best they learn, and keep them on task with stimulating lessons connected to the students' existing knowledge base.

The National Board Certification process uses cognition as a tool to evaluate the teacher's thinking about what they perceive is happening in their classroom on a day-to-day basis. They are tasked with in-depth knowledge of the learner and the development of lessons that meet the learner's needs. A longitudinal study is required of the candidate that encompasses studying student work over a period of time. The teacher must understand how the learner comprehends the material that was presented. It is not always

the most successful lesson that is showcased by the candidate - more often it is the lesson that shows learners who are actively engaged in the learning process. The implication from this is the teacher learns from the teaching experience and is incorporating that learning for future instruction. This is critical and is what matters the most in the teaching/ learning cycle.

In this section of the review of the literature, cognition was connected to Core Propositions Number 2 and 3 of the National Board standards. These propositions involve teachers knowing how students learn and using this learning theory as a basis for their instruction. Teachers also must know how to manage and monitor student learning to ensure the optimal environment for learning to take place. The constructivist approach and cognitive learning theories have appeared in the literature since the 1990s and are the cornerstone of the National Board process. In addition Board Certification acknowledges that learners are instinctively and cognitively active and construct new knowledge from carefully designed lessons. Social interaction is a vital part of knowledge construction as pointed out in this section. In order to have learning through social interaction, teachers must know their students, manage behavior, and construct stimulating learning opportunities. The certification process for National Board includes all these components.

Next, I will examine teaching as a metacognitive practice and find any connections from this to the National Board process.

Metacognition

Core Proposition Number 4 of NBPTS says “teachers think systematically about their practice and learn from experience” (NBPTS, 2001a). Reflection is metacognitive in nature, and this fact emphasizes that the practice of teaching demands reflection on a

regular basis. The definition of metacognition is being aware of personal learning so that strategies that are not effective are changed. The National Board process emphasizes both metacognition and reflection, but they are very closely related. So much so, that for the purposes of this study *metacognition* and *reflection* will be treated as synonyms. The following is what the literature says about metacognition.

The literature review section on metacognition has three parts: teaching as a complex and diverse enterprise, teachers who are metacognitive improve professionally, and teachers learn from experiences.

Teaching Is Complex and Diverse

Teaching is an activity of enormous complexity (Collins, 1990; Doyle, 1990; Glaser, 1982; Lustick, 2002; Schorr, 1993). It is teachers who understand this complexity of teaching and learning and who think about their practice, who are considered to be the most successful teachers. In other words, teachers are metacognitive. It has also been stated that the work of teachers has multiple requirements but infinite possibilities (Lustick, 2002)-another indication that teaching is complex.

The National Board process may foster enriched opportunities for managing the complexity of teaching. It was noted by many researchers that teachers who were metacognitive about their teaching while seeking certification were continuously developing strategies to deal with their many responsibilities (Bottiger, 2001; Keiffer-Barone, Mulvaney, Hillman, & Parker, 1999; Lustick, 2002). Other researchers related that reflection about teaching was a complex endeavor, produced new learning, and was directly related to content and content-related pedagogical knowledge (Bottiger; Keiffer-Barone et al.; Schorr, 1993). It is documented that reflection on teaching is a cyclical

process as evidenced by skilled teachers who continuously monitor what is going on in their classrooms in order to adjust instruction and provide for clearer understanding - a definition of *metacognition* (Bottiger, 2001; Sawyer, 2001; Tracz et al., 1995). It appears that metacognition should be a constant that gives teachers an opportunity to change their practice and to improve their skills. This prepares teachers for good decision-making and the outcomes they can expect (Kauchak & Eggen, 2005). Metacognition is required of all candidates for NBPTS certification.

The complexity and diversity of teaching is thoroughly documented in research. In order to handle this complexity, teachers must become organizers of their own learning to the point that they change their own learning paths as needed to improve their teaching. The ability for teachers to know how they learn and be able to adjust their own learning as new information is added is an example of metacognition.

Teachers Who Are Metacognitive Improve Professionally

As Core Proposition Number 4 states, “teachers think systematically about their practice and learn from experience” (NBPTS, 2001a). One of the first substantial pieces of research produced regarding National Board candidates by Bond et al. (2000) identified 14 dimensions of expert teaching. The research centered around three questions: Is the quality of student work produced by students whose teachers were National Board Certified better compared to students whose teacher was not certified; Are the teaching practices of National Board Certified teachers different from teachers who were not Board Certified; and Does the amount of professional activity involvement by Board Certified teachers differ from those that were not Board Certified? The most significant of the completed analyses to date concluded that the Board Certified teachers

scored higher than non-certified peers in the following areas: ability to think critically about their students and convey knowledge to them, being able to solve problems and improvise, and being able to articulate high standards and teach lessons that incorporated the same. Hattie et al. in 1996 (as cited in Bond et al., 2000) found that students taught by National Board Certified teachers tended to have a greater depth of understanding than peers taught by non-National Board certified teachers. Goldhaber, Perry, and Anthony (2003) stated as an overall goal that by “seeding schools with such teachers, NBPTS hopes to improve the quality of the teaching force as a whole” (p.4 - 5).

According to Core Proposition Number 4 of the National Board standards, teachers who are metacognitive about their practice do improve professionally. The description that follows the proposition includes “accomplished teachers know how to make subject matter understandable to students, and they are able to modify instruction when difficulties arise.” Core Proposition Number 4 refers to metacognition in its description “accomplished teachers critically examine their practice, and they seek continual professional growth” (NBPTS, 1994).

Metacognition is a key element in the selection of the learning that is to be videotaped for the National Board process. The videotape must show students meaningfully engaged in learning, and the candidate also has to write in detail about the student learning taking place. Explicit directions for the candidate include showing via videotape “exploration, discovery, and talk among children, and between the teacher and children, in which they respond to one another’s ideas” (NBPTS, 2001a, Section 3, p.4). Much metacognition happens on the part of the candidate before the final choice is made of the lesson to be videotaped. As is stated in the facilitator’s manual “they (teachers)

regularly reflect on their practice to strengthen the effectiveness and quality of their practice” (NBPTS, 2001a, Section 4, p.4). In all sections of the National Board process a task entitled “reflection” is included that requires written discourse by the candidate (NBPTS, 2001a).

Understanding the process teachers use to gain self-knowledge is the essence of metacognition. Teachers who are metacognitive about their teaching improve more than teachers who are less cognitive (Heller & Gordon, 2002; Williams & Bearer, 2001). This cognition focuses on a teacher’s belief, expectations and need for order, predictability, and understanding. In the classroom there are areas where evidence of metacognition can be seen by an observer. If teachers expect students to achieve and they make the task appropriate and interesting, they will succeed. Teachers who are metacognitive are examples of teachers who think about their practice and learn from it.

Setting realistic goals for learning and equally realistic goals for performance are other identifiers that teachers are metacognitive about their practice (Burroughs, Schwartz, & Hendricks-Lee, 2000; Darling-Hammond & Ball, 1998; McRobbie, 2000). Strategies that did not work were either quickly abandoned or adapted by a teacher who was metacognitive (Darling-Hammond & Ball; Goodlad, 1984; McRobbie). Teachers who displayed this way of understanding their own learning also taught this skill to their students. The more metacognition was used in a classroom, the more effective and enriching the learning community became for students (Darling-Hammond & Ball; McRobbie; Pintrich, 1990).

Metacognitive teachers, according to Oser and Franz (2001), were able to construct a bridge between teaching and learning and “possess professional knowledge

about the stimulation and the coordination of learning-based, multiform activities” (p. 1031). Learning theory is concerned with what happens to the learner, and metacognitive teachers are actively seeking out that information (Oser & Franz; Rodriguez & Berryman, 2002). Piaget’s statement “teachers who convey only knowledge without considering the operations of students inhibit student learning” - must be taken more seriously (Oser & Franz, p.1061). Additionally Oser and Franz wrote that “teachers who stress content alone do not see that the content is fruitful only if the students use and model it” (p. 1061).

We need to “get to the heart of our practice, the place that pumps the lifeblood into our teaching, where we reflect, gain insight, and change what we do with our students” (McEntee, Appleby, Dowd, Grant, Hole, & Silva, 2003, p.55). As teachers try out different ways of presenting information to students, use good questioning techniques, and connect learning to that which is known, the quality of teaching improves. In planning and teaching we can think in terms of five major contextual components: students and how they have performed in the past, a sequence of teaching events, a specific goal for the students, the student responses, and the curriculum event as it relates to the curriculum (Hillocks, 1999; Tracz et al., 1995). Adjustments to instruction begin to occur as conversations with and questioning of students allows a teacher to see through the eyes of the child how the new learning material is perceived. Metacognitive teachers know that the background experiences which students bring to the classroom seldom, if ever, match those of the teacher (Sarason, 1993).

National Board Certification is constructed with metacognition as a foundation (NBPTS, 2006b). Teachers are unlikely to change their practice unless they see a clear

need, and metacognition enables them to define this need (Berg, 2003; Childers-Burpo, 2001; Hillocks, 1999; Keiffer-Barone et al., 1999; Lustick, 2002). Kauchak and Eggen (2005) suggested reflection on practice prepares teachers for future decision-making and makes them cognizant of past decisions and their outcome. Videotaping a lesson and reflecting on its outcome provides an opportunity for the candidate to be metacognitive. The written commentary after the candidate views the videotape is designed to contextualize, analyze, and evaluate teaching. The candidate is required to sequentially navigate the learning experience for the students, beginning with the planning of the lesson (NBPTS, 2001a).

The National Board process, according to Bottiger (2001), taught her how to be more reflective and refine her teaching in a continuous fashion. She felt that a teacher going through the National Board process evolved into a better educator and became an accomplished teacher. Teaching and teacher learning are really about forming and reforming frameworks for understanding practice, construction of the curriculum, mixing teacher and student experiences, and knowing how learners infuse teacher actions into their existing understanding (Cochran-Smith & Lytle, 1999; Lustick, 2002). All of this insight occurs as a teacher gains rich experiences in the classroom. These are also skills that a candidate for National Board must develop, examine, and write about reflectively.

Tracz et al. (1995) concurred that reflective teachers think deeply about what they are doing, what they could or should do, and why. They described a reflective teacher as “one who makes instructional decisions consciously and tentatively, considers a full range of pertinent contextual and pedagogical factors, actively seeks evidence about the results, and continues to modify these decisions as the situation warrants” (p. 4).

Metacognition is woven through the candidate's tasks as they seek National Board Certification. In the *Components of Professional Practice*, Danielson and McGreal (2000) listed four domains: Planning and Preparation, the Classroom Environment, Instruction, and Professional Responsibilities. In each of the four domains reflection becomes a key component. In domain one, Planning and Preparation, there is listed a section entitled designing and assessing student learning. This task requires reflection on the part of the teacher for optimal learning to occur. The Classroom Environment domain had a section for the establishment of a culture conducive to learning. This topic infers the teacher has knowledge of the students and is thoughtfully reflecting about supporting the interpersonal aspects of the teaching space. Domain three, Instruction, is a highly reflective section including: questioning students, engaging students in their learning, giving feedback, and being flexible and responsive as teaching is occurring. None of these will happen unless a teacher is constantly being metacognitive and adjusting to the needs of the learner. In the last domain reflecting on teaching is listed first under Professional Responsibilities. Growing and developing professionally is an important part of this domain and one that materializes through teaching experiences that are reflected upon (Danielson & McGreal).

The five core propositions of National Board for Professional Teaching Standards embody what teachers should know and be able to do to teach to our diverse student population. As a candidate for NBPTS examines student work and looks for evidence of learning, they are metacognitive about their teaching and adjust instruction based on the success of their practice.

Core Proposition Number 2 states that teachers know the subjects they teach and how to teach those subjects to students. Cognition and metacognition are important aspects of demonstrating this proposition as a candidate works through his or her portfolio. Knowing content in depth is stressed, but so is being able to take that core content and connect learning to a student's existing knowledge base.

Teachers Learn From Experiences

Skilled teachers monitor their classroom environment on a continual basis (Helms, 2000; Hillocks, 1999; Sarason, 1993). Core Proposition Number 3 states, "teachers are responsible for managing and monitoring student learning" (NBPTS, 2006b). Through a pattern of refinement skilled teachers have developed their practice by using their experiences in the classroom. This pattern, it has been suggested, can be divided into four parts: knowledge of students, specific goal, trial event, and student responses (Hillocks). Initially the teacher must determine the readiness of the students to be able to deal with the new material. If the students are ready, a specific goal for the lesson is set. In the trial event, a pair of students or a small group might work collaboratively on the task set for them. During this time student responses can be elicited to determine if the new material is being absorbed correctly, if not, an adjustment in instruction needs to be made. This pattern is a hallmark of a National Board Certified teacher.

"Teachers think systematically about their practice and learn from experience" is the fourth of the five core propositions of the National Board for Professional Teaching Practices (NBPTS, 2001b). As Berg (2003) intimated, teachers who do not know their students, do not know the curriculum, or do not realize the teacher's important role in

connecting the two will be unlikely to have effective learning taking place in their classrooms. This experience of teaching is even more critical as classrooms are filled with students who represent tremendous diversity. Defining what teachers know and can do becomes vital in improving teaching and student achievement nation-wide. In 2002 the American Federation of Teachers (AFT) stated in their manifesto (as cited in Berg):

The nation can adopt rigorous standards, set forth a visionary scenario, compile the best research about how students learn, change the nature of textbooks and assessment, promote teaching strategies that have been successful with a wide range of students, and change all the other elements involved in systemic reform. But unless the classroom teacher understands and is committed to the plan and knows how to make it happen, the dream will come to naught. (p.2)

One way to make sure teachers have that understanding is to make teachers researchers of their own practice, using their own students' learning as the topic of study (Berg). The NBPTS process requires this understanding on the part of the candidate.

Cognition is defined as the process of knowing. *Metacognition* is being aware of personal learning to the point that strategies that are not effective are changed.

Throughout the National Board process metacognition is emphasized as candidates grow and change their teaching practices to become more effective and gain more knowledge about their craft.

In summary, metacognition in the review of the literature was treated as a synonym for reflection. A connection was made from metacognition to Core Proposition Number 4 of National Board Certification standards. This proposition outlines that teachers think systematically about their practice and learn from experience. Teaching is an immensely

complex endeavor, and this section has documented that fact. In order for teachers to be able to handle this complexity, their own learning must be highly organized and experiential in nature. Studies by Bond et al. (2000) and Goldhaber, Perry and Anthony (2003) indicated that metacognitive teachers improve more professionally than those who are not metacognitive. Teachers who are metacognitive are able to bridge the gap between teaching and learning and are masterful at incorporating new learning themselves while adjusting the learning opportunities for their students.

Cognition and metacognition appear to be related to the National Board process. Two additional areas, assessment of teaching and student achievement, are next examined for their relatedness.

Assessment of Teaching

What does research tell us about the assessment of teaching? It is noteworthy that little empirical research has been done in the area of teaching assessment and its connection with student learning. Additional empirical research is needed to connect high-quality teaching with optimal student learning, if teaching is going to improve significantly and impact our increasingly diverse population of students (Rotberg, Futrell, & Lieberman, 1998; Schwartz, 1986; Sikula, 1990). Controversy has abounded about the ways to assess teaching and teachers and the optimum tools to use for effective assessment.

Madeline Hunter's research work in 1979 on teaching assessment focused on the design of a lesson as a reflection of the ability of the teacher. She defined five areas in her description of a good teacher in action: the teacher is teaching to an objective, the objective is at the correct level of difficulty, the teacher monitors and adjusts the lesson,

the teacher knows the principles of learning, and the teacher continues to grow (American Association of School Administrators, 1980). It is interesting to note that all of these areas are part of the focus of National Board candidacy.

This literature review section explores the assessment of teaching and the historically difficult task of defining quality teaching. Goldhaber, Perry, and Anthony (2003) expressed this clearly: “[T]he evidence shows that good teachers make a clear difference in student achievement. The problem is that we don’t really know what makes a good teacher” (p.50). It is extremely difficult to determine teacher performance (Ediger, 2000), and even the federal government is unclear on what it means for a teacher to be “highly qualified” (Berry, 2003). This section of literature review includes the following topics: external assessment of pedagogical practice, self-assessment, and National Board as an external and self-assessment of pedagogical practice.

External Assessment Of Pedagogical Practice

The focus of teaching in the 21st Century is centered on authentic pedagogy, engaged teaching and learning, and teaching for understanding (Danielson & McGreal, 2000). As complex as teaching is to define and describe, so too is the evaluation of teaching. What is high-quality teaching for our students in today’s classrooms? Across the nation and globally many debate this question, from teachers’ unions to school boards and from university professors to principals. Teaching evaluation, however, remains a controversial and complex issue and one that deserves the attention of researchers in helping to define (Goldhaber, Perry, & Anthony, 2003; McRobbie, 2000). Some research has been and is being conducted that points to the smartest investment for our decade and

one that common sense would dictate – high-quality teaching for all students (Wright, Horn, & Sanders, 1997).

What does high-quality teaching look like in the classroom? To assess teaching up to this point administrators have made classroom visitations to sit and observe the actions of the teacher. For decades these frequent one-stop snapshots have been all that was required for assessing teaching across the country. This is not precise enough (Blau, 1995). Following are some of the attempts along a continuum to define quality teaching.

The publication in 1983 of *A Nation at Risk* generated fear that American schools were lagging behind the rest of the developed nations. As a response to this fear the first of the disciplines to set content standards was mathematics in 1989. The setting of content standards was coupled with student performance standards incurred through two pieces of federal legislation – Goals 2000: Educate America Act and the Improving America's Schools Act (IASA) of 1994 (Kraft, 2001). Institutes for higher learning were also tasked to prepare teachers who were more qualified, committed, and caring to teach our nation's students. The standards movement of the late 1980s was heralded as the answer to higher accountability in education (Kraft).

Standards can be a form of assessment tool. Two major sets of standards have been developed nationally and are guides for teacher education programs – the NCATE Standards and the INTASC Standards. A third set of standards, those for NBPTS, were developed for distinguishing quality teaching once a teacher is hired and teaching in the classroom. Each of the three sets of standards is for a different purpose: NCATE is for teacher education accreditation; INTASC is for initial licensing; and NBPTS is for denoting advanced certification (Berry, 2003; Darling-Hammond, 1997a; Heller &

Gordon, 2002; Kraft, 2001). Each of these sets of standards reinforces and complements each of the others.

Assessment of practice as it is observed by others can be linked to standards. Standards can provide the framework for assessing quality teaching. Commonalities can be seen and differences noted between the standards for NCATE, INTASC, and NBPTS. Kraft (2001) believed that standards are important in providing a set of directions and priorities. It is in these priorities that the educational community can put their time, resources, and energy. She cautioned, however, against the standards becoming their own end, instead of the means to the end result. On a positive note Kraft believed these standards could be the vehicle for dialogue among teachers, administrators, parents, and the community about quality teaching practices and how to achieve them. Standards need to be used as the impetus to rethink teacher education and practice (Darling-Hammond, 1997b; Kraft).

It is critical to use the standards movement for collegial discussion and making changes in the way students are taught and not let it be just another idea whose time will pass. As stated during the President's Summit on Teacher Quality (1998) in the report entitled *Promising Practices: New Ways to Improve Teacher Quality* (cited in Kraft, 2001),

teaching is the essential profession, the one that makes all other professions possible..... accordingly, what teachers know and are able to do is of critical importance to the nation, as is the task of preparing and supporting career-long development of teachers' knowledge and skills. (p.1)

There are currently 600 different teacher tests throughout the country to assess teachers (Berry, 2003). Some of the tests are able to measure minimum basic skills and content knowledge; none distinguish average levels from highly qualified levels (Berry). NCATE is currently working with the Educational Testing Service to create a new PRAXIS test that will include new content and pedagogical content knowledge that new teachers are expected to meet (Berry). INTASC is also creating a Test of Teaching Knowledge that will assess a beginning teacher's knowledge of child development, theories of teaching and learning, diagnostic skills, knowing student background as a foundation to instruction, and other essential skills (Berry). It is estimated to cost \$300 per candidate. INTASC is also creating an examination to weed out weak teaching candidates and develop potentially good ones through a portfolio assessment of novice teachers. This assessment is slated to be around \$800 per candidate. NBPTS currently costs \$2,300 to assess candidates according to their standards. Berry noted how expensive it is to assess quality teaching, as did Davis et al. (1999).

Ferguson (1991) completed research that connected money with quality of schooling that influenced test scores and future earnings for students. Ferguson maintained that higher salaries in school districts in Texas attracted better quality teachers in those districts. In Ferguson's study data was compiled from 900 of the almost 1,000 school districts in Texas. The TECAT (Texas Examination of Current Administrators and Teachers) was the measurement data of choice for the teachers studied. Data were also collected on the number of students per teacher, number of years of experience of the teacher, and degrees held. Student scores in both math and reading were collected from the TEAMS (Texas Educational Assessment of Minimum Skills). Student scores were

collected in the 1985-86 school year and on the same children in two years (87-88) and four years (89-90), respectively.

Ferguson (1991) related that with all factors controlled, teacher's language skills as measured on the TECAT were the best predictors of student success in both math and reading. He pointed out that "we can only speculate about what teachers with high scores do differently from teachers with low scores" (p. 477). Ferguson concluded his research by stating "teaching quality matters and skilled teaching is the most critical aspect of schooling" (Ferguson, p. 490)

Sikula (1990), in his report on *Staffing the Nations Schools: A National Emergency* (1984), stated, that more research needs to be done on teacher assessment. Studies need to be done on the most effective way to determine competency of teachers during and at the conclusion of teacher preparation programs as well as one-, five-, and ten-year follow-up studies. Sikula also reported from the same study that research needed to be done to determine relationships between performance in the classroom and teacher competency through some type of examination. Doyle (1983) also indicated only through parallel and simultaneous assessment of a variety of information can an evaluative assessment be made that takes advantage of strengths and controls for weaknesses.

In his book *Teacher Evaluation*, Peterson (2000) emphasized that assessing teaching means determining the value, worth, and merit of teaching. Current administrator visits to classrooms do not impact or positively change the teaching that is going on daily. In order to make evaluation of teaching an assessment, whose purpose is to improve practice, Peterson outlined twelve steps that can be taken. The following five practices are some of the key elements:

Place the teacher at the center of the evaluation

Use more than one person to judge teacher quality and performance

Use multiple data sources to inform judgments about teacher quality

When possible, include actual pupil achievement data

Use variable data sources to inform judgments

Peterson concluded by stating this change in the process would need to be gradually introduced over as much as a five-year period.

A potentially effective means of assessing teaching is through a portfolio review (Tucker, Stronge, Gareis, & Beers, 2003; Yaoying, 2004). Through the building of the portfolio teachers can be encouraged to self-evaluate and gain insight into their own strengths and identify areas where they need to improve. As this document can emphasize strengths and be more meaningful to teachers, it can be considered as a more valid indicator of what teachers know and are able to do. A portfolio can include written documentation of planning, curriculum, organization, interaction with parents, classroom management approaches and professional development opportunities (Yaoying). Although these assessment tools require much time in preparation they are able to provide professional development opportunities.

Research completed by Tucker et al. (2003) outlined whether a portfolio assessment would be useful for teachers and their administrators. The conclusions reached were organized around four basic questions: Do teacher portfolios contribute to a valid assessment of teacher performance? Do portfolios provide a value-added factor to teacher evaluation systems in terms of differentiating quality of performance? What are the perceptions of teachers and administrators regarding the use of portfolios in teacher

evaluation? How do teacher portfolios contribute to professional growth for teachers?

The researchers studied portfolio implementation in the Williamsburg-James City (WJC) County school system in Virginia. The implementation had two purposes – accountability and student performance improvement. This was a two-year study by teachers and administrators that employed multiple data collection strategies (Tucker et al.).

The conclusions reached by the researchers in the Tucker et al. (2003) study were that portfolios have a powerful potential of enhancing teacher evaluation. Portfolios “expand the lens on the work of teachers for the purposes of accountability and offer a possible avenue for meaningful professional development – the two touchstones of teacher evaluation” (Tucker et al., p. 594). National Board portfolio preparation is intended to accomplish the same results.

Self-Assessment

Numerous human traits are needed for teachers to be successful in classrooms (Harland & Rowland, 2002). According to Bandura (as cited in Harland & Rowland) self-efficacy, or self-assessment is “[a] judgment of one’s capability to accomplish a certain level of performance” (p. 391). Self-efficacy is a trait of an effective teacher. Teachers must understand their own human relations skills, behaviors, and dispositions as well as those of the students they teach. They must also cultivate, refine, and utilize these skills as they instruct students (Harland & Rowland). Teachers must be masterful at managing student behaviors and maintaining a positive, friendly, and safe environment for learning in their classrooms.

One example of assessing a teacher for self-efficacy is to have them complete Emmer and Hickman’s instrument (Harland & Rowland), *The Scale for Measuring*

Teacher Efficacy in Classroom Management and Discipline. The 36 items in this questionnaire are clustered around three efficacy factors: classroom management and discipline efficacy items, external influences efficacy items, and personal teaching efficacy items. These scores can then be analyzed as an assessment to give insight into teacher effectiveness. This is one example of a way teachers can self-assess their teaching.

In 1997 Darling-Hammond, as part of a commission, wrote the report, *Doing What Matters Most: Investing in Quality Teaching* (1997a). In this report teaching quality and how to assess it is the central theme. The five recommendations from the commission were aimed at long-term improvements in teaching and learning. The majority of these recommendations could be used as self-assessment tools by teachers. The first recommendation was for standards for teachers to be linked to standards for students. With both sets of standards clearly delineated, measurement against these standards can be done by each teacher in their classroom. The second recommendation proposed a reinvention of teacher preparation and professional development. Again, standards were stressed as the benchmarks of achievement. Mentoring programs providing dialog and support for teachers were also stressed. Additionally, embedding professional development in the teacher's day through study groups, peer coaching, research and planning were noted (Darling-Hammond). Recommendation number three concerned recruitment and was not connected to self- assessment. The fourth recommendation was to encourage and reward knowledge skill. It was proposed that a career continuum and compensation system be developed to reward accrual of knowledge skills. Knowledge accrual would be easily assessed by the teacher who was earning this incentive. The last

recommendation was to create schools that are organized for student and teacher success. Adoption of shared standards, inclusion of parents as partners in the learning of the children, and restructuring schedules to permit more sharing and planning for teachers (Darling-Hammond) were listed. All of these recommendations build self-efficacy in teachers and are components of self-assessment.

Teachers benefit most from development activities that they have selected for themselves (Danielson & McGreal, 2000; Kyriakides & Kelly, 2003; Sato, 2000). One of the most effective ways for teachers to self-evaluate or assess excellent teaching is for teachers to videotape themselves and write a critique after viewing the lesson taught (Sato). Rarely do teachers get an opportunity to watch their own teaching. In this way teachers can discover for themselves if they have clear learning objectives for their students. This self-assessment tool can then be used to highlight effective teaching practices or elucidate the need for professional development in needed areas. When teachers request professional development as a result of a self-determined need the result is an opportunity for huge professional growth.

Self-assessment is one aspect of improving teaching. In addition to self-assessing teachers must also be able to assimilate and accommodate external assessment into their practice. As practice is refined, all assessment tools become vital links in the evaluation of teaching. National Board for Professional Teaching Standards incorporates both external assessment and self-assessment of teaching.

National Board as an External and Self-Assessment of Pedagogical Practice

National Board for Professional Teaching Standards is an assessment of teaching. Many measurements are included in the candidacy tasks for National Board Certification.

The five propositions that are the standards of becoming a National Board Certified teacher encompass: planning for instruction, managing and monitoring student learning, using a variety of instructional techniques, having a rich understanding of content, using multiple methods to assess student progress, and being an effective communicator (NBPTS, 2001a).

The National Board for Professional Teaching Standards was conceived at a critical point in the history of education in the United States. The original intent was to reward good teaching, but in order to accomplish this reward system the process has to identify good teaching as well.

NBPTS (2001b) states in the conclusion of its research report, *The Impact of National Board Certification ® on Teachers: A Survey of National Board Certified Teachers and Assessors*, that the process of certification is clearly established as an excellent, valuable professional development opportunity (Kelley & Kimball, 2001). In addition, this experience can improve teaching practices and impact the classroom instruction and transfer the same to peers. This certification can also increase professional recognition and provide opportunities for collegial interaction. Most important it states that the National Board Certification process improves student attitudes about student learning. With this in mind NBPTS can be considered to be both an external assessment of pedagogical practice and a self-assessment tool.

Multiple pieces of data need to be collected to represent teacher competence: evidence of student learning, parent surveys, teacher tests, peer reviews, systematic observations, an administrator report, student focus groups, and documentation of professional activities (Peterson, 2000; Sparks & Loucks-Horsley, 1990). Decades of

research went into the development of the National Board Standards delineating what teachers need to know and be able to do. The process was an attempt to assess quality teaching (Goldhaber, Perry, & Anthony, 2003; McRobbie, 2000; NBPTS, 2001a).

National Board teacher work samples are an example of linking teacher performance with the learning of the students they teach (Dennert, Salzman, & Bangert, 2002; Futrell, 1999). The five core propositions and their descriptors that candidates are asked to define in their daily practice embody the preparation, support, and development of teachers.

Kowalski, Chittenden, Spicer, Jones, and Tocci (1997) instituted a four-year project in a South Brunswick, New Jersey, school district to determine if National Board Certification enhanced teacher's professional knowledge and, as an assessment process, if it promoted professional growth. Eighteen teachers were used in the study, and data were collected through records of meetings, written comments, and individual interviews. It was noted in the research that it was not the lesson of the teacher that was as important as the analysis of the lesson by the teacher and how this analysis was done and what impact this had on subsequent teaching. Teachers commented on the value of documenting a lesson and reflecting and writing about the lesson (Bohen, 2001; Serafini, 2002). This act alone made the teacher become more conscious about future planning and far more precise about subsequent instructional decisions that were made (Kowalski et al.). Other teachers noted they became more focused and reflective and less intuitive. This experience made them move to a new professional level by being more scientific about their teaching. "It was important as external confirmation," was one teacher comment (p.15). Another teacher expressed "an awareness of the assumptions that shape daily

decisions and with the teachers' capacities to evaluate – and ultimately to modify – what they are doing” (p.15).

In the South Brunswick study, five distinct themes emerged in the participants' responses: a framework, documentation, collaboration, time and pace, and evaluation. As a framework, for good teaching exists it helps teachers evaluate themselves against this framework and this becomes a template for critical analysis of practice (Shulman, 1987). Documentation becomes grounded in the daily classroom life and is viable to teachers as they ask, “What standards am I addressing in this lesson?” Working with colleagues in an established trust environment is a primary source of direct feedback. This systematic feedback is essential for most teachers and is the core reason for collaboration. Timelines that are established support the setting of regular meetings for review and documentation of practice. Evaluation, although somewhat tension-filled, injects attention to the framework and documentation of standards that ultimately results in a sense of closure for the teachers. The result of this project indicated a need for local and national levels of assessment for experienced professionals to be a viable venture (Berry, 2003; Kowalski et al., 1997; Rotberg et al.,1993).

Schwartz (1986) maintained that we know more today about best practice and what works than ever before. Teachers need to be well-educated, sensitive, intelligent, and able to learn from theory and example. They also need to be researchers of their own practice, and possess skills in critical thinking and analysis. They must be able to demonstrate daily application of a body of knowledge to students. In the realm of assessment of teaching it is noteworthy that “[n]inety-three percent of candidates – both successful and unsuccessful – say they believe the Board Certification process has made

them better teachers” (Gordon, 2002, p.12). National Board Certification can be a tool in identifying better teachers.

Myford and Englehard (2001) analyzed teachers scores on NBPTS using the Rasch theory to determine if the Board process was identifying accomplished teachers or teachers who were capable of effective teaching. Of the 569 candidate scores evaluated, the results showed that the assessment system for NBPTS did assess correctly whether candidates were at, above, or below the performance standards set by the Board.

Good teacher assessment systems (Peterson, 2000) are themselves evaluated. Empirical data are gathered and outcomes, long-term effects, and problems constantly examined. Good teacher assessment systems are “credentialed by outside experts and knowledgeable educators” (Peterson, p. 57). Serafini (2002) questioned the goal of NBPTS. Is it recognizing the few teachers who are accomplished, or is the goal of NBPTS to broadly increase the quality of teaching as a whole? Lieberman (2004) echoed this by indicating that National Board teachers have the potential to improve teacher performance in the classroom, but it is debatable whether National Board is doing enough to evaluate the effect of Board certification on student achievement.

Pellegrino, Baxter, and Glaser (1999) outlined the standards-based movement of the 1990s as a tri-fold reform movement involving the following: content standards (what students should know); delivery standards (how schools will ensure all students achieve those goals); and performance standards (the level at which students should know the content). “Assessment of performance and conditions of learning are now being studied as dynamically related events in experimental instructional situations” (Pellegrino et al.). As early as 1957, Cronbach called for linking theories of research on learning and

instruction with the assessing of individual differences in cognitive abilities (Pellegrino et al.). The two disciplines of theories cognition and learning and assessment of instructional practice are woven throughout the National Board process. Educational psychology measures readiness of different types of teaching and teaching methods to fit different types of readiness.

As Sanders (2000) stated, all students do not achieve at the same pace, but teachers do have primary control over the rate of achievement of their students. By studying groups of students over time for their rate of academic progress much of the debate over mitigating differences between students can be eliminated.

In conclusion, assessment of teaching historically has been poorly done. Defining what makes a good teacher is elusive. The assessments up to this point have either been external assessments such as those linked to standards or self-assessments. Good examples of external assessment would be NCATE, INTASC, and NBPTS. Self-assessments have been linked to self-efficacy, a trait of being effective in the classroom (Harland & Rowland, 2002). Portfolio construction and viewing videotapes of themselves teaching are two methods of self-assessment. If both external assessment and self-assessment are viable tools to identify quality teaching, National Board for Professional Teaching Standards incorporates both. In this section of the review it was noted that multiple pieces of data are needed to show teacher competence (Peterson, 2000; Sparks & Loucks-Horsley, 1990). The five Core Propositions of which candidates have to demonstrate mastery encompass both external assessment and self-assessment.

The next section in the review of the literature explores teaching and student achievement and the connections between increased student achievement and National Board certification for teachers.

Teaching and Student Achievement

Research about the influence of teaching on student achievement has not been definitive up to this point. Student achievement, or how much knowledge a student gains in content areas, still remains the key element in education (Knapp, 1999; Uhlenbeck et al., 2002). Over the span of several years, identification of components for achieving optimal student growth have been generated by many groups. No one method has become the panacea. Criticisms have raged as different groups put forward their best effort at describing quality teaching that produced significant learning gains (Ballou, 2003; Podgursky, 2001; Pool et al., 2001). The question remains – how is quality teaching maintained in order to promote the highest levels of student achievement? Can the nation come together and agree on a set of components that we define as quality teaching and consequently put time, energy, and resources into providing this teaching for all students, since as McRobbie (2000) stated, “student success pivots on good teaching” (p.7)? National Board proposition number four states in its description “accomplished teachers critically examine their practice, and they seek continual professional growth” (NBPTS, 1994). Could National Board Certification be linked to student achievement?

One documented example of quality teaching to support the highest levels of student achievement occurred in a Texas school district in Brazosport. The effort was outlined by Davenport and Andersen (2002), who stated that characteristics called the Effective Schools Principles, whose philosophy coupled with W. Edward Deming’s Total

Quality Management tools, would help to close the achievement gap in the district and change lives. Deming, considered the father of quality control, used his business acumen to define fourteen points to make businesses successful. His famous four-part improvement cycle was called “Plan–Do–Check–Act” and was implemented in Brazosport. Davenport and Andersen set out to see if these business ideas could be useful in school districts, especially those that were low-performing. Using these techniques 90 percent of all student groups in each of the district’s eighteen schools and all sub groups – White, Hispanic, African American, and low socio-economic – passed the Texas Assessment of Academic Skills (TAAS). The “Plan-Do-Check-Act” cycle is a model of continuous evaluation. A National Board candidate is required to plan, do, check, and act as part of his or her candidacy. Proposition number four states, “Teachers think systematically about their practice and learn from experience” (NBPTS, 2006b).

This literature review section explores teaching and its connection to the achievement of students. It is divided into the following topics: skillful organization of the educational setting impacts achievement, teachers who design appropriate instructional processes improve student learning, motivated students achieve, professional development from NBPTS certification boosts student achievement, students’ quality of work is higher if teacher is Board certified, and measuring teaching effects on student learning.

Skillful Organization of the Educational Setting Impacts Achievement

The educational setting for students organized by classroom teachers has an impact on their subsequent achievement (Wright et al., 1997). Wortham (2004) outlined an ontological approach to learning where new learning not only changes what the

learner knows (epistemology) but also who the learner is in the community of learners. Learning, according to Wortham, is then intertwined with social identification. Danielson and McGreal (2000) outlined the physical and interpersonal components of the environment in the classroom: create an environment of respect and rapport, establish a culture for learning, manage classroom procedures, manage student conduct, and organize physical space. The building blocks for framing instruction to produce optimal learning growth were: effective use of time, getting to know the students, and planning effective instructional strategies (Kauchak & Eggen, 2005; Pool et al., 2001).

One attempt at defining what quality teaching would look like was a comprehensive study called the Beginning Teacher Evaluation Study completed in California in 1978. This was a six-year study that sought to identify classroom conditions and teaching activities that fostered student learning and led to cognitive outcomes in elementary schools. Five behaviors were determined to impact instruction: diagnosis, prescription, presentation, monitoring, and feedback. The researchers believed these five teacher behaviors could help teachers evaluate their teaching performance and be the basis for analyzing the strengths and weaknesses of the instructional process (AASA, 1980). National Board candidates are asked to diagnose, prescribe, present, monitor, and give feedback about their students as they journey through the certification process.

Candidates going through the National Board process developed the capacity to be at all times aware of the impact of the classroom environment on the learning of their students (Heller & Gordon, 2002). Core Proposition Number 3 states, "Teachers are responsible for managing and monitoring student learning" (NBPTS, 2006b). This included organizing the content knowledge and creating a learning environment for

optimal student learning (Sullivan, 2002). Two of the documents required of teachers seeking National Board Certification are a classroom profile and a classroom diagram. Making the classroom environment as safe and conducive to learning as possible includes monitoring the grouping of students and checking the flow of work centers (Donaldson & Stobbe, 2000; Sullivan).

Teachers who are skillful at instructional design create more learning opportunities for their students. The setting of the classroom has a powerful impact on student learning. In addition, the design of the instructional day has a significant impact on students and how effectively they learn. As Castor (2002), then President of NBPTS stated, “We can develop policies and set budgets, but what happens in the classroom – the interaction between teacher and child – is the most important thing” (p. 53).

Teachers Who Design Appropriate Instructional Processes Improve Student Learning

The more precisely students’ needs are aligned with instruction, the more effective the learning becomes (Darling-Hammond, 1999). Teachers who make their learning goals explicit and have higher and clearer expectations had students who achieved more (Heller & Gordon, 2002; Poole et al., 2001). “Teachers have to notice what student learning is actually going on before they can reflect on their practices and adjust instruction accordingly” (Heller & Gordon, p. 26). National Board Core Proposition Number 4’s description includes a continual revisiting for the candidate to students and their learning. As Helms (2000) stated, teachers are responsible for their classroom climate; but more importantly, they create optimal learning environments for students. This can best be accomplished through constructivist, child-centered pedagogy

(Donaldson & Stobbe, 2000). More traditional methods may work for segments of the population which respond better to a more didactic approach, but overall the consensus is that knowing students and their needs and developing instruction to meet those needs should direct the instruction in a classroom. It is interesting to note Ballou (2003) criticized the National Board for being a proponent of the constructivist movement that appeared to exclude teachers who are required to teach using a more scripted or direct instruction approach by their school district. The use of scripted approaches and the difficulty teachers encountered when required to use this approach while completing National Board Certification entries were also noted in research done by Linquanti and Peterson (2001).

One of the first substantial pieces of research produced regarding National Board candidates by Bond et al. (2000) identified 14 dimensions of expert teaching. The research centered around three questions: quality of student work produced by students whose teachers were National Board Certified compared to students whose teacher was not certified; classroom observations to determine the teaching practices of National Board Certified teachers and if they differed from teachers who were not Board Certified; and the amount of professional activity involvement there was by Board Certified teachers as opposed to those that were not. The conclusions reached by this study were that the Board Certified teachers scored higher than non-certified peers in the following areas: the ability to think critically about their students and convey knowledge to them; the ability to solve problems and improvise; and the ability to articulate high standards and teach lessons that incorporated the same.

Effective teachers are continuously constructing their knowledge base about their students, classrooms, and subject matter. The field of education has been slow to assemble and connect the insights we have from varying arenas such as: human development and learning; motivation; individual and group behavior; the nature of intelligence and performance; and the effects of teaching methods and curricular approaches (Darling-Hammond, 1999; Doyle, 1990; Wilson & Berne, 1999). It is the compilation of all of these fields that forms the base for effective teaching that produces student learning. Diagnostic teaching that offers varied approaches to instruction gives all students an opportunity to succeed (Darling-Hammond). The National Board's 5 Core Propositions exemplify all the arenas mentioned above.

Dennert et al. (2002) stated that teachers who demonstrated an impact on student learning used assessment data to build a profile of the student, communicated that information, and planned for the next steps in instruction for that student. In this research there was a significant relationship between teachers who provided a quality analysis of their students' learning and positive holistic performance. The National Board's Core Proposition Number 3 description includes the teacher's ability to "use multiple methods to assess the progress of students, and they effectively communicate this progress to parents" (NBPTS, 1994).

To engage students, design appropriate lessons, and sustain the learners' attention requires teachers to be energetic and stimulating (Doyle, 1983). Students who are constantly being challenged by their teachers to learn more and achieve at higher levels are the students who are the most successful.

Motivated Students Achieve

Students who are highly motivated by their teacher are able to achieve at higher levels (NBPTS, 2001b; Wasley, 1999). Using concrete examples to illustrate topics was a great motivator for students because abstract ideas were given meaning (Battista, 1999; Darling-Hammond & Ball, 1998). Concrete examples allowed students not only to understand the topic but also how to link the information to add to their understanding and apply this knowledge in a variety of settings (Kelley & Kimball, 2001). Personalized examples that are high-quality and a clear representation of what is being taught are even more powerful in clarifying a student's understanding (Kauchak & Eggen, 2003). Student motivation has to be demonstrated by a National Board candidate. One of the descriptors for Core Proposition Number 3 is, "Accomplished teachers capture and sustain the interest of their students and use their time effectively" (NBPTS, 1994).

It has been noted that praise from a teacher motivates students. The description of Core Proposition Number 1 for the National Board candidate states that they must demonstrate that they "foster students' self-esteem, motivation, and character" (NBPTS, 1994). This praise acts as a positive reinforcer, which increases the frequency of the student behavior. Students who are constantly praised contribute to a positive and more productive learning environment (Kauchak & Eggen, 2003). Sullivan (2002), in her work on developing and teaching instructional units that are performance-based listed under Domain C, Teaching for Learning, noted that students are to be encouraged to extend their thinking by being provided with positive feedback.

Teachers, to be most effective, need to organize the educational setting, design appropriate instructional processes, and keep students motivated to learn. Can the

candidate experience of the National Board process better inform teachers in how to accomplish these tasks?

Professional Development from NBPTS Certification Boosts Student Achievement

The Belden Report (2002), an investigation about California teacher's attitudes toward National Board Certification, highlights how going through the process of certification was a professional development tool and as such impacted student learning. A survey was mailed to 786 National Board Certified teachers in California with 519 returned - a return rate of 68%. The highest ratings on these surveys were given in the areas of improved self-confidence, developed a stronger curriculum for students, and articulated learning goals for students clearly (Belden, 2002). Over half of the respondents stated that certification helped them in their interactions with other teachers and understanding how to reach students. These ratings, it was noted, aligned with the premise that the certification process identified already existing excellent teachers, although professional development to improve existing skills did occur. This report listed a positive impact on teacher's pedagogical skills, enhanced student learning, evaluation of student needs, and using student assessments effectively. Teachers also reported favorably that the certification increased their capacity to mentor other teachers as well as collaborate with other professionals (Belden, Waller & Klotz, 2001).

Teachers who have gone through the National Board Certification process stated that they found the experience to be the catalyst that made them devise new teaching and assessment practices and ways of thinking about teaching (Heller & Gordon, 2002). Teachers also stated that they became more "present" in the classroom. They reported being more metacognitive and questioned their practice more often and consequently

reflected about how their action affected student learning. Part of the National Board portfolio was constructed to allow evidence to be shown of a positive impact on student learning (Dennert et al., 2002; Rotherham, 2004). The portfolio requirement for candidates ignited reflection and changed methods of teaching for candidates more than any other professional development, even more than gaining higher degrees (Darling-Hammond, 1999; Heller & Gordon, 2002). Teachers also related that they had an increased knowledge base for detecting what each student knew and understood about a topic.

The process of becoming Board Certified integrated understanding of learners and learning, educational goal setting, teaching, pedagogy, and context (Darling-Hammond, 1999). Assessment practices changed for National Board candidates who began using the methods they were required to use in their quest for certification: anecdotal records, student portfolios, and student projects (Darling-Hammond; Heller & Gordon, 2002). The excitement generated in a classroom when students are assessed through varying means is a powerful teaching moment. Professional learning for groups of teachers is enhanced while reviewing other candidates' portfolio entries in a collegial group. Teachers were able to construct and discuss their teaching in a collaborative way that allowed for refinement of their practice. Refinement of practice had a positive impact on student learning and achievement.

Wilson and Berne (1999) reiterated that effective teaching is accomplished by weaving together ideas about teacher learning, professional development, teacher knowledge, and student learning. These fields, it was noted, have largely operated independently of one another. If the National Board candidacy process does what it

maintains, then student learning and subsequent student achievement should also be impacted.

Students' Quality of Work Is Higher if Teacher Is Board Certified

Teachers feel the National Board process taught them to have higher and clearer expectations for students (Heller & Gordon, 2002). The National Board for Professional Teaching Standards' stated mission is "improving student learning in American schools" (NBPTS, 2001b). Teachers going through the process have reported improved student scores on standardized tests (Heller & Gordon). Learning goals became more specific after going through the candidacy phase (Heller & Gordon). Many teachers were in fact left with a greater sense of responsibility for meeting the learning needs of every child.

Few empirical studies have been completed to test the assumption that gaining National Board Certification can have a positive impact on teaching and subsequently student learning (Moore, 2002; Pool et al., 2001; Vandevort et al., 2004). Darling-Hammond (1999) indicated that the National Board standards "offer a conception of teaching that is linked to student learning using performance-based modes of assessment" (p.29). As Goldhaber, Perry, and Anthony (2003) pointed out, little is currently known about how NBPTS teachers affect students' learning. They do suggest that a significant amount of research does, however, link measures of teacher academic skills with those of student outcomes. In the Goldhaber study there was a positive correlation between z scores of teachers and successful NBPTS certification. Indirectly this indicates that National Board is certifying teachers likely to be the most effective measured by student outcomes (Goldhaber, Perry & Anthony). Many other factors that are broader can impact student learning such as NBPTS teachers serving as role models, taking on leadership

roles, sharing best practices, and becoming more active participants in the learning community in schools.

As Harman (2002) stated, what is really important is the quality of instruction and subsequently the quality of student learning. “Good teachers use an array of methods all the time” (p. 5). Ann Harman was the director of research and information for the National Board for Professional Teaching Standards. Harman also spoke of the Sanders value-added assessment tool. The interest in using his model stemmed from not wanting to get an average class score, but measuring the teacher’s competency to teach to every child and look at their individual learning gains.

The NBPTS assessment is focused on four things: a teacher’s ability to set high and appropriate goals for students; develop specific instruction to attain those goals; use effective assessments to ensure goals are met; and use this data to inform instruction on a consistent, cyclical basis. Early research, according to Harman (2002), indicated National Board Certification may be a way to do this. Although Heller and Gordon (2002) in their research reported higher test scores for candidates’ students than for students whose teachers were not candidates for National Board Certification, the claim needs to be tested empirically (Pool et al., 2001).

The Bond (2000) study at the University of North Carolina at Greensboro studied National Board Certified teachers and found 14 dimensions of skills and abilities that they possessed at a higher level than teachers who were not Board Certified. These are called “characteristics of expert teaching” by the researchers. They include the following:

- Possess pedagogical content knowledge that is more flexibly and innovatively employed in instruction.

- Better able to improvise and to alter instruction in response to contextual features of the classroom situation.
- Understand at a deeper level the reasons for the individual student success and failure on any given task.
- Understanding of students is such that they are more able to provide developmentally appropriate learning tasks that engage, challenge, and intrigue students.
- More able to anticipate and plan for difficulties students are likely to encounter with new concepts.
- Can more easily improvise when things do not run smoothly.
- More able to generate accurate hypotheses about the causes of student success and failure.
- Bring a distinct passion to their work, (as reported in Lieberman, 2004, p. 46)

Salzman, Denner, Bangert, and Harris (2001) conducted a study in Idaho that set out to use Teacher Work Samples to assess the ability of pre-service and inservice teachers to meet program requirements and state standards and to also use these samples to assess the impact in the learning of the students. One of the groups used in the study, along with interns and experienced teachers, was a small number of teachers who had attained National Board Certification. The results of this benchmarking, validity, and generalizability study supported using Teacher Work Samples as assessment tools with sufficient reliability to use the results for decisions about high-stakes testing and the effectiveness of the teacher's performance. According to the researchers, the work sample assessment connected teaching performance to student learning (Salzman et al.).

The method used to collect the work samples in the Salzman study is very like the portfolio preparation a candidate for National Board Certification completes. The documentation required for both is: planning for instruction, designing an instructional sequence of about four weeks, planning for assessment, analyzing the impact of the instruction on the learning of the student, and reflecting on the unit of study (NBPTS, 2001a). The researchers in their study noted more work needs to be done and cited the small number of National Board teachers used in the study as a limitation. Out of 132 work samples studied only four were taken from National Board Certified teachers. In future research, it was noted, more National Board Certified teachers will be used. Teacher effectiveness was reported by the researchers to be at varying levels throughout the experience spectrum: interns, practicing teachers, and National Board Certified teachers. In summary, the teachers in this study had to “provide a quality analysis of student learning and had to demonstrate a positive impact on the learning of their students” (Salzman et al., 2001 p. 30).

Another study was conducted in Arizona by Vandervoort et al. (2004) which compared standardized test scores of students in fourteen school districts in second through sixth grade. The study included students who had teachers with National Board Certification and those who had teachers who were not National Board Certified. Surveys and test scores in each grade-level analysis indicated greater gains were made for students when they had National Board Certified teachers (Vandervoort et al.). It was stated that the student results gained were comparable to having an additional twenty-five days in the school year for instructional purposes. This can have a huge impact on student learning, especially at the elementary level.

If there is an increase in student achievement when a student has a teacher who is Board Certified as opposed to a student who has a teacher who is not Board Certified, how can this be measured? Across the country many methods are being used to measure effects of teaching on students' learning.

Measuring Teacher Effects on Student Learning

The National Board process has been identified as a way to assess high-quality teaching and student learning. A large pilot project of 564 teachers and 134 principals was completed in Iowa on the impact of National Board Certified teachers on the educational system in that state (Dethlefs, Trent, Boody, Lutz, Robinson, & Waack, 2001). Four specific areas were studied: professional development, provision of professional services, teacher induction and retention, and teaching quality. The part of the study on teaching quality measured core classroom teaching practices. The most marked positive difference was noted in the Early Childhood and Middle Childhood Generalist groups. These groups were the elementary teachers in the study. The National Board Certified teachers and candidates were compared with those not involved in the NBPTS process. The results indicated that certified or candidate teachers better understood the knowledge base of their teaching material, and how to organize this knowledge and link it to other disciplines, and were more likely to create varied ways to teach this knowledge base. In addition, the certified/candidate teachers used many methods to reach their teaching goal some of these methods were: cooperative grouping; engaging students more frequently and continuously assessing student progress (Dethlefs et al.).

In interviews with teachers involved in the Iowa study almost all agreed the process of National Board Certification added to their teaching abilities (Dethlefs et al., 2001; Heller & Gordon, 2002). Some of the areas where the teachers felt they had grown were: developing stronger curricula; improving ways to evaluate student's learning; becoming more reflective; and increasing levels of engagement of their students. Two-thirds of the same teachers felt they had personally improved in involving parents in the teaching day, and they reported improved connections with community resources. About the same number of teachers reported they were more easily able to connect to their district's standards and benchmarks in their teaching practice than before candidacy. They also found collaboration with other teachers following the National Board process became more focused on student learning issues and the teacher's craft.

More research needs to be done of a longitudinal nature, according to the authors of the Iowa study, but they indicated there was a positive change during the process of certification. It was noted that a limitation of the research would be that causality could not be inferred from the study as teachers who gained certification may have been different from other teachers before gaining the certification (Dethlefs et al., 2001). Another limitation noted was the reliance in the study of self-reporting of data. It was interesting to note that candidates who were halfway through the process scored on teaching quality at the mid-range between those already certified and those not involved in certification (Dethlefs et al.). As Ferguson (1991) professed, teacher quality matters and needs to be the focus of efforts to improve the quality of teaching. Skilled teachers are the most critical impact on a student's learning.

Sanders (2000) noted in his research that all students' needs must be met every year for optimal learning. Just measuring student growth is only one part of the puzzle. Teaching teachers to be more effective in the classroom is the only way to make a positive difference in student learning. More recently Sanders' work in Tennessee on value-added student learning attempted to link high-quality teaching with the learning growth of students (Sanders). This method used standardized test scores as the measure of learning growth for each student using a pretest/posttest format. The initial reason Sanders completed this analysis was to identify teacher improvement needs and form professional development plans that were aligned with the total school improvement process (Sanders). This was accomplished by using norm referenced standardized achievement tests (Sanders; Stronge, 1997).

In the Sanders (2000) study students' growth was tracked over time, but simultaneously the growth by each year was noted. The growth was then connected to the teacher the child had for that year and was called the value-added number for the student (Danielson & McGreal, 2000; Sanders; Stone, 2002). In Tennessee each student is tested annually in grades 3 through 8 with subject area assessments. Individual learning profiles of children were developed from this data pool that spanned several years.

According to Sanders (2000) this longitudinal data set measured the influence of schools, teachers, and school systems on student learning growth (Kane, Staiger, & Geppert, 2002; Sanders, 1998; Wright et al., 1997). Teachers were assigned a teacher effectiveness index that was considered the most fair and exact available (Sanders, 2000; Wright et al.). The index was reported to the principal and teacher at each school site and was used as a tool to establish professional development needs for the teacher and for

individual goal-setting (Stone, 2002; Stronge, 1997). This is an example of one approach to statistically evaluate teacher effects on student learning. Other states such as Oregon, Texas, South Carolina, and parts of Florida used similar approaches. In these handful of states there are enough Board Certified teachers to enable large scale studies of their impact to be conducted (Archer, 2002).

Teaching assessment is being increasingly linked to student achievement. Student achievement is what quality teaching is trying to support. Shulman (2002) indicated that student learning and teaching must be connected, we must not “lose sight of a key principle of product-process research: the importance of linking distinctive features of teaching to the quality of student learning” (p. 250). Shulman also cautioned against rejecting the validity of standardized achievement tests as “representations of student understanding” (Shulman, p.250). Does National Board Certification make the needed difference?

Additional research needs to be done connecting student outcomes with high-quality teaching. Researchers like Bond et al. (2000), Davenport and Andersen (2002), and Heller and Gordon (2002) found that skillful organization of the educational setting and appropriately matching the design of the lesson with the needs of the student were effective ways to increase student achievement. Student who are highly motivated are also able to achieve at high levels, therefore motivation is a key ingredient of high-quality teaching. Lastly, the research studied did indicate that National Board Certified teachers did appear to have increased teaching abilities compared to their peers (Heller & Gordon, 2002; Moore, 2002).

Conclusion

For the purpose of this literature review the National Board process was divided into four areas. Each has been taken in turn and presented, namely: cognition, metacognition, teaching assessment, and teaching and student achievement. Each area is a vital part of successful teaching and student learning (See Appendix D). The methodology section follows which describes the next steps in determining if there are connections between National Board for Professional Teaching Standards certification and student learning.

CHAPTER 3

METHODOLOGY

Chapter 3 details the methods used to carry out the study, with emphasis on the analysis of data. The chapter has been divided into six parts: the general perspective, the research context, the research subjects, instruments and procedures used in data collection, and data analysis. There is a short summary as a closing. The design of the study is correlational and retrospective (i.e., causal comparative and ex post facto). The data collected included the scaled scores on the norm-referenced section of the Florida Comprehensive Assessment Test (FCAT) for two consecutive years (pre-test, Spring 2002 and posttest, Spring 2003). A gain score or “value-added” score was computed from these two scores to measure the mean growth of a class of students in each subject area. The data collected were analyzed with a multivariate analysis of variance (MANOVA) using a 2 x 2 factorial, pretest-posttest design to test the hypotheses. The independent variables were certification status (National Board Certified teachers or non-Board Certified teachers) and the grade levels studied (fourth or fifth). The dependent variable was the class average gain score. This was a causal comparative study using intervally-scaled scores from FCAT and two nominal predictors, National Board Certification status and grade level designation. Using a standardized test helped to assure valid and reliable measurement of the dependent variable.

The General Perspective

This is a quantitative study that explored connections that may exist between National Board Certification and student learning gains. The research question for this project was as follows:

Research Question: Does National Board Certification for teachers improve student learning gains of 4th and 5th graders in reading comprehension and math problem solving as measured by Florida Comprehensive Assessment Test mean gain scores as compared to student learning gains of teachers who are not National Board Certified?

Null Hypotheses:

H1 (main effect for certification status)

There is no statistically significant ($p = .05$) difference in the classroom average reading comprehension and math problem-solving achievement for students of those teachers who are National Board Certified and those who are not National Board Certified.

H2 (main effect for grade level)

There is no statistically significant ($p = .05$) difference in the classroom average reading comprehension and math problem-solving achievement for students of those teachers who teach fourth grade and those who teach fifth grade.

H3 (interaction effect)

There is no statistically significant ($p = .05$) effect of the certification status and grade level variables interacting together to affect the classroom average reading comprehension and math problem-solving achievement.

Prior to testing these three substantive hypotheses, a pretest group equivalency comparison was conducted using the FCAT scores from the Spring 2002 test administration. The purpose of this analysis was to determine the degree to which students across the certification status and grade level groups may be equivalently compared in terms of the posttest scores. Equivalency of groups at the beginning of the study served to strengthen the study's design. Equivalency strengthened the psychometric soundness of the dependent variable measures considering that the actual posttest scores were utilized in lieu of statistically adjusted posttest scores (i.e., gain scores, covariate adjusted posttest scores) in the testing of Hypothesis 1.

The pretest equivalency analysis was conducted via two ANOVA tests: (a) comparison of pretest reading achievement scores by certification status and (b) comparison of math problem solving pretest scores by certification status. Pretest differences were statistically significant for the dependent variables, gain scores (i.e. posttest minus pretest) were then used in lieu of the posttest scores in the testing of the three substantive hypotheses.

The Research Context

The study took place in six north Florida counties. Each county in Florida is a separate school district. The names of counties, schools, teachers, and students were not used to preserve confidentiality as much as possible. The data were collected ex post facto from archived records at each school: Spring 2002 (pretest) achievement scores and Spring 2003 (posttest) achievement scores. At that time a change in the FCAT scoring was a real possibility following lawsuits in South Florida. Data were collected at the Spring 2002 and Spring 2003 mark to ensure two years of comparable data. This allowed

a gain score to be calculated for each student in each subject area, reading comprehension and math problem solving. As previously noted, gain scores were utilized to test the study's substantive hypotheses.

The FCAT norm referenced test provides a ranking for Florida students against national norms. Gain scores or "value-added" scores show the growth of a student from one year to the next. Test items in reading and math include: multiple choice, short response, extended response, and gridded response. There are only two extended response items in any one test. Fifth and fourth grades have the same numbers of items of each type. These are the numbers of items in each category: 42 multiple-choice items in reading and 26 multiple-choice items in math; 5 short-response items in reading and six in math; 2 extended-response items in both reading and math; 16 gridded-response items in math, none in reading. Reliability and validity of FCAT scores are addressed by the state in an *FCAT Briefing Book* (Florida Department of Education, 2001) that is available online for all citizens. All of the FCAT reliability indices at grades 4 and 5 are above 0.90 and, therefore, the tests are generally regarded as capable of yielding reliable data. Multilog provided an estimate of the standard error of measurement and an overall reliability index like that yielded by Cronbach's alpha. These marginal reliabilities show that FCAT scores have reliabilities similar to scores from other state standardized tests (Florida Department of Education, 2002, p. 26).

FCAT test item preparation and test assembly were accomplished through a rigorous process. CTB/McGraw Hill and Harcourt Educational Measurement are two contracted companies that have designed operational items and field test items. Reviews of each of the items were conducted by four separate groups: (a) Florida Department of

Education for content, sensitivity/bias, match to benchmark, and FCAT style (Florida Department of Education, 2002, p. 6); (b) community sensitivity committees; (c) bias committees – with representatives from a variety of cultural backgrounds; and (d) content committees.

A detailed year-to-year calibration is used to ensure items scored in a previous administration of the test will be scored the same way in a current administration. This is accomplished by sending all training materials to the Rangefinder Review session where scores are discussed. This process ensures that work that was evaluated as a score of 2 in one year's administration would also be given a score of 2 in the next year for the same item. Rangefinder review entails training scorers using sets of training papers to train them in scoring rules. Each rater must qualify by scoring at an 80% or higher match with the training papers (Florida Department of Education, 2002, p. 7). An item bias for or against one of the groups has been analyzed and found to have a low incidence of differential item fit (Florida Department of Education, 2002, p. 21).

Read-Behind is another process that involves Team Leaders going behind scorers of student work to ensure the appropriate scores are being assigned. This will identify stronger and weaker scorers and will allow Team Leaders to correct problems and do additional training. This process continues to ensure accuracy (Florida Department of Education, 2002).

Using processes like the Read-Behind method helps control scorer drift. Consistent monitoring by teams includes spending 15 minutes daily reviewing Rangefinder and horizontal sets of papers that refocus scorers on their original training parameters. Scoring directors regularly receive validity and reliability reports and act upon these

findings. At each point of the process the goal is to continuously check for scorers who are assigning values higher or lower than peers. Additional training is afforded those who have discrepant scoring as identified by validity and reliability analyses. If needed, a set of calibration papers can be used to reinforce original training.

A detailed calibration sample review has been conducted that compares the sample taken with comparisons for ethnicity, gender, and FCAT scores. A set of students that included all students who scored on FCAT in February 2000 comprised one calibration. The other, most appropriate, calibration was done on all standard curriculum students (this excludes exceptional education students, those identified with special needs and requiring an Individualized Education Plan, and those in the Limited English Proficiency program for two years or less). The following is the conclusion:

The pattern of results supports the representativeness of the calibration sample. Certainly, if analyses were conducted on the full set of standard curriculum students, differences in results might be observed; however, such differences should have no practical impact (Florida Department of Education, 2002, p. 10).

Much work was done to create IRT (Item Response Theory) item parameters used to assign achievement scores. These parameters allow each student's score to be assigned a level of achievement that best matches the student's responses. Different statistical models were used to score multiple-choice items and open-ended items. Gridded items received a hybrid treatment. Any items that were not functioning (either because of poorly functioning distractors or unusual curriculum emphasis in some parts of the state) were either eliminated or reworded. All of these analyses determine that the

FCAT scores are content valid and measure what they are intended to measure (Florida Department of Education, 2001).

According to the 2002 *Technical Report: For Operational Test Administrations of the 2000 Florida Comprehensive Assessment Test* from the Florida Department of Education, test equating has been established (p. 19). In February 2000, IRT scaling produced item parameters centered on an achievement scale targeted to a mean of 0 and a standard deviation of 1. In its initial year of operation, the FCAT reporting scale was reset to target a mean of 300 and a standard deviation of 50 by a simple linear transformation that spread students' scores along a scale of 100 to 500. This transformation happened by applying the Stocking and Lord (1983) procedure to anchor items from previous years that were repeated in the February 2000 test. An example is given that shows the additive constant that projects the change expected from each student:

... an average standard curriculum student would be expected to have a score of 300 for Grade 4 Reading in 1998, the same student would be expected to have a score of approximately 306 in February 2000. (Florida Department of Education, 2002, p.19)

Qualitative reviews by expert panels have been utilized to help eliminate possible gender or ethnic bias. FCAT test items are reviewed before field-testing and after each use. Item bias indices or differential item functioning (DIF) statistics were examined and found to be very low (Florida Department of Education, 2002, p. 21).

Score reliability and standard error of measurement are carefully interpreted for FCAT test items. Reliability is built around the classical measurement theory concept that

a test score results from some true error of measurement plus achievement measurement error. For a population of students, reliability is a ratio of variation in true achievement compared with variation in the observed test scores. The less that measurement error contaminates test scores, the closer the ratio is to 1 (Florida Department of Education, 2002). Tests tend to have lower SEM (standard error of measurement) in the center of an ability distribution, where hard, easy, and average items can all contribute information about a student's ability. At the tails of the distribution, fewer items make contributions to the ability estimate and, consequently, SEM is higher. Therefore, score assignments tend to be more accurate for students toward the center of the distribution than for students with more extreme scores (Florida Department of Education, 2002). Most of the students score in the center of the distribution.

It is possible to compute an overall reliability index by using the average SEM for all students. Using traditional statistics like multilog and coefficient alpha, the marginal reliabilities indicate FCAT scores have reliabilities similar to those of other standardized tests. Individual scores will vary by 20 points toward the center of the distribution (plus or minus the lowest SEM). Individual scores will vary more toward the upper and lower portions of the distribution.

The Research Subjects

In order to conduct the present study, a process was initiated that included the following steps. The Institutional Review Board at the University of North Florida reviewed the research proposal and granted permission to collect data under the exempt status (see Appendix A). Once granted, permission to proceed in a district was pursued by contacting the district-level administrator overseeing National Board Certification for each county. Each administrator provided a list of National Board Certified teachers whose students' data could be used for the study. This pool was then narrowed down to those teachers with Board Certification currently teaching 4th or 5th grade. This information was only accessible at the school site or via a telephone conversation with the principals or their designees. An introductory letter (see Appendix B) explaining the study and assuring the anonymity of the data collection was mailed or given to the principal. Scores were collected on students who have had a National Board Certified teacher, and another set of scores were collected from another class in the same school and at the same grade level that was not being taught by a National Board Certified teacher (see Appendix C). The sampling method could be described as both convenient and purposive.

Due to the high rate of mobility, data were recorded for only those students in the school year 2002-2003 who were in attendance in October 2002 and who took the FCAT in March 2003. This parameter is the same one used by the Florida State Department of Education when it assigns grades to schools. Data were collected during the summer and fall of 2003. With the study being retrospective in nature, two years of data were needed for each student in order to compute the gain score for each student in each subject.

Procedures

After entry to the school was obtained through a telephone conversation and an appointment at the school site was secured, the principal or designee were asked about the socio-economic level of the school and the similarity of the two or more classes being studied. In these two grade levels in Florida, teachers often team-teach certain subjects. The homeroom teacher must teach students both language arts and math, as these are the two content areas of interest in the present study. Teachers of self-contained identified gifted students or teachers of self-contained identified exceptional education students were not used in the study. If an inclusion teacher had a large number of either set of identified special needs students in his or her homeroom, a different comparison homeroom was utilized with a similar student composition as the class taught by the Board Certified teacher. This helped to eliminate as many confounding variables as possible.

Student names were only useful in this study until the scores for the previous year were obtained. Once the scores were obtained, the student name information was destroyed, with all data being described only by a case number.

Data Analysis

Data were analyzed using a multivariate analysis of variance (MANOVA), as there was more than one mean difference being evaluated. Gain scores were compared across National Board versus non-National Board Certified teachers and across the two grade levels studied.

The archival data collected was analyzed using several strategies. As previously noted, an initial t-test was used on the pretest scores to determine if differences existed;

because they existed, adjustments were made. Following that, an omnibus or overall MANOVA was used to evaluate the overall null hypothesis. The p value was set at .05 level ($p < .05$), indicating that there is a 5% chance of a Type I error for any test.

The MANOVA inferential statistical technique is based on a set of assumptions, namely:

1. Units are randomly sampled from the population of interest.
2. Observations are statistically independent of one another.
3. The dependent variables have a multivariate normal distribution within each group.
4. The groups have a common within-group population covariance matrix.

(Bray & Maxwell, 1985, p. 32)

All of the above assumptions are appropriate when conducting MANOVAS; however MANOVA is considered sufficiently robust not to invalidate the results even when certain assumptions are not met.

Twenty-nine National Board Certified teachers were located within the north Florida counties. Teachers' homeroom classes of students added to a comparable homeroom in the same school and grade comprised the data set collected.

Summary of the Methodology

This chapter has explained the research design and statistical analyses used to treat the data. The study was designed to investigate the possible positive impact of National Board Certification on student learning. This was a quantitative study of

learning gains using a standardized test. The inferential statistic used was a multivariate analysis (MANOVA).

Data collected were limited to FCAT reading and FCAT math scores as measures of achievement in the two settings. No other measures of achievement in these two or other content areas were investigated. Also, the study was delimited to students in grades four and five in six counties in north Florida. Generalizabilities of the findings beyond these counties should be made cautiously.

Limitations of the study include using gain scores in the data collection. The reliability of gain scores was a potential limiting factor of the study. These scores were doubly contaminated by error variance and therefore may have had large standard errors (Allen & Yen, 1979). In many schools and districts gain scores are systematically studied for growth patterns to be established and goals set for subsequent years. The next chapter presents the results obtained after data collection using the methods outlined.

CHAPTER 4

FINDINGS

The purpose of the present study was to examine the relationship between teacher participation in National Board Certification and the gain scores of students on a standardized achievement test. Specifically, the research question to be studied was: Does National Board Certification for teachers make a difference in student learning gains of fourth and fifth graders in reading comprehension and math problem solving as measured by the Florida Comprehensive Assessment Test (FCAT) mean scale scores?

A data pool of 1,600 students' scores were collected for a two-year period representing 58 teachers in six different north Florida counties. Scores were collected in both reading comprehension and mathematics problem solving for all students in a two-year period using scores on the spring 2002 FCAT as pretest data and scores on the spring 2003 FCAT as posttest data. Certification status and grade level taught were the two independent variables. Data were analyzed using a multivariate analysis of variance (MANOVA) using a 2 x 2 factorial, pretest-posttest design to test the hypotheses. Both main and interaction effects were considered. Statistical calculations were completed using SPSS 12.0 (SPSS, Inc., 2003).

Demographic Data

Only students who had both pretest and posttest scores were used. Of 1,600 students for whom scores were collected, only 1,092 had both pretest and posttest scores. Of the student scores collected, the mean reported on the math problem-solving pretest

was 643.74 , and the median was 644.00. On the posttest in math, the mean score was 661.47 and the median was 659.00. The standard deviation on the math pretest was 35.95 and on the posttest 35.38. The range for the math pretest scores was from 518 to 759 and on the posttest 555 to 781.

A more dramatic difference was noted in the reading comprehension test. The reading comprehension mean on the pretest was 657.44, and the posttest mean was 671.79. Median scores were 657.00 on the pretest and 673.00 on the posttest. The standard deviations were 40.42 and 35.53, respectively, for the pretest and the posttest. The range of scores on the pretest was from 537 to 784, and on the posttest, it was 555 to 802. See Table 1.

Table 1

Sample Demographic Data

	FCAT Math Problem- Solving Pretest	FCAT Math Problem- Solving Posttest	FCAT Reading Comprehension Pretest	FCAT Reading Comprehension Posttest
Mean	643.74	661.47	657.44	671.79
Median	644.00	659.00	657.00	673.00
Mode	631	678	683(a)	683
Std. Deviation	35.951	35.383	40.417	35.529
Minimum	518	555	537	555
Maximum	759	781	784	802

Multiple modes exist. The smallest value is shown.

The data collection involved students in both fourth and fifth grade. These two grades were selected because the Florida Comprehensive Assessment Test (FCAT) in the elementary school is given in third, fourth, and fifth grades only. The third grade was not included in this study as the students would not have a second-grade “pretest” FCAT score for comparison. The posttest scores were collected for the grade the students were in for the Spring 2003 test session. The distribution of fourth graders and fifth graders

was as follows: 51.5% ($n=562$) were 4th graders and 48.5% ($n=530$) were fifth graders. Grade level served as one of the independent variables.

The second independent variable, National Board Certification, was represented in the student data as follows: 48.1% were not taught by National Board Certified teachers ($n=525$ students), and 51.9% were taught by National Board Certified teachers ($n=567$ students). The number of National Board Certified teachers studied was 29 with an additional 29 non-National Board Certified teachers used as a comparison - a total of 58 teachers.

Additional data were collected on the socio-economic status of the students. These were categorized using three distinctions: high, low, and mid-range or middle. The distribution is as follows: 28.5% were students considered in the high socio-economic status ($n=311$), 35.5% were in the low socio-economic status ($n=388$), and 36.0% were considered as mid ($n=393$). The status of the students as a whole school was determined in a conversation held with the school's principal or assistant principal. This determination was made by judging the percentage of the school population on free or reduced lunch and/or the school receiving Title 1 funding.

Data from six north Florida counties were used in the study. The percentages of students by county were as follows: 20.0% in County A ($n=218$), 29.2% in County B ($n=319$), 3.9% in County C ($n=43$), 16.2% in County D ($n=177$), and 30.7% in County F ($n=335$). The percentages were determined by the number of elementary teachers in those counties, at that grade level, who had National Board Certification in the year of the posttest score. If there were seven possible National Board Certified teachers in a particular county, every effort was made to track the data to be sure the teachers were

certified prior to the Spring 2003 FCAT testing session. If they were certified at a later date, the student scores were not used.

After computing the gain score for the groups of students in each subject area, mean gain scores were computed for the students having National Board Certified teachers and for those students who did not. In the reading subject area for those students who had National Board certified teachers, fourth graders' mean gain score was 21.88 (standard deviation = 25.69); for math, their mean gain score was 17.37 (standard deviation = 25.40). For the fourth graders who did not have a National Board Certified teacher in fourth-grade reading, the mean gain score was 18.80 (standard deviation = 29.55); the math mean gain score for this group was 16.44 (standard deviation = 29.00). See Table 2.

Table 2 *Gain Scores for Reading and Math by Grade Level*

	Teacher NB Certification	Child's Posttest Grade Level	Std.		
			Mean	Deviation	
Reading Gain Score	No	4	18.7950	29.54452	278
		5	8.6559	27.23608	247
		Total	14.0248	28.90220	525
	Yes	4	21.8803	25.68565	284
		5	7.4028	24.46260	283
		Total	14.6543	26.08678	567
	Total	4	20.3541	27.68020	562
		5	7.9868	25.77513	530
		Total	14.3516	27.46548	1,092

	Teacher NB Certification	Child's Posttest Grade Level	Mean	Std. Deviation	N
Math Gain Score	No	4	16.4424	28.98503	278
		5	19.0810	30.62110	247
		Total	17.6838	29.76657	525
	Yes	4	17.3662	25.39858	284
		5	18.2049	24.78547	283
		Total	17.7848	25.07578	567
Total	4	16.9093	27.21134	562	
	5	18.6132	27.63527	530	
	Total	17.7363	27.41857	1,092	

Those fifth-grade students who had a National Board Certified teacher had a mean gain score in reading of 7.40 (standard deviation = 24.46); the math mean gain score for this group was 18.20 (standard deviation = 24.79). The math mean gain score for fifth graders who did not have National Board Certified teachers was 8.66 (standard deviation = 27.24); and in math the mean gain score was 19.08 (standard deviation = 30.62). See Table 2.

Pretest data

Pretest data were evaluated for group equivalence prior to the analysis of the posttest data. Two one-way analyses of variance (ANOVAS) were conducted with National Board status serving as the independent variable. Analyses of variance for the pretest scores in both math and reading yielded statistically significant results at the 0.01 levels, indicating that two sets of pretest data were not equivalent across either pretest. As the groups were not equivalent, a decision was made to use gain scores (posttest minus pretest) in the further analysis of the data rather than simply using raw dependent variable scores. See Table 3.

Multivariate tests

A multivariate analysis of variance (MANOVA) was performed using FCAT gain scores (reading and mathematics) as dependent variables and grade level and National Board status as predictors. A factorial (2 x 2) design was utilized. Results of four multivariate tests for each effect are presented in Table 4.

Table 3

Analysis of Variance for Pretest Scores in Math and Reading

		Sum of Squares	df	Mean Square	F	Sig.
FCAT Math Problem Solving Pretest	Between Groups	328031.406	50	6560.628	6.312	.000
	Within Groups	1082063.690	1041	1039.446		
	Total	1410095.095	1091			
FCAT Reading Comprehension Pretest	Between Groups	356625.932	50	7132.519	5.209	.000
	Within Groups	1425534.958	1041	1369.390		
	Total	1782160.889	1091			

For purposes of the present study, Wilks' λ (lambda) served as the multivariate test statistic of choice. As noted by Stevens (1996, p. 192), lambda "is an inverse criterion, i.e., the smaller the value of λ the more evidence for treatment effects (between group association)." Specifically, the multivariate effect size (r^2 analog) is equivalent to $1 - \lambda$.

Stevens (1996) noted:

Although the groups may not be significantly different on any of the variables individually, *jointly* the set of variables may reliably differentiate the groups. That is, small differences on several of the variables may combine to produce a reliable

overall difference. Thus, the multivariate test will be more powerful in this case (p. 153).

Table 4

Multivariate Tests^b

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.380	333.607 ^a	2.000	1087.000	.000	.380
	Wilks' Lambda	.620	333.607 ^a	2.000	1087.000	.000	.380
	Hotelling's Trace	.614	333.607 ^a	2.000	1087.000	.000	.380
	Roy's Largest Root	.614	333.607 ^a	2.000	1087.000	.000	.380
Status	Pillai's Trace	.000	.162 ^a	2.000	1087.000	.851	.000
	Wilks' Lambda	1.000	.162 ^a	2.000	1087.000	.851	.000
	Hotelling's Trace	.000	.162 ^a	2.000	1087.000	.851	.000
	Roy's Largest Root	.000	.162 ^a	2.000	1087.000	.851	.000
Grade	Pillai's Trace	.054	31.083 ^a	2.000	1087.000	.000	.054
	Wilks' Lambda	.946	31.083 ^a	2.000	1087.000	.000	.054
	Hotelling's Trace	.057	31.083 ^a	2.000	1087.000	.000	.054
	Roy's Largest Root	.057	31.083 ^a	2.000	1087.000	.000	.054
Status*Grade	Pillai's Trace	.002	.954 ^a	2.000	1087.000	.386	.002
	Wilks' Lambda	.998	.954 ^a	2.000	1087.000	.386	.002
	Hotelling's Trace	.002	.954 ^a	2.000	1087.000	.386	.002
	Roy's Largest Root	.002	.954 ^a	2.000	1087.000	.386	.002

a Exact statistic

b Design: Intercept+Status+Grade+Status*Grade

The MANOVA test yielded a statistically non-significant effect for National Board status ($p > .05$) and a statistically significant effect for grade level ($p < .001$). National Board status had a non-effect on the dependent variables (Wilks' Lambda = 1.00) with a multivariate F (df 1087) of .162. The grade level main effect was statistically significant ($p < .001$) although the effect size ($1 - \lambda$) was appreciably small (.054).

The interaction effect between grade level and status was not statistically significant ($p > .05$). See Table 4.

Table 5

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Reading Gain	43263.898 ^a	3	14421.299	20.123	.000	.053
	Math Gain	1013.056 ^b	3	337.685	.449	.718	.001
Intercept	Reading Gain	218955.952	1	218955.952	305.519	.000	.219
	Math Gain	343829.855	1	343829.855	456.662	.000	.296
Status	Reading Gain	228.377	1	228.377	.319	.573	.000
	Math Gain	.155	1	.155	.000	.989	.000
Grade	Reading Gain	41221.628	1	41221.628	57.518	.000	.050
	Math Gain	822.525	1	822.525	1.092	.296	.001
Status*Grade	Reading Gain	1280.331	1	1280.331	1.787	.182	.002
	Math Gain	220.347	1	220.347	.293	.589	.000
Error	Reading Gain	779735.069	1088	716.668			
	Math Gain	819176.988	1088	752.920			
Total	Reading Gain	1047918.000	1092				
	Math Gain	1163706.000	1092				
Corrected Total	Reading Gain	822998.967	1091				
	Math Gain	820190.044	1091				

a R Squared = .053 (Adjusted R Squared = .050)

b R Squared = .001 (Adjusted R Squared = .002)

Follow-up ANOVA results are presented in Table 5. Although the entire analysis is presented, only those components corresponding to statistically significant main effects in the foregoing MANOVA analysis will be interpreted. In the MANOVA test only the overall grade level effect was statistically significant. In follow-up testing math and reading were looked at separately and a statistically significant difference in reading was noted between fourth and fifth graders. Earlier gain score computations indicated that there was an average gain of 20 points in reading at the fourth grade level. See Table 2.

Tests of the Hypotheses

The research question for this study was: Does National Board Certification for teachers improve student learning gains of fourth and fifth graders in reading comprehension and math problem solving as measured by Florida Comprehensive Assessment Test mean gain scores as compared to student learning gains of teachers who are not National Board Certified? To answer this question three null hypotheses were examined.

Null Hypotheses:

H1 (main effect for certification status)

There is no statistically significant ($p = .05$) difference in the classroom average reading comprehension and math problem solving achievement for students of those teachers who are National Board Certified and those who are not National Board Certified. There was a near zero correlation. This null hypothesis was not rejected.

H2 (main effect for grade level)

There is no statistically significant ($p = .05$) difference in the classroom average reading comprehension and math problem solving achievement for students of those teachers who teach fourth grade and those who teach fifth grade. There was a statistically significant main effect for grade level. In follow-up testing, a statistically non-significant difference was found in math and a statistically significant difference in reading. Mean comparisons indicated a small statistically non-significant difference in the math gain score means ($\Delta = .06$) favoring fifth grade, and a larger

statistically significant difference in the gain scores for reading ($\Delta = .45$) favoring fourth grade. This null hypothesis was rejected.

H3 (interaction effect)

There is no statistically significant ($p = .05$) effect of the certification status and grade level variables interacting together to affect the classroom average reading comprehension and math problem solving achievement. The interaction effect between grade level and status was trivial and not statistically significant. There was a failure to reject this null hypothesis.

Summary

In this chapter the data collected were analyzed using an overall MANOVA analysis. This analysis yielded a statistically non-significant effect for National Board status. The analysis yielded a statistically significant small effect for grade. The interaction effect was not statistically significant. Chapter 5 will present a discussion of the findings, along with conclusions and recommendations for further research.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The reason for the present study was to study the relationship between the process of a teacher gaining National Board Certification and the gain scores of the students taught by that teacher. Student learning gains were measured using a standardized test format through a computed gain score. These students' scores were then compared with students' scores at the same grade level and same school who were not taught by National Board Certified teachers.

In this final chapter the methodology that was used is reviewed and the findings summarized. Narrative assessments of all the tests of hypotheses are given, conclusions are drawn, and recommendations are made for future research on this topic. The concluding remarks link this study with its contributions to the field of education.

Review of Methodology

Standardized test scores of 1,092 students in six north Florida counties were used. In this study, 567 (51.9%) of the students had teachers who held National Board Certification; the remaining 525 (48.1%) were not taught by National Board Certified teachers. The scores were collected for two consecutive years in both reading comprehension and math problem solving using the Florida Comprehensive Assessment Test (FCAT) in a pretest (spring 2002) and posttest (spring 2003) format. A gain score or "value-added" number was computed for each student in each subject area to measure learning growth. The students were fourth or fifth graders at the time of the posttest.

FCAT is not administered to Florida students prior to the third grade.

After gain scores were compared they were analyzed using a multivariate analysis of variance (MANOVA) using a 2 x 2 factorial design to test the hypotheses. Institutional Review Board approval was granted prior to the collection of the scores. Anonymity of the counties, schools, teachers, and students was maintained throughout the process.

The design of the study was correlational and retrospective (i.e., causal comparative and ex post facto). This causal comparative study used scaled scores of students from the norm-referenced test component of FCAT in mathematics problem solving and reading comprehension. Nominal predictors for the study were (National Board) certification status of teacher and grade level designation of students.

This quantitative study explored connections between National Board Certification and student learning gains. Pretest data were examined for equivalency using two, one-way analyses of variance (ANOVAS). The results were statistically significant at the 0.01 level, indicating the two groups of students were not equivalent, and the decision was made to use gain scores (posttest minus pretest) as previously indicated. This was in place of using raw dependent variable scores.

Summary of Results

The overall finding was that National Board Certification did not account for student learning gains for students in both mathematics and reading comprehension that were above the gains shown by students who were taught by non-National Board Certified teachers. Results of the primary research question and the findings of the three null hypotheses follow.

The primary research question for this study asked: Does National Board Certification for teachers improve student learning gains of fourth and fifth graders in reading comprehension and math problem solving as measured by Florida Comprehensive Assessment Test mean gain scores as compared to student learning gains of teachers who are not National Board Certified? The results of this study indicate that there is not an appreciable difference in reading comprehension and math problem-solving scores of students who were taught by National Board Certified teachers. Based on partial eta-squared values, less than 1% variance was due to differences in grade level status, fourth graders compared to fifth graders. There was a statistically non-significant effect for the grade level by teaching status interaction.

At the multivariate level statistically non-significant results were noted for National Board status and a small statistically significant effect for grade level. Stevens (1996) noted that by using several criterion measures we can get a more detailed description of the phenomena being studied (e.g., reading achievement and math achievement combined is superior to reading achievement or math achievement separately).

The first research hypothesis was: There is no statistically significant ($p = .05$) difference in the classroom average reading comprehension and mathematics problem-solving achievement for students of those teachers who are National Board Certified and those who are not National Board Certified. This result indicated a near zero correlation. This null hypothesis was not rejected.

The second research hypothesis was: There is no statistically significant ($p = .05$) difference in the classroom average reading comprehension and mathematics problem-

solving achievement for students of those teachers who teach fourth-grade and those who teach fifth grade. There was a statistically significant main effect for grade level in the overall MANOVA. In follow up testing, a statistically difference was found for reading between the fourth and fifth grade levels. Results indicated a small difference in the math gain score means for math ($\Delta = .06$) favoring fifth grade and a larger difference in the gain scores for reading ($\Delta = .45$) favoring fourth grade. This null hypothesis was rejected.

The third research hypothesis was: There is no statistically significant ($p = .05$) effect of the certification status and grade level variables interacting together to affect the classroom average reading comprehension and math problem-solving achievement. The results were not statistically significant; hence, there was a failure to reject this null hypothesis.

Discussion of the Results

Previous research studies will be discussed in relationship to the findings of this study. Connections will be made with the four primary research areas of this study, namely: cognition; teaching as a metacognitive practice; assessment of teaching; and teaching and student achievement. Most importantly the impact of metacognition as it pertains to teaching practice, upon which this study is founded, will also be addressed in relation to these findings. Implications for educational practice and limitations of the study will also be analyzed.

Relationship of the Present Study to Previous Research

There have been very few empirical studies done on National Board Certification and its relationship to student learning. The present study has been an attempt to test linkages between National Board Certification in teachers and increased student

achievement. The results were a statistically non-significant effect for National Board status and a small statistically significant effect for grade level. Some additional researchers have found positive correlations existed (Bond et al., 2000; Goldhaber, Perry, & Anthony, 2003; Sato, 2000). Other researchers have been very critical of National Board and what it reports it is doing for the field of teaching (Stone, 2002; Wilcox, 1999). The data pool of 58 teachers and 1,092 pretest and posttest scores of students made the present study substantial in size. Most of the research done thus far is qualitative, using very small numbers of teachers or students in the studies. The few that are quantitative are also not large in scale or of long duration and generally indicate in their conclusions that more study needs to be done on this topic.

Cognition was the first section addressed in the present study's review of the literature. As stated previously, cognition is the cornerstone of knowing how students learn and how best to teach to their learning needs. Links were established in this study from the National Board Certification process to learners being instinctively and cognitively active. Managing and monitoring student learning is one of the five Core Propositions of the National Board for Professional Teaching Practices. Constructivism is the basis of the portfolio compilation for gaining National Board Certification. The candidate studies his or her students' work over a multi-week period to show effective progression of their learning. Knowledge construction by the learner becomes most effective when embedded in social interaction. Core Proposition Number 2 of the National Board process indicated teachers know the subjects they teach, but equally important to the present study, they know how to teach those subjects for maximum growth of knowledge.

It is well known that teachers who are metacognitive about their practice improve more than teachers who are less cognitive (Heller & Gordon, 2002; Oser & Franz, 2001; Sarason, 1993). National Board Certification is constructed with metacognition as a foundation (NBPTS, 1994). Teachers who better understand the knowledge base of their teaching material know how to organize this knowledge and link it to other disciplines and are metacognitive in nature (Dethlefs et al., 2001). In the literature review of the present study, Core Proposition Number 4 was linked to metacognition, as teachers are to give evidence of thinking systematically about their practice and adjusting their teaching to fit the needs of the learner. Teaching is complex and diverse, and Core Proposition Number 2 states that teachers know the subjects they teach and how to teach those subjects to students. Teachers who are metacognitive improve their practice and learn from their experiences. National Board candidates must provide evidence of metacognition as they go through the candidacy.

Assessment of teaching historically has been difficult to accomplish. Both external assessment of pedagogical practice as seen in the standards movement and self-assessment as shown through portfolio compilation were outlined in the literature review of the present study. The National Board for Professional Teaching Standards uses both an external assessment and a self-assessment process. This process can be a tool for identifying better teachers.

Teaching and student achievement was the last area explored in reviewing the literature in the present study. As stated, previous findings on the influence of teaching on student achievement has not been definitive. Areas that were explored in the literature review for the present study included: skillful organization of the educational setting,

designing appropriate instructional processes, and motivating students. The National Board candidacy process was identified in previous findings as a form of professional development. However, in the present study, a connection could not be made from National Board Certification in teachers to increased student achievement.

In all four of the areas studied in the review of the literature, connections between National Board Certification for teachers and student learning gains were attempted. The present study was also an attempt at measuring teacher effects on student learning.

Interpretation of Results Within the Theoretical Framework

As previously noted throughout the present study, there is a paucity of research on the linkage between National Board Certification and student achievement. The present study is an attempt at linking student achievement to certification status. The following empirical research is outlined to highlight the type of research, methodology, and design used in studies that include any connections directly or indirectly from student achievement to National Board Certification.

The use of gain scores in the present study was the assessment method employed to measure students' learning gains. It is in the use of student learning gains that a link was attempted between National Board Certification and teacher effectiveness. Another study by Wright et al. (1997) completed in 1994 and 1995 was very similar in its methodology to the present study. Wright and colleagues used gain scores of students on the TCAP, a Tennessee standardized test. In this study the methodology used a multivariate longitudinal analysis of achievement data of students. A total of 30 school systems in East Tennessee were studied and 24 in Middle Tennessee. The study was quite large and included five subject areas and three grade levels: third, fourth, and fifth

grades. All students' test scores for these subjects and grade levels were included. The conclusions reached were that individual teachers do make a difference in the learning levels of students. Teacher effectiveness was the main factor in differences in student achievement. Now a link needs to be established that defines how teachers become more effective in their instruction. The present study tried to establish that link.

As previously stated, the process of National Board Certification is a professional development opportunity often described by candidates as the most powerful they had experienced. Portfolio preparation is a powerful tool in a teacher becoming more metacognitive. Metacognitive teachers, it has been established, create greater student learning gains. In another study by Sato (2000), the process teachers go through to gain National Board Certification was examined. One of her research questions was, did the process of going through candidacy improve teaching skill levels? Sato's study included 17 candidates of whom 12 became National Board Certified. Her conclusions were reached through a series of interviews with the candidates. Sato found that teachers considered the opportunity of going through the candidacy as a professional development experience. The main findings of the study were that teachers used the standards as benchmarks for professional growth, and as a tool to analyze instructional practice as criteria to determine if their teaching was effective. In the present study analyzing practice is determined to be metacognitive and is the essence of the National Board process.

The present study attempted to connect metacognition with improved student performance and matched the 14 dimensions of expert level teaching (Bond et al., 2000) with the assessment practices for National Board candidacy. Bond et al. used a sample

size of 65 teachers from three states. The methodology used in this study was a questionnaire and an observation, with additional telephone interviews with 40 traditionally certified candidates and 40 National Board Certified candidates. A multivariate procedure was used and a casebook compiled on each teacher. Student writing samples were also used to glean information on the effectiveness of the teaching.

The Bond et al. (2000) study indicated that expert teaching, as defined in the study, increased student achievement. Students taught by National Board Certified teachers produced work and offered oral evidence of concepts taught at a deeper level than students taught by non-National Board Certified teachers.

The present study did research the link between National Board Certification and student achievement and found a zero correlation. Other qualitative studies like Kelley and Kimball (2001) and Williams and Bearer (2001) indicated a positive impact made on student learning by National Board Certified teachers. Both of the studies looked at the positive impact of Board Certification at the district level. These studies centered on financial incentives offered to teachers and how this related to a teacher attempting the certification process. These studies did concur with others stating that the Board Certification process was a significant form of professional development. Recommendations indicated the need for additional studies to be completed at the school and student levels to evaluate any impact on student achievement.

The present study found a statistically non-significant effect for students who had National Board Certified teachers as compared to those students whose teachers were not Board Certified. Another study in Iowa (Dethlefs et al., 2001) focused on many research areas but included measuring National Board Certification and teaching quality. This

study used surveys of 564 teachers and 287 principals. In the area of teaching quality, the study reported there was a statistically significant difference in the teaching quality of Board Certified teachers when compared to teachers who have not been involved in the certification process.

The present study did not show a link between National Board Certification and increased student achievement. Another study similar in methodology to the present study had different outcomes. Goldhaber, Perry, and Anthony (2003) conducted a huge study in North Carolina resulting in four databases being compiled for each year from 1997 to 2000 with over 70,000 teachers. Much of the study was devoted to the financial incentives gained by candidates, but part of the study did focus on the growth of students taught by National Board Certified teachers. The study concluded that according to NCDPI standardized test scores, exemplary growth was determined in students who had National Board Certified teachers (Goldhaber, et al. 2003). The researchers also stated that National Board for Professional Teaching Standards did accurately identify teachers with stronger academic skills who are likely to be more effective as measured by student outcomes. Although the researchers also point out that little is currently known about National Board Certification for teachers and how it affects the students they teach, a significant amount of research did show a link between measures of teacher academic skills and student outcomes (Goldhaber, et al. 2003).

Limitations of the Research Study

The present study examined relationships between student gains in learning and National Board Certification in teachers of those students. The use of the Florida Comprehensive Assessment Test (FCAT) helped to assure valid and reliable

measurement of the dependent variable; however, there are limitations to the study.

While FCAT is similar to other standardized achievement tests used nationwide, it is only administered within the state of Florida. The limitation would be that the study results are only generalizable to other Florida students.

Another limitation was that the data collected was for two specific consecutive years, 2002 and 2003, and does not necessarily correspond to other years. First, posttest data were collected for the spring 2003 test administration. Pretest data were then traced back to the spring 2002 test administration for the same students. Due to the mobility of the Florida school population, much data were lost due to students not being present for both years. Of 1,600 students scores collected only 1,092 were actually used in the analyses. The remaining 508 could not be matched to pretest scores.

Scores collected were limited to fourth and fifth graders. FCAT is administered annually to students at or above third grade in Florida. Third-grade students' scores were eliminated due to the non-administration of FCAT at the second-grade level. At the third grade level there would not be comparison data for a pretest. Early in the study, it was determined in order to have clean data comparisons all test data must be from the same testing instrument. In Florida, second graders are assessed using the Stanford 10 instrument. Portions of this test are comparable to FCAT, but to preserve the integrity of the data only FCAT to FCAT data comparisons were made. Methods for equating Stanford and FCAT tests would be needed to make comparisons at lower grade levels.

As the present study used scores from only 1,092 students in both reading comprehension and math problem-solving this cannot be construed to mean that all students' scores would yield the same results. One example would be a teacher teaching a

number of classes in reading, but not math, and vice versa. The scores in this study, therefore, represent students who had the same teacher for both math and reading instruction.

Lastly, 29 National Board Certified teachers' student scores were used in this study. These scores were compared to 29 non-National Board Certified teachers in the same grade level and at the same schools. Questions were asked of the administration at each school about the heterogeneity of each class. Verbal assurance was given at each school site that the classes were equally heterogeneous so the student scores were collected. These judgments were made by individual administrators not systematic analysis of achievement data from the students as a whole.

In conclusion, these students' gain scores were a result of the instruction of 29 National Board Certified teachers and 29 non-National Board Certified teachers, but these gain scores should be cautiously be generalized to other teachers who may or may not be Board Certified.

Conclusions and Recommendations

The results of this study yielded conclusions, recommendations for educators, and recommendations for further study relative to the impact of National Board Certification on student learning.

This study does not indicate a statistically significant relationship between National Board Certification for teachers and student achievement in both subject areas of reading comprehension and math problem solving. However, at the national, state, and district levels of government, demands are being made for increased student achievement. Both the No Child Left Behind legislation and the Florida A+ Program

measure growth for all students annually. School Improvement Plans are constantly being written to reach higher and higher standards. Subgroups of students are identified and specific growth for each subgroup of the population is targeted. In this study the indications were that students whose teachers are Board Certified did not increase their gain scores in reading comprehension and math problem solving more than students whose teachers were not Board Certified. More research in this area needs to be done to understand the impact on student learning of a teacher becoming Board Certified.

As noted previously, educational policies at all levels are focused heavily on linkages between teaching performance and student learning growth. Student achievement is measured, disaggregated, and studied for patterns and trends. Monies allocated for staffing, supplies, and bonuses are now predicated on test scores. Much staff development is occurring throughout the nation relative to teaching behaviors that should promote student achievement. Although the present study did not clearly link student achievement with National Board Certification of the teacher, it also does not indicate a need to abdicate the process. Previous research links National Board Certification with the professional growth of teachers. Rewarding teachers who become certified is providing an incentive for those teachers that choose to go through the rigorous process. Optimal growth is also documented by previous researchers with sufficient robustness to indicate that teacher preparation and growth should be focused on metacognition.

The present study's results indicate that the process of becoming a National Board Certified teacher is not linked to increased student achievement as measured by high-stakes tests in mathematics and reading. If National Board Certification does not impact learning of students, more study needs to be done on why this is not happening.

Metacognitive teachers are both National Board Certified and non-National Board Certified. The decision to go through the process is intensely personal and hinges on many factors in the life of an individual teacher. Further research could be conducted on teaching efficiency before and after professional development focusing on metacognition. Areas to evaluate could include: assessment; student engagement; social interaction in order to gain knowledge; evaluation of student learning; and the content expertise of the teacher.

Lastly, this study needs to be replicated on a larger scale and studied over a longer period of time in other parts of the country to build a robust body of research findings. The confining nature of the small area studied and the numbers of teachers and students studied cannot generalize to the national population.

Contributions of the Study and Policy Implications

Results of this study are inconsistent with previous research that supports the link between National Board Certification in teachers and increased student achievement as compared to students whose teacher was not National Board Certified. Some of the major studies that supported this conclusion were: Bond, Smith, Baker, and Hattie (2000); Goldhaber, Perry, and Anthony (2003); Sato (2000); Dethlefs, Trent, Boody, Lutz, Robinson, and Waack (2001); Wright, Horn, and Sanders (1997); and Kelley and Kimball (2001). The criterion measure used in each of these studies differed.

The Bond et al. (2000) study included classroom observations, pre-observation questionnaires, narrative records, lesson transcripts, and student and teacher interviews. The conclusions reached by the researchers included the statement that students of National Board Certified teachers produced work and showed an overall deeper

understanding of concepts taught than their peers who were not taught by National Board Certified teachers. This study also indicated that students provided more highly developed verbal explanations of concepts that also supported the results of this study.

In the Goldhaber et al. (2003) study a large number (251,567 eligible and 4,246 applicants) of teachers in North Carolina were studied using their Praxis I, Praxis II, National Teacher Exam score and, in some instances, SAT and GRE scores which were converted into databases: (a) the NBPTS eligible teacher sample, and (b) the applicant sample, showing both eligible and applicants scores. All of these scores were converted to Z scores for the purpose of analysis. The research study included a four-year period from 1997 to 2000. The conclusions of the researchers were that NBPTS is identifying teachers with stronger academic skills. The researchers pointed out that the positive correlation between teacher Z scores and NBPTS certification provides indirect evidence that the certified teachers are more likely to be effective as measured by student growth.

The study by Sato (2000) was an investigation of the type of learning that takes place when a candidate goes through the National Board process. Seventeen candidates were studied and the criterion used was an interview format. Results indicated positive growth in the areas of: content knowledge, teaching repertoire, improved interactions with students, learning about oneself, and thinking more metacognitively. The results reported were that teachers grew positively from the experience with an emphasis on professional growth and the ability to make better instructional choices.

Dethlefs et al. (2001) studied a large data pool of National Board Certified teachers in Iowa. The purpose of the research was to study the effects of: professional development of teachers, provision of professional services, induction and retention of

teachers, and teaching quality. The criterion measure was a survey of 564 out of a possible pool of 1,108 teachers and 134 principals of National Board teachers out of a possible pool of 287. The findings of the researchers indicated National Board Certified teachers were more involved in professional development, did provide more services to their schools and districts, and also demonstrated significant differences in teaching quality when compared to other teachers who were not National Board Certified.

The research study completed in Tennessee by Wright et al. (1997) used the collection of student's TCAP scores for a period of two years in the subject areas of total math, total reading, total language, social studies and science. These data were analyzed using a gain score model. In the conclusions of the study the researchers reported that differences in teacher effectiveness were the most important factor affecting student academic gain. This study did not include the study of National Board Certified teachers but concurred that the teacher was the most important factor that made the difference in student learning gains.

Another study by Kelley and Kimball (2001) yielded similar results using National Board Certified teachers in the research. An interview was conducted of 30 National Board Certified teachers across five school districts. Questions included: motivation to apply for certification, effects of the process, and changes in the roles of the teachers. According to this study the National Board Certified teachers were excellent teachers before going through the certification process according to the interviews. These same teachers, however, stated that they felt their teaching had improved significantly by going through the process. The students of these teachers continued to perform well. The certification process taught the teachers to reflect more deeply on their instructional

strategies and go to the literature to research best practices when planning for instruction. The researchers concluded that the Board Certification process was a significant professional development experience. Although the indication was that Board Certified teachers were excellent teachers before certification, the teachers believed the process contributed to even greater improvement.

The present study did not find a statistically significant difference in student achievement of students whose teachers were National Board Certified as compared to student achievement of students who were not National Board Certified. Results of this study cannot be considered conclusive. The National Board for Professional Teaching Standards was not designed as a professional development exercise for teachers, but was created to reward exemplary teachers. Much of the earlier research did reach conclusions, but the present study was not conclusive.

This study used the criterion measure of high-stakes standardized tests to measure effectiveness of the National Board Certification in increasing student achievement. The pressure of high-stakes testing alone could have been an intervening variable that could have affected the results. Practice tools for students to use prior to FCAT testing are numerous and varied and can account for increases in test scores of some students. Web sites for student additional practice at school and home also factor into the results of the study. If a child is not performing at the required level, parents are asked to sign Individualized Academic Improvement Plans that state what role the parents will take in trying to improve their child's academic standing. This can include the use of the FCAT Explorer website and practice materials in the form of workbooks or other tools teachers send home with the students. The recent statewide rollout of LEARN (Literacy Essentials

and Reading Network) allows administrators, reading coaches, and classroom teachers access to scientifically based reading instruction. Teachers have an opportunity to view reading instruction through classroom video clippings to help them reflect on their classroom practice compared to the visible teaching example. Each of these factors could impact and diminish the effects of identifying teachers who positively impact student achievement. If a measure like critical thinking ability were the criterion measure perhaps the results would have been more definitive.

Policy questions still are left unanswered by the present study. Large amounts of money are allocated to the National Board process from local, state, and federal levels as well as private funding – should this continue? The present study does not answer that question. The criterion FCAT measure used in this study is narrow and cannot infer that National Board Certification is or is not improving the teaching of the individuals who become certified each year. As the knowledge base of FCAT becomes widespread and more materials are developed at all grade levels to prepare students for the test, the likelihood of more students becoming successful is not solely dependent on the teacher. This fact alone diminishes the difference between Board Certified teachers and non-Board Certified teachers when comparing them using FCAT as the criterion measure.

The more metacognitive teachers are about their practice, the better able teachers are to meet the learning needs of the students. Even if all teachers do not go through the National Board process, parts of the process could be replicated in professional development practices to encourage a more metacognitive teaching force. The process of becoming National Board Certified still remains a viable professional development tool for teachers to become more metacognitive about their practice.

Teachers must examine teaching closely and evaluate what impact their teaching has on student learning. Being metacognitive about teaching does lead to greater student academic gains. Examining practice on a consistent basis is one of the key components of effective teaching. By using the methods outlined in the National Board process a teacher can look closely at personal practice. The videotaped portions of the National Board process and the reflective writing required of each candidate regarding student's work are tools to refine teaching. Although this study did not definitively link National Board Certification with student achievement, parts of the process reinforce what is known about effective teaching. More research needs to be completed on this topic using a different criterion measure. The time is now to make needed changes to enable students to succeed at the highest levels possible.

Appendix A
University of North Florida
Division of Sponsored Research and Training

**REQUEST FOR REVIEW BY INSTITUTIONAL REVIEW BOARD FOR THE
PROTECTION OF HUMAN SUBJECTS**

MUST BE TYPED

Principal Investigator: Patricia E. Falaney

Faculty Advisor (if student project): Chair Dr. Paul Eggen

College/Dept.: College of Education

Campus Address & Phone: 4567 St. Johns Bluff Rd. S.
Jacksonville, FL 32224-2645

Project Title: What is the relationship between National Board and student achievement?

Project Type: Non-funded (or student research) Externally Funded Research

Supporting Agency (if any) Submission Deadline:

Dated Submitted to DSRT for Review: 7/5/03

Project Termination Date: 7/5/04

Type Review Requested: Exempt/Category # 4 Expedited/Category # _____ Full IRB

IRB USE ONLY:

Type of Review: Same as Requested Other than Requested (Type)

Subjects at Risk: Yes No Minimal

If yes, potential benefits justify proceedings Yes No

Informed Consent Required: Yes No If yes, forms approved: Yes No

Modifications Required:

Second Review Needed: Yes No

1st Review By: J. W. [Signature] 7/2/03 (signature and date)

Approved Conditionally Approved, Pending Modifications Referred to Full IRB

2nd Review By: _____ (signature and date)

Approved Conditionally Approved, Pending Modifications Referred to Full IRB

Right to Appeal: Make appointment with Vice President for Academic Affairs

DSRT USE:

Notices Sent:

Informed Consent Forms Received:

File Closed:

Appendix B

Patricia E. Falaney
Durbin Creek Elementary
4100 Racetrack Road
Jacksonville Florida 32259

February 27, 2004

Stewart Maxey
Wadsworth Elementary School
Post Office Box 353010
Palm Coast, Florida 32135

Dear Mr. Maxey:

Please allow me to introduce myself. My name is Patricia E. Falaney and I am principal of Durbin Creek Elementary School in St. Johns County.

I am also a doctoral student at the University of North Florida currently working on my dissertation proposal. My dissertation topic is National Board Certified teachers and their effect on student learning gains. In order to measure these gains FCAT scaled scores in Reading Comprehension and Math Problem Solving need to be collected from students who were taught by a National Board Certified teacher. Another set of scores for comparison need to be collected from a teacher in the same school and the same grade level who does not have National Board Certification. The hope is that there will be greater student learning gains from the National Board Certified teacher.

Data collected for the study will be kept confidential at all times. Once data collection is completed, all identifiers will be eliminated and the remainder of the process will remain anonymous. There will be no names of students, teachers, schools, or counties used in the reporting on this project. The only data collected will be numerical and a mean gain score will be averaged. Four counties in the northeast Florida will compose the data group.

Your school has been identified as having at least one National Board Certified teacher. It is my hope that I will be allowed to collect data from your archives. I will be calling you for a convenient time for me to collect this data.

The University of North Florida Dissertation Committee and Institutional Review Board have approved this research effort. If you have any questions, feel free to contact my chair, Dr. Paul Eggen, at the University of North Florida in the College of Curriculum and Supervision or myself at (904) 759-0904.

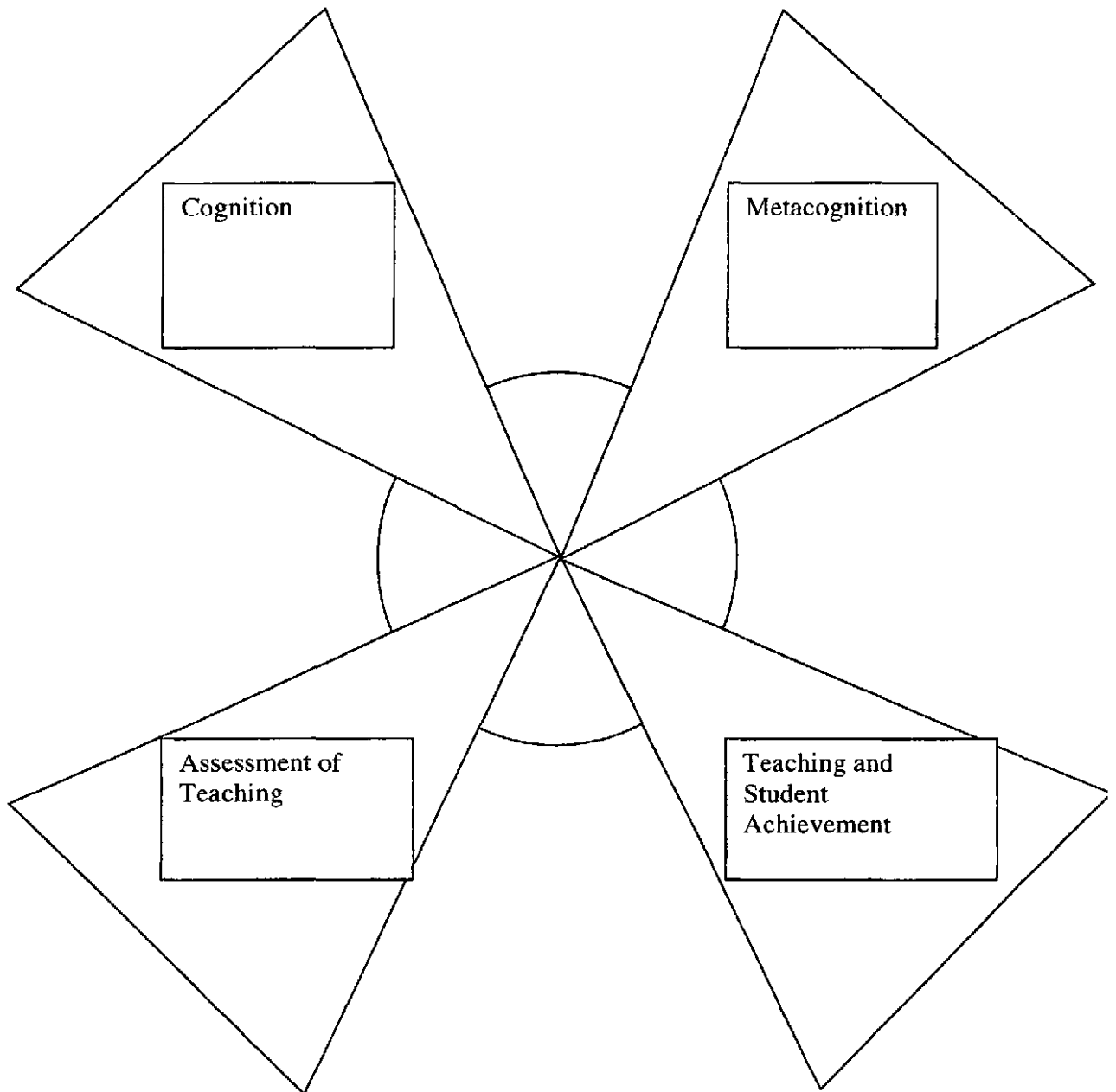
I look forward to meeting you in the future.

Sincerely,

Patricia E. Falaney
Principal

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Four Focus Areas of National Board for Professional Teaching Standards



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