# Measures of Effective Teaching:

# National Board Certification and

# Physical Education Teachers

by

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ABSTRACT

The non-profit National Board for Professional Teaching Standards (NBPTS) grew out of the belief that teachers were a key factor in improving student achievement and that the profession needed a way to recognize and reward exemplary classroom teachers. Over 100,000 teachers nationwide have achieved National Board Certification across all certificate areas, with approximately 1,800 of those in the area of Physical Education. Although National Board Certified Teachers (NBCTs) have been the subjects of several studies since the inception of NBPTS, very few have investigated the impact of National Board Certification (NBC) and Physical Education Teachers. This study examined the teaching effectiveness of NBCPETs and non-NBCPETs as they taught intact Physical Education classes with their own students. Participating teachers were provided with an experimental teaching unit (ETU) with a specific learning objective, but were free to plan and design the intended instruction. This study also examined the cognitive processes of NBCPETs and non-NBCPETs during interactive teaching. Academic Learning Time-Physical Education (ALT-PE), the System for Observing Fitness Instructional Time (SOFIT), stimulated-recall interviews, and document analysis were utilized for data collection. Pre- and post-tests on the ETU specific learning objective were conducted to determine student learning and three lessons were videotaped and used in subsequent analysis. Stimulated recall interviews were conducted following each lesson, lasting between 5 to 15 minutes. Themes that emerged from the stimulated-recall interviews across all teachers included: 1) building on past skills, 2)

modifications to increase physical activity, and 3) goal-directed instruction. In addition, there is no difference between the amount of time students of NBCPETs engage in moderate to vigorous physical activity (MVPA) as compared to students of non-NBCPETs. Similarly, students of non-NBCPETs are provided the same amount of motor activity at an appropriate success rate (ALT-PE) as students of NBCPETs. Lastly, the results showed no difference in gain scores of the learning objectives between the two groups of teachers.

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## Chapter 1: Introduction

In an era of educational reform, educators, researchers and policy makers alike are interested in identifying those teaching practices that contribute to improved student learning, performance and achievement (Sato, Wei, & Darling-Hammond, 2008). The non-profit National Board for Professional Teaching Standards (NBPTS) grew out of the belief that teachers were a key factor in improving student achievement and that the profession needed a way to recognize and reward exemplary classroom teachers (Vandevoort, Amrein-Beardsley, & Berliner, 2004). At last count, over 100,000 teachers nationwide have achieved National Board Certification across all certificate areas, with approximately 1,800 of those in the area of Physical Education (NBPTS, 2014a).

### National Board Certification Process

In order to apply for National Board Certification (NBC), teachers must have three or more years of teaching experience, at least a bachelor's degree and a valid state teaching license. Each accomplished candidate has presented evidence of effective teaching through videotaping teaching events, student work samples and more than 50 pages of descriptive, analytic and reflective writing. The NBPTS identified what it determined to be the essential characteristics of accomplished (effective) teaching and developed a method for identifying those teachers that demonstrated these practices. The product was a set of standards for 25 teaching specialty areas (Hakel, Koenig, & Elliott, 2008). The standards in each area describe the ways accomplished teachers demonstrate what they know and are able to do, according to the NBPTS five 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 students, 3) teachers are responsible for managing and monitoring student learning, 4) teachers think systematically about their practice and learn from experience, and 5) teachers are members of learning communities (Berg, 2003).

In order to earn the NBPTS certification, candidates must successfully complete six computer-based exercises that measure content area knowledge. In addition, candidates must assemble a four-part portfolio consisting of videotapes of their teaching, written reflections on their lesson goals and the outcomes of each lesson submitted, along with examples of student work. Both the four-part portfolio and knowledge test are aligned with the high and rigorous standards of the NBPTS (Berg, 2003). Unlike the mandatory systems of state licensing that set entry-level requirements for beginning teachers and school counselors, the NBC process is voluntary, and developed by teachers and other education stakeholders to recognize experienced educators for the quality of their practice (NBPTS, 2014b).

Once NBC materials and assessments are completed, multiple NBPTS-trained assessors score each candidate's portfolio and online assessment responses according to a four-point rubric, though information on the validity of this four-point rubric could not be located. The rubric used is based on the Five Core Propositions and it is customized to the particular certificate area (Hunzicker, 2011). Only about half of all board candidates are successful on their first attempt (Boyd & Reese, 2006).

Statistics relative the to the pass/fail rate specific to the area of Physical Education have yet to be released by NBPTS. Many if not most teachers who went through the process described certification as the best professional development they have ever experienced – even if they did not achieve the certification (Linquanti & Peterson, 2001; Rotberg, Futrell & Holmes, 2000). Teachers, who achieved certification, reported learning as a result of the process. (CFLT, 2002; Lustick & Sykes, 2006).

National Board Certified Teachers (NBCTs) have been found to be highly effective teachers in the core subject areas such as English and Math (Bond, Smith, Baker, & Hattie, 2000; Goldhaber & Anthony, 2007), positively influence student learning outcomes (Cavalluzzo, 2004; Vandervoort, Amrein-Beardsley, & Berliner, 2004), and have a high sense of self-efficacy (Freund, Russell, & Kavulic, 2005.

To further complicate the issue, standardized achievement test scores do not easily measure student-learning outcomes in Physical Education. Thus, linking NBC status to increased student learning is a relatively major undertaking (Woods & Rhoades, 2010).

Moreover, this review of the literature related to NBCTs raises at least two key questions: (a) Does achieving NBC status reflect pre-existing teaching effectiveness?; and (b) does the process of becoming nationally board certified cause a teacher's classroom effectiveness to improve? In nearly all the studies investigating the effects of NBC on student learning outcomes authors have compared the achievement test scores of students taught by board-certified teachers to those students whose teachers were not

board-certified. In fact over 200 studies have focused on various aspects of NBC, including student-learning outcomes (NBPTS, 2014b). The majority of the studies have investigated the impact of the NBC process on teaching processes (e.g., Bond, Smith, Baker, Hattie, 2000; Hakel et al, 2008). Several researchers showed that NBCTs have an impact in student learning and demonstrate greater teaching effectiveness than their non-NBC colleagues (e.g., Cantrell, Fullerton, Kane & Staiger, 2007; Cavalluzzo, 2004; Goldhaber & Anthony, 2005; Harris & Sass, 2007), while others found few or no differences between students taught by NBCTs and those taught by non-NBCTs (Woods & Rhoades, 2012).

**NBCTs in Physical Education**

There have been very few studies in the Physical Education subject area. In fact, to date the number of actual studies with NBCPETs as the subject matter is five (Phillips, 2008; Rhoades & Woods, 2012 Woods & Rhoades, 2010; Woods & Rhoades, 2012; Woods & Rhoades, 2013).

In the Physical Education context, Phillips (2008) investigated student competencies in high school Physical Education. The study described the differences across teachers with and without NBC, in relation to the percent of motor competent students in high school Physical Education classes. Motor skill competency was defined as "the ability to independently and safely participate in the activity with enough skill to make it an enjoyable experience and perform the activity with continuity" (Rink & Williams, 2003, p. 485). Phillips (2008) found that NBCTs were stronger on four

measured performance indicators as well as the global measure of student competency.

In addition, several researchers have investigated the effects of achieving NBC on the work life of Physical Education teachers (Woods & Lux, 2011; Woods & Rhoades, 2010, 2012). They reported that the pursuit of NBC improved teachers' teaching skills, caused them to be more reflective, and brought them enhanced respect from colleagues and administrators (Gaureault & Woods, 2012).

**More Effective versus Less Effective Teaching**

As mentioned earlier, NBPTS grew out of the idea that teachers were considered a key factor in improving student achievement and that the profession needed a way to recognize and reward exemplary classroom teachers (Vandevoort, Amrein-Beardsley & Berliner, 2004). This statement then begs questions such as "What is an exemplary teacher?" "Does board certification status approach performance levels that reflect at least in part higher levels of expertise?" Several researchers have attempted to not only define the expert teacher, but to also differentiate the expert or experienced teacher from the novice or inexperienced teacher (e.g., Berliner, 1986; 1988; 2004; Bond, Smith, Baker, & Hattie, 2000; Griffey & Housner, 1991; Housner & Griffey, 1985). For example, Bond et al. (2000) described expert teaching as consisting of 5 major dimensions and these 5 major dimensions led to 16 examples of expertise. The five major dimensions include along with the 16 examples of expertise under each dimension are as follows:

A. Can identify essential representations of their subject

a) Expert teachers have deeper representations about teaching and learning

b) Expert teachers adopt a problem-solving stance to their work

c) Expert teachers anticipate, plan, and improvise as required by the situation

d) Expert teachers are better decision-makers and can identify what decisions are important and which are less important decisions

B. Can guide learning through classroom interactions

a) Expert teachers are proficient at creating an optimal classroom climate for learning

b) Expert teachers have a multi-dimensionally complex perception of classroom situations

c) Expert teachers are more context-dependent and have high situation cognition

C. Can monitor learning and provide feedback

a) Expert teachers are more adept at monitoring student problems and assessing their level of understanding and progress and they provide much more relevant, useful feedback

b) Expert teachers are more adept at developing and testing hypotheses about learning difficulties or instructional strategies

c) Expert teachers are more automatic

D. Can attend to affective attributes

a) Expert teachers have high respect for students

b) Expert teachers are passionate about teaching and learning

E. Can influence student outcomes

a) Expert teachers engage students in learning and develop in their students' self-regulation, involvement in mastery learning, enhanced self-efficacy, and self-esteem as learners

b) Expert teachers provide appropriate challenging tasks and goals for students

c) Expert teachers have positive influences on students' achievements

d) Expert teachers enhance surface and deep learning

Berliner (2004) also described several propositions about expert teachers, including the idea that expert teachers are more opportunistic and flexible in their teaching than are novices.

Similarly, in Physical Education, Housner and Griffey (1985) found that experienced Physical Education teachers were better equipped to not only anticipate possible situations that may be encountered during a lesson and cause a change in plans, but they were also better equipped to meet the demands of these situations than the novice teachers.

**Proxy Measures of Student Learning in Physical Education**

There are several quantitative methods for assessing effective teaching in Physical Education. In addition, there are specific process variables that are related to student achievement and effective teaching. These variables include Academic Learning Time (ALT), and Opportunity to Respond (OTR). ALT is defined as the optimal amount of time for successful student practice (Berliner, 1979). Academic Learning Time in

Physical Education (ALT-PE) has been used in numerous studies to examine the relationship between student learning time, or time-on-task measures, to actual achievement in a motor skill (e.g., McEwan & Graham, 1982; Silverman, 1985, Young & Metzler, 1982). OTR on the other hand refers to the number of practice trials observed following instruction. Research has indicated the number of practice trials at an appropriate difficulty level may predict achievement in a motor skill (Ashy, Lee, & Landin, 1988). The fundamental premise is that effective teaching is or should be measured in terms of appropriate student engagement, which in turn, is reflective of student learning (Behets, 1997).

Rink (2013) discussed the importance of rethinking how a teacher's performance is evaluated. Assessments of a teacher's performance should be tied directly to student achievement, which in turn has the potential for replacing the term 'highly qualified' with 'highly effective' teachers (Rink, 2013). However, before this occurs the profession needs to develop a valid and reliable system to evaluate Physical Education teachers.

**Scoring Rubrics for National Board for Professional Teaching Standards**

The NBPTS has provided rubrics for each certificate area as well as for each portfolio entry. These rubrics are derived from the standards, which define the levels of accomplished teaching that one must demonstrate in order to be deemed National Board Certified (NBPTS, 2014c). However, there is no evidence that the portfolio assessment process has been validated. The body of each rubric consists of statements organized in a manner that reflects the order of tasks or questions within the entry or exercise. The

portfolio entries and assessment center exercises are scored holistically. In other words, an assessor must look at the entry and exercise for its overall quality and evaluate the work as a whole.

Assessors are teachers in each specific content area who have successfully completed an intensive training program rooted in the National Board's Standards and scoring guidelines. Measurement experts rate National Board assessor reliability among the highest reported for such a complex performance assessment, which is a direct result of the focused and rigorous training National Board assessors undergo (NBPTS, 2014c). Again, there is no evidence stating that the assessment process has been validated.

The portfolio entries that require candidates to submit videos are entries one and three. Entry one is entitled "Instruction to Facilitate Student Learning". The instructions ask the candidate to choose three video segments that together demonstrate the teacher practicing sequenced motor-skill instruction, related conceptual understanding, promotion of an active lifestyle, and engagement of all students (NBPTS, 2014c). According to the NBPTS portfolio-scoring guide, all of these factors together make for effective teaching. However, the candidates are not asked to measure the amount of time students spend in motor activity at an appropriate success rate, nor are they asked to measure the amount of time their students are engaged in moderate to vigorous physical activity (MVPA), both of which are considered key proxy indicators of student learning, and, thus, teaching effectiveness (Hastie, 1994; Rowe, van der Mars, Schuldheisz, & Fox. 2004).

**Experimental Teaching Units in Physical Education**

In the 1970s and early 1980s, the process-product research paradigm was the primary designs for studying teacher effectiveness (Dunkin & Biddle, 1974). This model studies the relationship between observed teacher behaviors in the learning environment (process) and subsequent student achievement (product) (Metlzer, 1983). However, these designs can be expensive and time consuming. One alternative to the long-term, expensive process-product design is the Experimental Teaching Unit (ETU) (Arehart, 1979; Berliner & Tikunoff, 1976; Gage, 1976). An ETU typically consists of a series of 1 to 10 lessons on a topic with an explicit/specific objective that is taught to a particular grade level. All of the teachers involved in the ETU study teach the same lesson content and are provided with pretests, posttests and possibly instructional materials, depending on the needs of the participants (Paese, 1986).

ETU's have been used in Physical Education teacher effectiveness research since the mid 1970s (Paese, 1986). The few initial efforts implementing ETUs in Physical Education appear to support the importance of looking at student process behaviors as better determinants of achievement than teacher behaviors (Metzler, 1983). Yerg (1982a) reported that student engaged time was a powerful factor in student learning in the ETU. Yerg (1982b) also acknowledged that the impact of the learner has been overlooked and needs to be examined further.

In order to investigate the effect of what teachers do on student learning, researchers in Physical Education have used a modified version of the ETU paradigm

(Paese, 1986). Although researchers have investigated various teaching behaviors, criterion process variables and teacher presage variables, the most common novel skill taught in ETUs in Physical Education has been a novel golf task (Paese, 1986). Paese reported that effective Physical Education teachers in their ETU lessons had higher rates of appropriate practice and teacher skill feedback to students (Paese, 1986).

**Evidence-Based Indicators of Teacher Effectiveness**

In this project two evidence-based indicators of teacher effectiveness were used: (a) Academic Learning Time in Physical Education (ALT-PE; Siedentop, Birdwell, & Metzler, 1979 as cited in Parker, 1989), and (b) the System for Observing Fitness Instruction Time (SOFIT; McKenzie, 2009). The former has a skill learning focus while the latter has a public health focus.

The two evidence-based proxy indicators of student learning (i.e., Academic Learning Time-Physical Education [ALT-PE], and students' in-class levels of Moderate to Vigorous Physical Activity [MVPA]) ALT-PE and SOFIT were utilized in this study to measure the opportunities to engage in motor activity at an appropriate success rate, as well as the physical activity levels of students, specifically MVPA. The ALT-PE observation instrument focuses on the students' opportunities for skill learning, while SOFIT has a health-oriented focus by measuring students' physical activity (along with lesson contexts and teacher behaviors specific to the promotion of physical activity). Both of the mentioned measures are evidence-based indicators of teacher effectiveness (Sallis et al., 2012; van der Mars, 2006).

*Academic Learning Time-Physical Education (ALT-PE)*

Before the development of the SOFIT instrument, an observation instrument used to study student engagement in Physical Education was the Academic Learning Time in Physical Education (ALT-PE). Academic Learning Time is a phrase coined by Berliner (1979) in the Beginning Teacher Evaluation Study (BTES). In the BTES, three measures of instructional time were developed: (1) allocated time, (2) engaged time, and (3) academic time. Academic time (ALT) refers to that portion of time when the student was involved with materials that were appropriate with his or her abilities, resulting in high success and low error rates (Parker, 1989). ALT-PE is an application of this notion to the Physical Education setting and was developed by Siedentop and his colleagues (Parker, 1989). The amount of time students spend appropriately engaged in a subject matter learning task is considered a key indicator of teacher effectiveness, because of its relationship with student achievement (van der Mars, 2006). The challenge with measuring student learning in Physical Education was pointed out by Placek and Randall (1986) when they said, "many complex skills such as team games taught in Physical Education classes do not lend themselves to valid and reliable measures of student achievement" (p.26). Therefore, finding a way to effectively measure student achievement through a standardized achievement test score is a constant challenge.

Several studies have investigated ALT-PE in the elementary school setting (Godbout, Brunelle, & Tousignant, 1983; Metzler, 1979 as cited in Parker 1989; Placek, Silverman, Shute, Dodds, & Rife, 1982; Shute, Dodds, Placek, Rife, & Silverman, 1982).

These studies show that the percentage of time teachers provide for Physical Education content tends to be quite high, with Placek et al. (1982) reporting 85% and Shute et al. reporting 79%. These percentages represent the time that is set-aside for actual Physical Education content as opposed to managerial matters, waiting in line, and transition time. However, the percentage of class time that these elementary students actually spent engaged in motor tasks at an appropriate level (ALT-PE) ranged from a low of 15% to a high of 38% (Placek & Randall, 1986).

Young and Metzler (1982) investigated the association between ALT-PE and student achievement implementing a novel skill (an accuracy task combining a hockey and golf skill) in an ETU context with a pretest and post-test (van der Mars, 2006). A group of 90 elementary students were taught one lesson on the target skill by four different teachers. The teachers were free to design and organize the lesson however they wanted, but the lesson had to focus on teaching content related to the hockey and golf skill. While the relationship between achievement scores and ALT-PE was not strong, it was statistically significant and in the desired direction (van der Mars, 2006).

In another study, Metzler (1983) re-analyzed data from another investigation using a similar hockey/golf skill in which two graduate students taught 77 elementary-level students. The students were divided into two groups, with one receiving instruction using the "reverse chaining" instructional strategy and the other group being exposed to a lecture/demonstration instructional strategy. This was done to create a greater variance in accumulated ALT-PE in the whole student group. The ETU format was used again with

time lengths of 20, 30 and 40 minutes, respectively. An extra group of students took only take the pretest and post-test. Students who accumulated lower levels of ALT-PE performed poorer in terms of gain scores compared to those with higher ALT-PE levels on the tests. However, the results also hinted at a possible point of diminished benefits. That is, when students were separated in low, medium and high ALT-PE groups, the gain scores in the latter group were actually lower than the medium ALT-PE group.

*Moderate to Vigorous Physical Activity*

The Institute of Medicine recently published a report on physical activity and Physical Education in schools (Kohl III & Cook, 2013). This report contains an objective similar to the objective published by U.S. Department of Health and Human Services (USDHHS, 2000), recommending that high schools students spend at least 50% of the time engaged in MVPA. Though the Healthy People 2010 objective was originally intended for high school students, the goal seemed to be broadly used and K-8 programs believed the objective applied to them as well (USDHHS, 2000). This objective was added to Healthy People 2010 after studies reporting that engagement in moderate and vigorous physical activity has substantial health benefits (McKenzie, Sallis & Nader, 1991). Moderate to Vigorous Physical Activity (MVPA) reflects Physical Activity (PA) levels that have been found to correlate to health (Sallie et al., 2012). MVPA is now regarded a primary outcome for physical education programs (Sallis et al., 2012).

Graham, Soares and Harrington (1983) were the first to demonstrate the use of an ETU in the context of intact physical education classes at the elementary school level.

Following a pretest on a similar hockey/golf skill as the one employed by Metzler (1983), 11 teachers taught one lesson on the task. Class sizes ranged from 14 to 30, 4th and 5th grade students. Using residual gain scores, teachers were grouped as more ($n$ = 4) and less ($n$ = 4) effective teachers. The three middle teachers were left out of the analysis. The difference in post-test scores between the two groups was significant ($p$ =.001). However, although students in classes of the more effective teachers spent more time engaged in activity, less time in instruction and waiting, than students of the less effective teachers, none of the mean differences on the continuum of student time utilization reached statistical significance (Graham, Soares, & Harrington, 1983).

Phillips and Carlisle (1983) also employed a pretest-post-test design using an ETU with 18 teachers, but this study was across elementary, junior high and middle school levels. The teachers were instructed to teach ten lessons of volleyball, with the choice of planning and teaching practices left up to them. Achievement was assessed using gain scores from five skills tests that had previously shown that they produced reliable and valid scores. A cluster analysis of skill achievement scores determined the five most and 13 least effective teachers. Students' performance on the pre-tests prior to the ten lessons was similar across the five skills. Following the ten lessons the two groups differed significantly in their post-test scores, favoring the more effective teachers group. Along with significant differences between the two groups on select teacher process variables (e.g. positive performance feedback), distinct differences between the two teacher groups were found for the student behaviors, engaged skill learning time and

success time during engaged skill learning time (Phillips & Carlisle, 1983). The more effective teacher group provided their students with more than twice the amount of engaged skill learning time and success time during engaged learning time than the least effective teachers (Phillips & Carlisle, 1983).

**Stimulated Recall**

It might be expected that the decisions of Physical Education teachers are different from those of classroom teachers, strictly because of the sheer difference between subject matter in Physical Education and classroom environments. Few studies of teacher decision-making have been conducted outside of clinical settings. Furthermore, there have been no studies of teacher decision-making done in the actual Physical Education environment with teachers engaged with 30 or more students. The use of stimulated recall was included in this study as a method of allowing teachers to verbally reflect on decisions made during interactive teaching and to investigate those decision-making processes.

Stimulated recall has been used as a method for accessing on-line cognition in various activities such as counseling, problem-solving, medical consultations, and teaching. The use of audiotape and videotape for capturing teacher thought in the classroom became popular in the 1970s and early 1980s when researchers from the emerging cognitive tradition began to study teachers in classrooms (Calderhead, 1981; Clark & Peterson, 1981; Marland 1984), rather than in experimental, clinical environments (Stough, 2001). While engaged in instruction with students, the teacher was

either audiotaped or videotaped. The recall session was then conducted after the recording had taken place (Stough, 2001). Teachers were then asked to retrospectively self-report on their thought processes during the recorded session and these responses were simultaneously recorded on audiotape to be later transcribed by the researcher (Stough, 2001).

The study of interactive decision-making has been conducted almost exclusively through the use of stimulated recall during videotape replay (Housner & Griffey, 1985). The research on interactive decision-making indicates that teachers become involved in decision-making only when the planned lesson is perceived as going poorly and that teachers consider only a few courses of alternative actions in such situations (Clark & Yinger, 1979; Joyce, 1978; MacKay, 1977; Morine-Dershimer & Vallance, 1976).

Snow (1972) described teacher thinking during classroom interaction with students as a cyclical process of observation of student behavior. In this model, the teacher begins with a teaching plan, which is composed during the pre-active phase of teaching – before the teacher is in actual contact with the students. The teacher begins the interactive phase of teaching with some teaching performance that is part of the teaching plan. This initial move by the teacher produces some changes in both the teacher and the students (Clark & Peterson, 1976). Some of these changes are observable by the teacher and some are not. The most important observable changes are called ‘cues’. The teacher observes these cues and makes judgments about whether or not these cues fall within the range of acceptable values or ‘within tolerance’ for this teaching plan. If the cues happen

to fall within an acceptable range, the teacher decides to continue with the teaching plan and the cycle is repeated as before. If however, some of the cues fall outside of acceptable limits, the teacher may either decide to continue with the teaching plan (ignoring the cues, hoping things improve) or to modify the play in a way that will restore the cues to acceptable values (Clark & Peterson, 1976). The primary cue used by teachers to judge the effectiveness of their lessons appears to be student involvement or participation (Peterson & Clark, 1978).

**Statement of Purpose:**

The purpose of this study was to compare the teaching and decision-making practices of National Board Certified Physical Education teachers with those of Physical Educators who are not Board Certified.

**Research Questions**

The first research question investigated whether those who go through the National Board Certification process are more effective Physical Education teachers than those Physical Education teachers who do not: Are NBCPETs able to provide more opportunities for MVPA and ALT-PE as compared with non-NBCPETs when presented with the same teaching task in the form of an experimental teaching unit (ETU).

The purpose of the second study was to describe the decision-making processes employed by National Board Certified Physical Education Teachers (NBCPETs) and non-NBCPETs as they teach lessons in Physical Education. That is, are there differences in the decision making processes between National Board Certified Physical Education

Teachers and non-National Board Certified Physical Education Teachers? The main objectives of the second study were: (a) to describe the information cues that NBCPETs and non-NBCPETs attend to during instruction or interactive teaching of the provided experimental teaching unit (ETU); and (b) to describe the decisions that are made by NBCPETs and non-NBCPETs during interactive teaching of the provided ETU.

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## Chapter 2 – Literature Review

The non-profit National Board for Professional Teaching Standards (NBPTS) was founded in 1987 and grew out of the up and coming movement that teachers were a key factor in improving student achievement and that the profession needed a way to recognize and reward exemplary classroom teachers (Vandevoort, Amrein-Beardsley, & Berliner, 2004). The mission of NBPTS has three parts and serves to: (a) establish high and rigorous standards for what accomplished teachers should know and be able to do; (b) develop and operate a national, voluntary system to assess and certify teachers who meet these standards, and; (c) advance related education reforms for the purpose of improving student learning in American schools (NBPTS, 2014a). National Standards (for NBPTS) in the area of Physical Education were not published until 1999. At last count, over 100,000 Teachers have achieved National Board Certification across all certificate areas nationwide, with just over 1,900 of those in the area of Physical Education (NBPTS, 2014b).

In 1987, the NBPTS published a set of policy statements, *the Five Core Propositions,* which formed a framework from which all of the standards evolved. These Core propositions have been incorporated into teacher quality initiatives at all levels of teacher education, and they have been become the industry standard for the education profession (Berg, 2003). These propositions identify the values, beliefs and assumptions that underlie quality teaching: (a) teachers are committed to students and their learning,

(b) teachers know the subjects they teach and how to teach those subjects to students, (c) teachers are responsible for managing and monitoring student learning, (d) teachers think systematically about their practice and learn from experience, and (e) teachers are members of learning communities. While these propositions are the common themes of accomplished teaching, the certificate area standards (of which there are 25 different certification areas) provide the depth and breadth of understanding for teaching in a particular subject area at a particular developmental level (NBPTS, 2014c).

Teachers who have achieved National Board Certification (NBC) have presented evidence through videotaping teaching events, student work samples and more than 50 pages of descriptive, analytic and reflective writing. They have also passed a rigorous test of their content knowledge to show what they know and are able to do. Both the four-part portfolio and knowledge test are aligned with the high and rigorous standards of the NBPTS (Berg, 2003). Unlike the mandatory systems of state licensing that set entry-level requirements for beginning teachers and school counselors, the NBC process is voluntary. In addition, the process was developed by teachers and other education stakeholders in order to recognize experienced educators for the quality of their practice.

To date, more than 200 studies have focused on various aspects of NBC (NBPTS, 2011), with many comparing students' achievement test scores of board-certified teachers with non board-certified teachers. The vast majority (75%) found National Board Certified Teachers (NBCTs) made a significantly measurable impact on teacher performance; as well as student learning, engagement and achievement (NBPTS, 2014d).

For example, Bond, Smith, Baker and Hattie (2000) found that NBCTs consistently outperformed their peers in knowledge of subject matter, ability to adapt instruction and ability in creating challenging and engaging lessons. Lustick and Sykes (2006) investigated the NBC assessment process in order to identify, quantify and substantiate impact on teaching practices. The results indicated that teachers who pursue NBC showed significant improvements in their teaching practices, regardless of whether they achieved certification (Lustick & Sykes, 2006). NBCTs also demonstrated greater influence on teacher mentoring, leadership, teambuilding, professional development and evaluation, curriculum development, efficacy, overall school leadership, and job satisfaction (Freund, Russell, & Kavulic, 2005).

Rice and Hall (2008) studied the cost effectiveness of pursuing NBC and found that compared with the costs of alternative approaches to teacher professional development, the NBC model is no more costly than alternative forms of professional development and is less costly than some. There is a lack of data of NBPTS program effectiveness; however, so conclusions about the relative cost-effectiveness of various alternatives should not be drawn.

NBPTS grew out of the idea that in order to increase the quality of the nation's teacher work force, there must first be increased professionalism in the field. This professionalism would be achieved by establishing high standards for what accomplished teachers should know and be able to do, and by recognizing teachers who meet those standards. In addition, studies have shown that many Board candidates have noted that

they have changed their teaching as a function of preparing for assessment center exercises and portfolio presentation (Goldhaber, Perry, & Anthony, 2004; Vandervoort et al., 2004). Specifically, about one third of the NBCTs (*n*=34) questioned during the Vandervoort et al. study (2004) reported that the Board certification process was not only worthwhile and rewarding, but had resulted in improved student achievement. Another 14% reported that they had become more analytical in their approach to teaching (Vandervoort, et al., 2004). On the other hand, it has to be taken into account that sometimes what teachers believe or say they do in self-reporting is not necessarily consistent with what they really do (Kyrgiridis, Derri, Emmanouilidou, Chlapoutaki, & Kioumourtzoglou, 2014).

**National Board Certification and Physical Education**

Unfortunately, the limited research base in Physical Education does not allow for comparison of studies like those in general education. Historically, there has been a lack of formal assessment in the field of Physical Education. In addition, other than the recently developed PE-Metrics test batteries (Fisette et al., 2009) there are few validated tools for determining student achievement in Physical Education. Thus, linking NBC to increased student learning is a relatively major undertaking (Woods & Rhoades, 2010). In their 2010 study, Woods and Rhoades investigated the types of teachers that sought NBC. Although over 300 teachers responded to the call, sixty-five were randomly selected to participate in qualitative interviews regarding their motivation to pursue certification. Seventy-nine percent of the National Board Certified Physical Education Teachers

(NBCPETs) were female, 78.9% were Caucasian, 55.1% achieved certification at the elementary level, the mean age of the applications was 45 years old, with about 20 years of teaching experience (Woods & Rhoades, 2010). Additionally, several themes related to subjective warrants emerged including career pursuit because of: (a) a joy of working with and helping children, (b) continued association with sport and physical activity, (c) lack of aspiration to coach, (d) and enjoyment of physical activity (Woods & Rhoades, 2010). The most frequent reasons reported for pursuing National Board certification were related to procurement of financial incentives, an attempt to confront the challenge, and a desire to participate in professional growth (Woods & Rhoades, 2010).

The National Board's system of standards and certification has changed the teaching discourse within the profession by setting and gaining acceptance of its high standards (Boyd & Reese, 2006). Accomplished Physical Education teachers provide students of all abilities and interests with a foundation of movement experiences designed to help them lead active and healthy lifestyles well after graduation from high school. What differentiates the requirements of a highly qualified teacher as defined by NCLB with the definitions of an accomplished teacher as defined by NBPTS is the ability to meet the established criteria, set forth by NBPTS, that exceed traditional assessments of teacher knowledge by examining student work and teacher-student interactions. This is done "in circumstances that would be genuine but could be standardized for scoring" (Hakel, Koenig, & Elliott, 2008, p. 42).

Physical Education teachers who apply for NBC must demonstrate effectiveness

in all of the aforementioned areas through a four-part portfolio. In addition, candidates are assessed in their content knowledge as well as their ability to teach that knowledge to students through assessment center exercises. The areas assessed include: (a) exercise science; (b) biomechanics and motor learning; (c) safety, equity, and fairness issues; (d) students with disabilities; (e) movement forms; and (f) integration of technology and interdisciplinary approaches (NBPTS, 2014c). NBCTs embrace what it means to be an accomplished teacher.

There are already many quality Physical Education teachers in our nation's schools who are going above and beyond to promote active and healthy lifestyles for our children. However they are not receiving the recognition they deserve. Pursuing and achieving National Board Certification is one avenue to obtain that recognition.

Although NBCTs have been the focus of many investigations since NBPTS began certifying candidates in 1995 (NBPTS, 2014d), there are very few investigations with Physical Education as the certification area of focus. To date, eight studies on National Board Certification Physical Education Teachers (NBCPETs) have been published. Phillips (2008) compared NBCPETs and non-NBCPETs in South Carolina, using the South Carolina Physical Education Assessment Program (SCPEAP). The SCPEAP was developed as a method of evaluating physical education programs in the state of South Carolina. It is a unique evaluation in that student performance is used to do a program evaluation (Rink & Williams, 2003). The assessment, at the high school level, consists of four measurable and achievable performance indicators that describe what students

should know and be able to do as a result of one-year of required physical education class. The performance indicators include: (a) demonstrate competency in two movement forms, (b) design and develop a personal fitness program to reach a desired level of health-related fitness, (c) participate regularly in physical activity outside the physical education class, and (d) meet the health-related fitness standards for their age and gender as described by Fitnessgram (Phillips, 2008). Data were used to compare student competency of the two groups of teachers. Findings indicated that students of NBCPETs performed better on all four of the SCPEAP assessment components than students of the non-NBCPETs (Phillips, 2008).

In another study, Rhoades (2010) qualitatively examined teaching performance (QMTPS), Academic Learning Time in Physical Education (ALT-PE), and teacher efficacy (TES) of six National Board Certified Physical Education Teachers (NBCPETs). Themes that emerged were: (a) reflection-in-action and reflection-on-action; (b) instructional collaboration with other physical education professionals; (c) perception of own quality instruction, and (d) the perceived change in professional practices as a result of NBC. Participants exhibited high scores on QMPTS, ALT-PE, and TES. Participants demonstrated competency in task presentation and usage of class time. Participants also exhibited a high degree of both general as well as personal teacher efficacy. Finally, the results indicated that the NBPTS could foster a Community of Practice among its certified teachers (Rhoades, 2010).

Other studies in the area of Physical Education have investigated the benefits of

pursuing NBC for Physical Education teachers (Gaudreault & Woods, 2012), NBCPETs task presentations and learning environments (Rhoades & Woods, 2012), and perceived changes related to the certification process (Woods & Rhoades, 2012). Woods and Rhoades have also investigated the perceived differences from colleagues, NBCTs background characteristics, subjective warrants, and motivations for pursuing National Board Certification as well as the teaching efficacy beliefs of NBCPETs (Woods & Rhoades, 2010; Woods & Rhoades, 2013).

The authors found that most (79%) National Board Certified Physical Education Teachers (NBCPETs) are female, Caucasian, and hold a master's degree. It was also discovered that Physical Education teachers who have achieved NBC explained that the certification process caused them to be more reflective teachers as well as more focused on student learning and assessment (Woods & Rhoades, 2012). Lastly, students of observed NBCPETs on average, experienced 38% motor appropriate practice time, 4.4% inappropriate practice time and 3.8% off-task time during observed classes (Rhoades & Woods, 2012) using the Academic Learning Time-Physical Education observation instrument.

The most recent study by Woods and Rhoades (2013) described the teaching efficacy beliefs of NBCPETs. The participating NBCPETs revealed strong Personal Teaching Efficacy (PTE), and their PTE scores were higher than their General Teaching Efficacy scores. Most NBCPETs expressed confidence in their abilities to influence student learning In addition, while comparing their own teaching effectiveness with non-

NBCPETs, most participants articulated a tendency to reflect on practice, a deeper understanding of commitment to teaching effectiveness, and greater motivation to excel (Woods & Rhoades, 2013).

**National Board for Professional Standards Scoring Criteria**

Assessors for NBPTS evaluate and score a candidate's responses through the lens of rubrics developed from the Standards. As the assessors identify the evidence in the responses, they are trained to judge the candidate's responses performance solely on the basis of the criteria established by the Standards embodied in the rubrics. Each of the responses are scored holistically, in that an assessor must look at the response as a total work and score that work based on the overall match with a level of the rubric (NBPTS, 2011). That is, once candidates submit their portfolios, assessors look at each entry and assessment exercise for its overall quality and evaluate the work as a whole. The NBPTS assessors use rubrics with four levels of performance, with level 4 representing the highest achievable score. A candidate's response may have characteristics of more than one performance level, but an assessor must assign a score that best describes the work as a whole.

The National Board scores all portfolio entries and assessment exercises using a 12-point score scale. The score scale is based on four primary levels of performance (Levels 4, 3, 2, and 1), with plus (+) and minus (-) variations at each level. The assigned scores correlate to the performance standard for National Board Certification as follows:

- The highest score for an entry or assessment center exercise is 4.25 (4+).

- The lowest score for an entry of assessment center exercise if .75 (1-).
- Level 4 or Level 3 performances represents accomplished teaching practice.
- Level 2 or Level 1 performances represent less-than-accomplished teaching practice.
- A total weighted scaled score that equals or exceeds 275 is required to achieve National Board Certification (NBPTS, 2011).

The Standards are founded on the Five Core Propositions that clearly state the commitment, knowledge, skills, and dispositions demonstrated by National Board Certified Teachers (NBCTs). In addition, it is clearly stated to candidates that in order to achieve certification one must be able to demonstrate strong evidence of analytical skills and ongoing reflection in their teaching practice (NBPTS, 2014e). Although analytical skills and ongoing reflection are essential to good teaching, these skills do not mention the measure of student learning outcomes. In addition, in both of the portfolio entries that require videos, neither entry instructs the candidate to provide any evidence of any student learning. Further, the candidates are not asked to provide evidence that the students were given the opportunity for appropriate practice, meaning time in a motor activity at an appropriate success rate. They are asked to reflect on providing "meaningful maximum time on task", but it does not specify whether or not that time is successful or not.

Lastly, candidates are not asked whether students are provided with opportunities to engage in moderate to vigorous physical activity (MVPA). Although the NBPTS did

not publish standards for Physical Education until 1999, McKenzie, Sallis, and Nader developed the System for Observing Fitness Instruction (SOFIT) in 1991. SOFIT is an observation instrument designed to assess student's physical activity levels along with opportunities to become physically fit during Physical Education class (McKenzie, Sallis, & Nader, 1991). Just prior to the release of the SOFIT protocol, the Department of Health and Human Services released Healthy People 2000, a strategy for improving the health of Americans by the end of the century, which contains 319 unduplicated main objectives grouped into 22 priority areas (CDC, 2009). According to this document, engagement in light, moderate and vigorous physical activity has numerous health benefits and has been promoted as a national health objective for disease prevention (McKenzie, Sallis, & Nader, 1991). In addition, relationships had been reported between physical activity and obesity in children (Sallis, Patterson, Buono, & Nader, 1988). Therefore, there is a health rationale for promoting physical activity in children, and because the majority of children attend school and therefore Physical Education in the United States, it seems logical to promote physical activity in Physical Education classes. In addition, providing physical activity during Physical Education is a major indicator of Physical Education quality, because doing physical activity has so many well-documented health benefits (Sallis et al., 2012).

**NBCPET Effectiveness and Student Achievement**

Although the body of literature is growing in the area of NBC and Physical Education, there still remains a lack of data on the relationship between NBCPET

effectiveness and student achievement. Several studies have been conducted in the classroom setting with results indicating NBCTs have improved student outcomes (Bond et al., 2000; Cavalluzzo, 2004; Goldhaber, et al., 2004; Vandervoort et al., 2004). However, similar studies have yet to be conducted in the physical education environment. In addition, Physical Education, along with art and/or music, is not considered "core academic curriculum" and therefore not as academically rigorous or essential as Math or English (Gaudreault & Woods, 2012). These subjects are therefore not associated with high stakes testing or accountability measures and as such the research has been limited in the investigation of how achieving NBC affects student achievement.

**Teacher Effectiveness**

The term 'teacher effectiveness' has been described as teaching that results in intended learning (Berliner, 1987; Brophy, 1979; Rosenshine, 1987). As Rink (2003) stated, "students learn a lot through experience. They learn a lot in schools that is not intended, some of it desirable and some it not, but the primary function of schools is to produce intended learning" (p, 165). Because of the current focus on standards, assessment and accountability in Physical Education, the idea of intended learning is more important than ever. In addition, the Physical Education environment is a multi-objective setting in which the goals for student learning are often complex, long-term, multidimensional, and not easily measured (Rink, 2003). Most of the literature in effective teaching comes from classroom studies that identify what teachers do who produce the most learning (Brophy & Evertson, 1974; Brophy & Good, 1986; Good &

Grouws, 1975; McDonald & Elias, 1976; Stallings & Kaskowitz, 1974). Though these studies were correlational efforts conducted primarily in a process-product design, identifying variables as important to effective classroom teaching, the Physical Education literature includes similar studies (Rink, 2003). More recent research in the classroom, as well as in Physical Education, has been concerned primarily with the identification of context-specific ideas that describe how effective teachers each particular content to particular learners in particular settings (Griffin & Placek, 2001).

**Systematic Observation**

Direct or systematic observation has a long history in the study of human behavior (McKenzie, 2002). Systematic observation instruments are especially popular in the areas of anthropology, social psychology, clinical psychology and cross-cultural psychology (van der Mars, 1989). Although systematic observation is not a new research tool by any means, it was not introduced into the realm of classroom research until the early 1960s (van der Mars, 1989). Shortly thereafter, systematic observation began to emerge as an effective research tool for the study of teaching and coaching behavior. Darst, Mancini, and Zakrajsek (1983) defines systematic observation as observation that allows a trained person following stated guidelines and procedures to observe, record, and analyze interactions with the assurance that others viewing the same sequence of events would agree with the recorded data.

While more traditional methods of observation include eyeballing, anecdotal recording, developing rating scales and checklists, systematic observation has specific

coding rules and procedures (van der Mars, 1989). Although systematic observation has its limitations, the instruments used to perform the acts of observation and recording greatly reduce how an observer's experiences, biases and beliefs might influence one's ability to accurately record what was observed (Johnston & Pennypacker, 1980).

**Evidence-based Indicators of Teacher Effectiveness**

Teacher effectiveness, in terms of student outcomes, can be approached from both a skill learning and health-optimizing perspective. The next two sub-sections will include key research finding for both perspectives.

In 1979 Berliner coined the phrase "academic learning time" in the Beginning Teacher Evaluation Study (BTES). The BTES produces initial evidence on the role and influence of time-based variables and their relationship with student achievement in the classroom (van der Mars, 2006). Teachers, by arranging their instruction in ways that maximize the time that students spend in direct and successful contact with learning tasks, have the potential to directly influence their students' achievement (van der Mars, 2006). Even before this study, the notion that student engaging with appropriate subject matter to be learned was a powerful predictor of achievement (Parker, 1989). Academic Learning Time (ALT) refers to the portion of engaged time when a student is involved with materials that are appropriate to his or her abilities, resulting is high success and low error rates (Parker, 1989). The "Time Spent Learning" metric is determined by the students' opportunity to learn and their willingness to actually engage in the learning activity. Opportunity to learn is influenced by the school's and the teacher's decisions to

allocate certain amounts of time to specific content (van der Mars, 2006). The "Time Needed to Learn" metric is based on the student's aptitude for learning the content, their ability to understand instruction and the quality of the provided instruction (van der Mars, 2006).

The time-learning relationship developed from the theoretical bases of the Model of School Learning (Carroll, 1963), Mastery Learning, (Bloom, 1968), and Harnischfeger and Wiley's "Quality of Schooling" (1985). The common bond between these three theories lies in the desire to understand learning from a student's perspective while at that same time recognizing that individuals master particular areas of content at different rates (van der Mars, 2006). Berliner (1990) used this idea and pointed out the key to explaining student achievement is to determine the amount and quantity of active involvement in their learning (van der Mars, 2006).

Around the same time as the BTES, Anderson and Barrette (1978) produced for the first time, data describing how Physical Education teachers were spending their time while in the classroom. The results of this study indicated that teachers were busy performing several pedagogical functional at the same time, but that much of this was not necessarily "instructional" in nature (Anderson & Barrette, 1978). Instead it appeared that teachers were spending much of their time organizing equipment and students, silently watching students, and/or managing students' general class behavior (van der Mars, 2006).

**Academic Learning Time-Physical Education**

Academic Learning Time in Physical Education (ALT-PE), a modified version of the original Academic Learning Time instrument, applies these principles to the Physical Education setting. ALT-PE is specifically defined as the time students spend appropriately or successfully engaged in a subject matter-related task. The time that students spend successfully engaged is considered a key indicator of teacher effectiveness, because of its relationship with student achievement (van der Mars, 2006). The ALT-PE observation system was originally developed and then refined by Siedentop and his graduate students at the Ohio State University (Parker, 1989). It allows for measurement of various class context variables (e.g., management, transition, and subject matter skill practice, scrimmage, game, fitness), as well as learner involvement measures (e.g., on-task behavior, off-task behavior, waiting, motor engaged), and specifically the portion of time in a Physical Education lesson that students are successfully/appropriately engaged in a motor activity (Parker, 1989).

Several researchers have examined ALT-PE in elementary school settings (Godbout, Brunelle, & Tousignant, 1983; Metzler, 1979; Placek, Silverman, Shute, content (as opposed to managerial, waiting, and transition time), is relatively high. For example, Placek et al. (1982) reported 85% of class time was spent engaging in appropriate physical education content, while Shute, Dodds, Placek, Rife, and Silverman (1982) reported 79% content time. However, it is important to note that although these studies indicated high on-task activity, the teachers were inclined to focus on the class as

a whole, instead of the successful involvement of individual students (Placek & Randall, 1986).

While the descriptive analysis studies provided a graphic record of teaching-learning interactions, Ashy, Lee, and Landin (1988) examined an alternative approach in using ALT-PE in which activities with discrete trials were observed and counted. Their study examined the relationship between the total number of practice trials using correct technique and achievement in a soccer kick-up skill. They found moderately high, significant relationships between appropriate (i.e, correct) practice, technique execution, and student achievement (Ashy, Lee, & Landin, 1988).

Students who spend more time in good practice learn more (De Knop, 1986; Graham, 1983; Metzler, 1983; Phillips & Carlisle, 1983; Stallings, 1980; Young & Metzler, 1982). Specifically, for students to learn motor skills they need to be engaged at a high level and be successful at an appropriate task for a sufficient amount of time (Cousineau & Luke, 1990; Goldberger & Gerney, 1990). The appropriateness of a student's motor engagement can be based on their form (technical execution), the outcome or product of task, or a combination of the two (van der Mars, 2006). When the ALT-PE instrument was originally designed, the coding rule relative to the appropriateness of a student's motor engagement was that the task needed to be "easy" enough so the student could be successful 80% of the time. However, Rink (2003) has argued that although this criterion may be appropriate for math content, is unreasonable in the psychomotor domain, particularly when using an outcome based

criterion for judging success (van der Mars, 2006). Even experts (i.e., collegiate, professional and Olympic or elite athletes) usually do not meet the 80% success rate.

Student practice time is positively related to student achievement, but only at an appropriate level of success (Silverman, 1985). What's more, transfer of practice to game conditions depends on the extent to which the practice resembles the game (Magill, 2001). For example, if the teacher is interested in teaching students how to protect a basketball from a defender during a 3v3 basketball game, but never goes beyond having students dribble around cones up and down the court, they will not likely see much progress in being able to protect the basketball from a live defender during a game. This construct has evolved to the idea that if teachers want students to learn a motor or tactical skill, they have to be engaged at a high level and be successful at an appropriate task for a sufficient amount of time (Rink 2003). In addition, the research on time-/opportunity-based variables and student learning in classrooms is conclusive that the quality of instruction does make a significant difference (van der Mars, 2006). In other words, the way in which teachers plan and deliver their instruction, monitor students' work, provides feedback and provides opportunities to respond successfully, directly influences both the quantity and quality of the engagement (van der Mars, 2006).

**Moderate to Vigorous Physical Activity (MVPA)**

It is well documented that daily engagement in moderate to vigorous physical activity (MVPA) has several health benefits (CDC, 2011), including weight control,

lower blood pressure, reduced risk of heart disease, Type II diabetes, and stroke, as well as improved quality of life. Physical inactivity is a serious health problem that is associated with several preventable diseases (McKenzie & Kahan, 2008). There are over 54 million children enrolled in public schools in the United States, and the proportion of children who are overweight has more than tripled in the last 30 years (McKenzie & Kahan, 2008). Being overweight during childhood not only can result in physical health problems, but also psychological health issues. In addition, individuals who are overweight during childhood are more likely to be overweight as adults (McKenzie & Kahan, 2008). Therefore, there is a legitimate health rationale in advocating for daily physical education in our schools in order to provide daily physical activity for our children (Payne & Morrow, 2009).

The Institute of Medicine (2013) recently published a report on physical activity and Physical Education in schools (Kohl III & Cook, 2013). This report contains an objective similar to the objective published by U.S. Department of Health and Human Services (USDHHS, 2000), recommending that school districts provide high quality curricular Physical Education during which students spent at least 50% of the time engaged in MVPA. Though the Healthy People 2010 objective was originally intended for high school students, the goal seemed to be broadly used and K-8 programs believed the objective applied to them as well (USDHHS, 2000). This objective was added to Healthy People 2010 after studies reporting that engagement in moderate and vigorous physical activity has substantial health benefits (McKenzie, Sallis & Nader, 1991).

Physical activity is defined as the process of engaging in bodily movement that results in energy expenditure, and it is essential for good health (McKenzie & Kahan, 2008). Physical fitness on the other hand is a set of attributes that people have or achieve relating to their ability to perform physical activity (Darst et al., 2012). Physical activity is a process-oriented outcome related to behavior and lifestyle. In contrast, physical fitness is an outcome that has both performance-related and health-related components (McKenzie & Kahan, 2008).

MVPA served as the second evidence-based indicator of teacher effectiveness for this study. The researcher used the System for Observing Fitness Instruction Time (SOFIT; McKenzie, Sallis, & Nader, 1991) instrument for objectively measuring the amount of MVPA students engage in during Physical Education classes. SOFIT is a three-level coding system that focuses on student activity levels, as well as teacher behaviors and lesson context, providing a full picture of what is happening during a lesson. It is designed to assess variables associated with students' activity levels and opportunities to become physically fit during Physical Education class (McKenzie et al., 1991). While the ALT-PE instrument focuses on measuring how "skilled" a student might be, the SOFIT instrument focuses on measuring how physically active a student might be.

These variables (physical activity levels, teacher behaviors and lesson context) are believed to promote health-related physical activity (McKenzie et al., 1991). The current study targets student physical activity levels categories that include: (1) lying down, (2)

sitting, (3) standing, (4) walking, and (5) very active or vigorous. The current study used the SOFIT instrument to investigate the physical activity levels of students only and therefore the lesson context was not coded. The SOFIT instrument has been validated for use with students that range from pre-kindergarten through high school (McKenzie, Sallis, Kolody, & Faucette, 1997; Rowe, Shuldheisz, & van der Mars, 1997; Rowe, van der Mars, Schuldheisz, & Fox, 2004).

Data collected using the SOFIT instrument are typically expressed as a percentage of time devoted to MVPA during physical education class (Chow, McKenzie, & Louie, 2009). The SOFIT instrument provides estimate of the time spent in an activity based on a behavioral observation every 20 seconds throughout the physical education class.

Two major outcomes of a quality physical education class are physical activity and health (Darst et al., 2012). Health promotion professionals recognize the important role physical education plays in providing physical activity, as many children in our nation, due to a variety of reasons, do not have access to opportunities for physical activity outside of school (McKenzie et al., 1995). The SOFIT instrument is an effective method for educators and researchers to assess whether or not their students are engaged in the recommended amount of MVPA during Physical Education class. In turn, in view of the current obesity crisis and the desire to teach health-related fitness, the percentage of time engaged in MVPA may be viewed as a measure of teacher effectiveness.

**Cognitive Processes During Teaching**

Snow (1972) described teacher thinking during interactive teaching with students

as a cyclical process of observation of student behavior, followed by a judgment of whether student behavior is within desirable limits, followed by a decision to either continue the teaching process as planned or to search for an alternative teaching strategy that might bring student behavior back within the limits of tolerance (Peterson & Clark, 1978). Clark and Peterson (1976) used this information-processing model of teaching to address questions about teachers' reports of their cognitive processes during teaching. In order to elicit the information about what teachers were thinking during the teaching process, the stimulated recall procedure was implemented.

This procedure consists of showing teachers videotaped segments of the day's teaching in order to "stimulate recall" of what he or she was thinking about while teaching. After viewing a videotaped segment, the teacher responds to a structured interview. The questions in the interview correspond to the boxes in the model of interactive decision-making, developed by Snow (1972) (See Appendix A). The structured interview involved a sequence of five questions:

1) What were you doing in this segment and why?
2) What were you noticing about the students? How were the students responding?
3) Were you thinking of any alternative actions or strategies at that time?
4) Did any student cause you to act differently that you had planned?
5) What was your main objective for today's lesson?

The first question, "what were you doing and why" is asked to help teachers recall what they were doing and thinking about as they taught the part of the lesson they had just

viewed on videotape. The question about alternative actions or strategies was asked to help teachers recall any internal changes that might have been going on while they were teaching. In the Clark and Peterson (1976) study, teachers seemed to only consider alternatives if things in the classroom were going poorly. For example, if students seemed unenthusiastic or uninterested in the material. In other words, teachers were not overly concerned with optimizing instruction; rather they were more interested in peeking the students' interests (Clark & Peterson, 1976).

In the model described above, the teacher begins with a teaching or lesson plan. The plan is composed during the pre-active phase of teaching- before the teacher is in contact with the students. The teacher begins the class, or interactive phase of teaching with some type of introductory activity that is part of the teaching plan. This initial move by the teacher produces some changes in both the teacher and the students. Some of these changes are observable and some are not. These observable changes are called "cues". The teacher observes these cues and makes judgments about whether these cues fall within the range of acceptable values for the teaching or lesson plan. If the cues do fall within the acceptable range, the teacher decides to continue teaching as planned. However, if some of the cues fall outside of the acceptable limits, the teacher may decide to either continue with the plan, hoping things will improve, or to modify the plan in such a way that restores cues to acceptable limits (Clark & Peterson, 1976).

According to Peterson and Clark (1976) the teachers' responses to the interview questions in the stimulated recall may be interpreted as merely self-reflection. On the

other hand, the teachers' reports of their interactive thinking may be taken at face value as truthful and in that case the data permit discussion of the relationship between teacher cognitive processes during teaching, teacher aptitudes, teacher planning and student achievement.

As mentioned earlier, in order to achieve NBC teachers must be able to demonstrate strong evidence of analytical skills and ongoing reflection in their teaching practice (NBPTS, 2014e). This stems from the Five Core Propositions, which represent what all accomplished teachers share in their expertise and dedication to advance student achievement. Core Proposition number four specifically states that teachers think systematically about their practice and learn from experience; they critically examine their practice on a regular basis to deepen knowledge, expand their repertoire of skills, and incorporate new findings into their practice (NBPTS, 2014).

The technique of stimulated recall has been put to use in all areas of research from investigating native speaker perceptions in native-nonnative speaker interaction (Polio, Gass, & Chapin, 2006), to counseling cases in psychology (Kagan, Krathwohl, & Miller, 1963), to studying the responses of primary school children after a visit to the science center (DeWitt & Osborne, 2010). However, the use of stimulated recall to investigate the decision making of teachers during interactive teaching began in the late 1970's when Clark and Peterson (1976) studied the decision making processes of 12 experienced teachers in a laboratory setting. Each participating teacher was given the task of teaching a social studies lesson to a group of eight junior high school students in three 50-minute

teaching sessions. When asked the question "what were you doing in this segment and why", teachers responded in general terms with a description of what they were doing but seemed less able to articulate why (Clark & Peterson, 1976). The question "were you thinking of any alternative actions or strategies at that time", was asked 43 times to the 12 teachers in this study, and only eight teachers gave an affirmative answer. According to Clark and Peterson (1976), these data indicate that it is relatively rare for teachers to be thinking about alternative actions or strategies while teaching.

When teachers were asked about what particular objectives they had in mind, three themes emerged from the data: (a) organizational, (b) affective, and (c) cognitive. Organizational objectives have to do with establishing rules, setting ground rules for behavior, informing students of the teacher's intended plan, and carrying out the plan. Affective objectives included wanting to create a group feeling such as rapport, relaxation, familiarity or unity, along with making students feel good about themselves (Clark & Peterson, 1976). The cognitive objectives, which were mentioned more frequently than organizational or affective objectives, included recall, analysis, comparison, synthesis and evaluation, with recall and analysis being mentioned most often (Clark & Peterson, 1976).

When asked "what were you noticing about the students", or "what cues were you noticing about the students", the most common themes that were mentioned were in relation to students in a global category. Teachers in this study very rarely talked about the behavior of individual students. The themes that were mentioned included tense,

relaxed, quiet, shy, cooperative, interested, attentive, and positive (Clark & Peterson, 1976).

For last question "did student behavior cause you to act differently than you had planned", 22 of the 31 responses were negative. That is, teachers did not tend to change their plans or behavior in response to student reactions. In four cases where teachers did change their plans in response to student reactions, it was either to continue with an activity that the students were enjoying or to shift to a new activity because the planned activity was not going well (Clark & Peterson, 1976). In the other five cases in which teachers did report changing their plans due to student reactions, the teachers were unable to explain what the specific influence of that change was.

In the area of Physical Education, Housner and Griffey (1985) investigated the decision-making processes employed by four experienced and four inexperienced Physical Education teachers as they planned for and taught two lessons to four elementary school children. Following each lesson, the decision-making strategies during interactive teaching were assessed using stimulated recall. During their teaching, experienced teachers focused most of their attention on individual student performance, while inexperienced teachers focused most of their attention on the interest level of the entire class. In addition, experienced teachers possessed more advanced strategies for managing students and facilitating psychomotor performance that enabled them to attend to individual student performance and modify their lessons if needed for individual student needs. Inexperienced teachers on the other hand, possessed fewer strategies for

effective management and tended to focus their attention on the interest level of the entire class to ensure that the students were busy, happy and good (Housner & Griffey, 1985).

**Experimental Teaching Units**

In the 1960s and 1970s, the process-product research paradigm was regarded as one of the strongest designs for studying teacher effectiveness (Dunkin & Biddle, 1974). However, these designs can be expensive and time consuming. One alternative to the long-term, expensive process-product design is the experimental teaching unit (Arehart, 1979; Berliner & Tikunoff, 1976; Gage, 1978). An experimental teaching unit (ETU) is typically a series of 1 to 10 lessons on a topic that is taught to a particular grade level. All of the teachers involved in the ETU study teach the same lesson content and are provided with pretests, posttests and possibly instructional materials (Paese, 1986).

ETUs have been used in Physical Education teacher effectiveness research since the mid 1970s (Paese, 1986). In order to investigate the effect of what teachers do on student learning, researchers in Physical Education have used a modified version of the ETU paradigm (Paese, 1986). The ETU provides a small-scale process-product setting enabling one to make reasonable assumptions about important variables related to teacher effectiveness (Pieron & Graham, 1984).

To reduce prior learning effects, the instructional task chosen for an ETU is typically a novel task for the target participant group (Metzler, 1983). According to various authors, different tasks have been selected from gymnastics (Pieron, 1983), tennis (De Knop, 1983), volleyball skills (Phillips & Carlisle, 1983) and golf (Metzler, 1983).

Findings of the ETU studies, in terms of teacher effectiveness, will be discussed: (a) improvement of student performance, (b) influence of student skill entry level, (c) role of student engagement time and (d) success and teacher feedback (Pieron & Graham, 1984). De Knop (1983) and Metzler (1983) used control groups who practiced the criterion without teacher instruction, and the studies reported conflicting outcomes. In De Knop's study the learning gains of the control group were less than those of the students learning under the direction of the teacher. However, in Metzler's study, the learning gains of the two groups were almost identical (Pieron & Graham, 1984).

Entry skill level was also observed as an important factor in determining final performance level. Yerg (1977, as cited in Yerg, 1983) and Yerg (1981) found that the student entry level of performance could explain 75% of the total variance of the final level of achievement in a task. However, Pieron and Piron (1981) observed a lower variance of 46%, and Yerg and Twardy (1982) found that entry-level performance explained 31% of the variance in student performance (as cited in Pieron & Graham, 1984).

Time allocated for practice as compared with time students actually spent practicing was found to be related to teacher effectiveness only in De Knop's tennis study (1983). Metzler (1983) and Phillips and Carlisle (1983) used the same variable without finding any significant differences on the amount of time allocated by more effective and less effective Physical Education teachers (Pieron & Graham, 1984). In a later related study, Paese reported that effective Physical Education teachers in their ETU lessons had

higher rates of appropriate practice and teacher skill feedback to students (Paese, 1986).

**Summary**

With the recent focus on educational reform and the nation's obesity crisis, there has been an increase on the importance of student learning and teacher accountability in Physical Education. However, measuring student learning and thus teacher effectiveness has been a challenge for those in the field of Physical Education. The two evidence-based indicators of teacher effectiveness implemented in this study attempted to shed some light on whether National Board Certified Physical Education teachers and non-National Board Certified Physical Education teachers are providing the opportunities for appropriate skill practice as well as MVPA (which both have been linked to teacher effectiveness) during class time in order to be deemed "effective teachers".

In addition, the National Board Certification is the highest certification a teacher can achieve and one would assume after going through the process of Board certification, one should be deemed an effective or accomplished teacher. However, several questions still remain unanswered. Are these National Board Certified Physical Education teachers providing opportunities for MVPA and appropriate skill practice more often than a non-board certified teacher? Does the board certification process make one a better teacher? When given an experimental teaching unit, will the students of National Board Certified teachers learn the objectives better than the students of the non-board certified teacher? Does the NBCT reflect and analyze her lesson more critically than the non-board certified teacher teaching the same content?

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## Chapter 3 – Manuscript #1

## Does National Board Certification Reflect Greater Teacher Effectiveness in Physical Education?

Several different synonyms for the term 'effective teacher' have been noted in the research literature. These terms include high quality, accomplished, highly qualified, exemplary and expert. The hallmarks of effective teaching have historically been topics of research and discussion within the academic community. The results of Hanushek's (1992) work indicates the estimated difference between having high quality teacher in comparison to a low quality teacher can be more than one grade-level equivalent in test performance (Hanushek, 1992).

The National Board for Professional Teaching Standards (NBPTS) however defines an "accomplished teacher" as one who has demonstrated the high level of knowledge, skills, abilities and commitments that are reflected in the Board's five core propositions, as well as shown their ability to enhance student learning. (Vandevoort, Amrein-Beardsley & Berliner, 2004). It can be inferred from previous research that teachers are powerful contributors to students' academic achievement. However, the characteristics that make for high-quality and effective teaching have yet to be satisfactorily determined (Vandevoort, Amrein-Beardsley, & Berliner, 2004). Required state tests, together with locally determined assessments are the usual source of data on student performance for classroom teachers. While it is necessary to ensure that our

teachers are effective, many educational leaders oppose the idea of connecting student test scores to teacher evaluations (Darling-Hammond, Amrein-Beardsley, Haertel, & Rothsetin, 2012).

Researchers have attempted to link teaching practices to student outcomes since the 1970s (Good, 2014). However, the research has failed to consider other outcomes of schooling other than achievement, such as creativity, adaptability, problem finding and problem solving (Good, 2014).

Berliner (2014) discusses the issue of value-added assessments of teachers as a method of identifying the most effective and the most ineffective in a school system (Berliner, 2014). However, these assessments do not take into account the effects of countless exogenous variables on student achievement (e.g., peer classroom effects, school compositional effects, class size, neighborhood characteristics in which some students live) (Berliner, 2014).

**NBC Outcomes**

Approximately 200 studies have focused on the various aspects of NBC (NBPTS, 2014a), with many studies comparing student' achievement test scores of NBCTs with non-NBCTs. Several of these studies reveal students of NBC teachers did better on student achievement scores than students of non-NBC teachers (e.g. Cantrell, Fullerton, Kane, & Staiger, 2008;Cavalluzzo, 2004; Goldhaber & Anthony, 2007). Conversely, McCloskey, Stronge, Ward, Howard, Lewis and Hindman (2005) along with Sanders, Ashton and Wright (2005) found that students of NBCTs did not have significantly better

rates of academic progress than students of other teachers.

**NBC and Physical Education**

Although there is a strong tradition of assessing teachers in Physical Education, standardized measures of student achievement is a relatively new concept (Mercier & Doolittle, 2013). The last decade has seen several national organizations, including the National Association for Sport and Physical Education (NASPE), the National Council for Accreditation of Teacher Education (NCATE), and the National Board for Professional Teaching Standards (NBPTS) call for regular assessment of student learning to guide instruction and to align programs with mandated standards (Mercier & Doolittle, 2013). The increased emphasis on both school and teacher accountability, as highlighted in Race to the Top (U.S. Department of Education, 2009), has forced administrators to use student assessment data in order to provide convincing evidence that teachers are producing the outcomes that our stakeholders demand.

The founders of the NBPTS envisioned that articulating the standards of accomplished teaching and recognizing teachers who meet these standards would result in large-scale improvements in the practice of teaching (Carnegie Task Force on Teaching as a Profession, 1986; NBPTS, 1991). The founders suggest in these documents that improvements would be realized by making the standards available to teacher preparation programs and by having a growing cadre of board-certified teachers in schools throughout the country who would implement better practices and share their skills with other teachers. While the founding documents do not specifically state that

individual teachers' practice will improve as a direct result of the certification process itself, more recent NBPTS publications make this claim " the certification process helps teachers improve their teaching" (NBPTS, 2001, p.1). However, several research studies have shown little difference in NBCT status and student achievement (e.g., Clotfelter, Ladd & Vigdor, 2006; Harris & Sass, 2006; McCloskey et al., 2005; Sanders, Ashton, & Wright, 2005). Therefore, completion of the certification process may increase the teacher's effectiveness, but completion of the certification process may also indicate preexisting teaching effectiveness. In other words, is the process of certification producing more effective teachers or are the more effective teachers more likely to seek out certification?

Thus, more research is warranted in the area of National Board Certification and student achievement, particularly in the field of Physical Education. With the abundance of research having examined the impact of NBC on teaching practices only five studies have investigated NBC and Physical Education. In addition, the candidate portfolio is evaluated holistically, rather than utilizing process measures of teaching effectiveness in the field of Physical Education. Not only did this study evaluate teaching effectiveness using process measures of teaching effectiveness, this study was guided by the mediating process-product paradigm (Berliner, 1979). Process variables typically refer to the actual activities of classroom teaching (e.g., observable behavior of teachers and students), while the product variables refer to changes that come about in students as a result of

their participation in classroom activities with teachers and other students (Dunkin & Biddle, 1974).

Examples of process variables in Physical Education are the time students spend doing tasks as well as characteristics of teaching behaviors (e.g., efforts to differentiate instruction, task presentation and assessment). Product variable examples include psychomotor, affective and cognitive outcomes which can be either long or short term (Rink, 1993).

This study sought to determine (a) whether students in classes taught by NBCPETs as compared to non-NBCPETs accumulated higher levels of Academic Learning Time-Physical Education (ALT-PE) and (b) higher levels of moderate to vigorous physical activity (MVPA), and (c) whether there were differences in post-test achievement scores between the same student groups.

The following section of the paper addresses the topics of: (a) student learning outcomes during Physical Education in regards to teacher NBC status; (b) student learning outcomes measured using ALT-PE and SOFIT instruments; (c) physical activity in Physical Education and (d) ETUs and student learning outcomes.

**Student Learning Outcomes**

Although the Race to the Top does not specifically address Physical Education, it would be irresponsible to assume it and other measures will not affect those teaching Physical Education (Mercier & Doolittle, 2013). Physical Education is regarded as a low-status subject in most schools in most developed countries (Sheehy, 2011). With the

exception of South Carolina, Physical Education is not part of the high-stakes testing movement. Therefore, there are continual reductions in the requirements for Physical Education credits and weekly minutes (Sheehy, 2011).

Marginalization of Physical Education is a complicated issue that continues to outshine the unique contribution that a quality Physical Education program can make to the lives of students (Sheehy, 2011). Studies have identified two basic problems that have beset high school Physical Education for years: (1) many Physical Education teachers have failed to provide in-class experiences that students perceive as meaningful, and (2) many Physical Education teachers have failed to convey to students that mastering a skill is important (Doolittle, 2007; Kretchmar, 2006). A third problem is that the majority of Physical Education teachers fail to communicate to parents, students, other teachers, and administrators what is distinct about quality Physical Education and continue to grade students on attitude, participation, and effort (Doolittle, 2007).

**NBC and Physical Education Student Outcomes**

To date, only a few researchers have investigated the impact on NBC on physical educators (Phillips, 2008; Rhoades & Woods, 2012; Woods & Rhoades, 2010; Woods & Rhoades, 2012; Woods & Rhoades, 2013). And in only one study has there been an attempt at linking NBC status with proxy-indicators of student learning (Rhoades & Woods, 2012). The limited research base in Physical Education does not allow for comparison of findings similar to studies in general education. It has been reported that, linking NBC to increased student learning is a relatively major undertaking (Woods &

Rhoades, 2010).

The first major study investigating the link between NBC and student achievement compared National Board Certified Physical Education Teachers (NBCPETs) and non-NBCPETs on student competency in high school Physical Education (Phillips, 2008). The authors found that students of NBCPETs had higher levels of student competency of all four-performance indicators (motor skill competency, cognitive fitness knowledge, outside activity, and fitness testing) and on the overall measure when compared with students of the non-NBCPETs (Phillips, 2008).

The current leaders of research on National Board Certification in the area of Physical Education are Woods and Rhoades who investigated teacher background characteristics, task presentations and perceived changes related to the certification process (Rhoades & Woods, 2012; Woods & Rhoades, 2010; Woods & Rhoades, 2012), as well as student learning outcomes (Rhoades & Woods, 2012). Most National Board Certified Physical Education Teachers (NBCPETs) are female, Caucasian, and hold a master's degree. It was also discovered that Physical Education teachers who have achieved NBC explained that the certification process had caused them to be a more reflective teacher as well as more focused on student learning and assessment (Woods & Rhoades, 2012). Lastly, students of observed NBCPETs on average, experienced 38% motor appropriate practice time, 4.4% inappropriate practice time and 3.8% off-task time (Rhoades & Woods, 2012). The most recent study by Woods and Rhoades (2013) described the teaching efficacy beliefs of NBCPETs. The participating NBCPETs

revealed strong Personal Teaching Efficacy (PTE), and their PTE scores were higher than their General Teaching Efficacy scores. Most NBCPETs expressed confidence in their abilities to influence student learning In addition, while comparing their own teaching effectiveness with non-NBCPETs, most participants articulated a tendency to reflect on practice, a deeper understanding of commitment to teaching effectiveness, and greater motivation to excel (Woods & Rhoades, 2013).

**Student Outcomes Measured using ALT-PE and SOFIT**

Teacher effectiveness in Physical Education has been studied using the mediating process-paradigm (e.g., Berliner, 1979; Metzler, 1983). As a consequence, there are now evidence-based indicators of teacher effectiveness. Academic Learning Time-Physical Education (ALT-PE) (as well as its corollary measure of Opportunity-To-Respond (OTR) are now accepted as "proxy" measures of student learning (van der Mars, 2006).

**Academic Learning Time: ALT and ALT-PE.** ALT refers to the portion of engaged time when a student is involved with materials that are appropriate to his or her abilities, resulting in high success and low error rates (Berliner, 1990). The key is to distinguish ALT from mere engagement time and/or time-on-task. Academic Learning Time in Physical Education (ALT-PE) is the corollary variable specific to Physical Education. ALT-PE is specifically defined as being the percentage of class time during which students are appropriately/ successfully engaged in Physical Education content activities (Godbout, Brunelle, & Tousignant, 1983). The time that students spend engaged successfully is considered a key indicator of teacher effectiveness, because of its

relationship with student achievement (van der Mars, 2006).

Siedentop, Birdwell, and Metzler (as cited in Parker, 1989) proposed that the ALT-PE is an intervening process variable playing the role of a mediating link between teacher behavior and student achievement, with the underlying assumption that improvement in this variable is related to improved performance (Godbout et al., 1983). The ALT-PE observation instrument not only has the potential to measure the type of motor activity (e.g., skill practice, scrimmage, game, fitness), but also the lesson context (general or subject matter) of the entire class (Parker, 1989).

The first attempts by researchers to determine a relationship between ALT-PE and student achievement were unsuccessful (Silverman, 1983; Yerg, 1983). However, in subsequent research, researchers considered both the context in which instruction occurred and the nature of the task, and showed how ALT-PE was related to achievement (e.g., Silverman, Tyson, & Morford, 1988). As researchers continued to investigate the role of ALT-PE, it became clear that merely being engaged in motor activities is not related to achievement. Rather, it is the quality (i.e., appropriateness/success) that is relative to student learning (e.g., Ashy, Lee, & Landin, 1988; Silverman, 1990).

**Moderate to Vigorous Physical Activity (MVPA).** More recently, the focus has been on the extent to which physical educators provide their students with opportunities for health-enhancing physical activity, given its immediate and long-term benefits. It too is now regarded as an important process measure of quality/effectiveness (Sallis, McKenzie, Beets, Beighle, Erwin, & Lee, 2012). Sallis and McKenzie (1991) discussed

the two main goals of health-related Physical Education as: (a) to prepare youth for a lifetime of physical activity, and (b) to provide youth with physical activity during Physical Education classes. The first goal, although widely accepted within our profession, is difficult to evaluate and has limited evidence to support its validity (Sallis & McKenzie, 1991). However, the latter goal represents an immediate, measurable outcome from participating in Physical Education. In addition, high levels MVPA may provide immediate health benefits (Sallis et al., 2012).

With overweight and obesity being identified as the biggest threat to U.S. children (Koplan, Liverman, & Kraak, 2005) in recent history, the U.S. government has published official guidelines for youth physical activity participation and documented the health benefits of physical activity during youth (USDHHS, 2008). This, in turn, caused a transformation in both the nature and quality of evidence about physical activity in Physical Education. A U.S. national health objective for 50% of MVPA in Physical Education classes has been part of the Healthy People documents since at least 1991 (U.S. Public Health Service, 1991) and was reaffirmed for Healthy People 2010 (USDHHS, 2000). More recently, the Institute of Medicine report (2013) recommended strengthening and improving programs and policies for physical activity and Physical Education in the school environment. Part of the first recommendation asks school districts to provide high-quality curriculum-based Physical Education during which the students spend at least 50% of the class time engaged in MVPA (Kohl III & Cook, 2013). McKenzie, Sallis and Nader (1991) designed a systematic observation system to assess

student physical activity levels and opportunities to become physically fit in Physical Education classes. The System for Observing Fitness Instruction Time or SOFIT, simultaneously records physical activity levels, curriculum context variables and teacher behavior (McKenzie et al., 1991).

**Physical Activity Levels in Physical Education**

Since 1991, numerous descriptive and intervention studies have been conducted to assess physical activity (PA) levels during Physical Education (e.g., McKenzie, Marshall, Sallis, & Conway, 2000; McKenzie, Sallis, Prochaska, Conway, Marshall, & Rosengard, 2004; Sallis, McKenzie, Alcaraz, Kolody Faucette, & Hovell, 1997; Simons-Morton, Taylor, Snider, & Huang, 1993) in which the researchers attempted to modify the process or situation. And then studies were comparison/compensation (e.g., Dale, Corbin, & Dale, 2000; Morgan, Beighle, & Pangrazi, 2007;) studies in which student outcomes from participation in Physical Education were documented (e.g., Pate, O'Neill, & McIver, 2011).

Simons-Morton et al. (1993) reported that on average students spent 8.5% of class time engaged in MVPA, 23.3% in minimal activity and 68.1% in sedentary activity. McKenzie et al. (2000) observed student activity, lesson context and teacher behavior during 430 middle school Physical Education classes, taught by 126 different teaches across 24 schools. The researchers observed student activity varied by lesson context, with fitness activities producing the most activity. Class size was negatively associated with student activity, and boys were more active than girls over all. In addition, Physical

Education contributed approximately 83 minutes of MVPA per week (McKenzie et al., 2000).

Students who were taught by a Physical Education specialist or a classroom teacher trained in leading physical activity spent more minutes per week being physically active than those taught by an a teacher untrained in leading physical activity (Sallis et al., 1997). McKenzie et al. (2004) found that on-going staff development and on-site follow up visits produced significant increases in MVPA levels during Physical Education. By year two, intervention schools increased MVPA by 18% (McKenzie et al., 2004).

Overall, Physical Education classes do not provide enough activity for students to reach the goal of 50% of class time spent in MVPA, as recommended by Healthy People, 2010 (Pate et al., 2011) and the more recent Institute of Medicine report (Kohl III & Cook, 2013). Students can achieve higher levels of MVPA during Physical Education classes, however these increases may still fall below the recommended levels (Pate et al., 2011). It can be inferred from the comparison/compensation study results that Physical Education has a positive contribution to daily PA levels in students. In addition, students may not compensate for low activity during school by being active during out-of-school hours or on days when Physical Education is not offered (Pate et al., 2011).

**Experimental Teaching Units (ETU)**

An experimental teaching unit (ETU) is an alternative to traditional process-

product research designs (Metzler, 1983). ETUs typically consist of a series of one to ten lessons on a topic that is taught to a particular grade level with a very specific objective (e.g., improve performance in shooting, throwing or passing). All of the teachers involved in the ETU study teach to the same objective, but are free to plan and implement the lessons. Students are pre-and post-tested using a test reflective of achievement to determine student-learning gains (Paese, 1986).

Experimental teaching units have been used in Physical Education teacher effectiveness research since the mid 1970s (Paese, 1986), with the most current research being done in 1996 (Solmon & Lee, 1996). Paese (1986) reported that effective Physical Education teachers in their ETU lessons had higher rates of appropriate practice and teacher skill feedback to students.

Using ETUs, Yerg (1977, as cited in Yerg 1983) and Yerg (1982) investigated the effect of teaching behaviors, criterion process variables and teacher presage variables (age, gender, skill level) on student achievement on a gymnastic tumbling skill (cartwheel). Within the context of the ETU the learners significantly improved their performance of the cartwheel task (Yerg, 1982). However, there is evidence that students of effective Physical Education teachers have higher rates of practice and spend less time waiting. (Graham, Soares and Harrington (1983) used experienced teachers in an ETU to teach a novel golf task, which consists of hitting a tennis ball with a hockey stick into a target area on the ground thirty yards away in as few strokes as possible (Paese, 1986). The authors noted students taught by less experienced teachers spent less time engaged in

activity and more time waiting (Graham et al., 1983).

**ETUs and Student Learning Outcomes**

Metzler (1983) performed a re-analysis of data collected from a master's thesis (Keller, 1982) in which the researcher modified a hockey/golf skill ETU, making it more sensitive to real differences in student achievement scores within the ETU (Metzler, 1983). Only one group (30 minutes of allocated time) had a statistically significant improvement, or decrease in the number of strokes (-1.67) with a group of students using an ETU with 30 minutes of class time. The group with the most allocated time (40 minutes) did not demonstrate a significant improvement, despite a drop of -1.54 strokes. This finding, according to the author, suggests that improved performance in the ETU was not a direct function of increase allocated time for students (Metzler, 1983), but rather a combination of time and successful practice. Supporting the importance of time and appropriate practice, Ashy, Lee and Landin (1988) examined the relationship between the total number of practice trials and practice trials using correct technique, and achievement in a soccer kick-up skill. The results showed a significant relationship between the number of correct practice trials and achievement, but just the total number of practice trials was not significantly related to student achievement.

Solmon and Lee (1996) investigated the relationships between entry characteristics, in-class behavior, self-report cognition, and achievement during motor skill instruction. Teachers were instructed to teach a four-day instructional unit on the four-arm pass in volleyball (Solmon & Lee, 1996). The results of this study showed entry

characteristics are important factors in how students interact in achievement settings.

What remains unknown is whether physical educators who are National Board Certified (NBCPETs) differ in their effectiveness from those who are not Board Certified. Therefore, the purposes of this study were to determine: (a) whether students in classes taught by NBCPETs accumulated higher levels of ALT-PE and MVPA compared to students taught by non-NBCPETs, and (b) whether there were differences in post-test achievement scores between the same student groups.

## Methods

### Participants

The participants for this study were two National Board Certified Physical Education Teachers (NBCPETs), and two non-board certified Physical Education teachers (non-NBCPETs) who reside in the state of Arizona, along with their students. Two teachers (one board certified and one non-board certified) taught in a middle school setting, while two teachers (one board certified and one non-board certified) taught in an elementary school setting. Once the NBCPETs had agreed to be a part of this project, all non-board certified Physical Education teachers in the same two districts were contacted through information on the district websites in order to recruit two comparison teachers. The comparison teachers were matched at closely as possible on the following variables: (a) gender, (b) age, (c) ethnicity, (d) teaching level, (e) teaching experience, and (f) district.

All four of the teacher participants were female, Caucasian and certified Physical

Education teachers. Each teacher was assigned a pseudonym in an effort to maintain anonymity. Katie, Sallie, Jessica and Beth were employed at two different districts in central Arizona. For the purpose of this study, these districts were referred to as Johnson Elementary District and Harrison High School District. These names are pseudonyms and have no relationship to the actual identity of the individual school districts. Human Subjects approval was obtained from the University and teachers provided informed consent (see Appendix B). Parents provided informed consent (see Appendices C and D) and students provided informed assent (see Appendix E).

Table 1.

*Demographic Information of Participating Teachers*

| Teacher | School level | NBC Status | Years of teaching | Student Body | % FRL | % Caucasian | % Hispanic | % Black | % Other |
|---|---|---|---|---|---|---|---|---|---|
| Katie | M.S. | NBCT | 9 | 1,280 | 29 | 70 | 20 | 5 | 5 |
| Sallie | M.S. | n-NBCT | 12 | 900 | 29 | 67 | 20 | 7 | 9 |
| Beth | E.S. | NBCT | 24 | 514 | 26 | 64.3 | 16.3 | 8 | 11.4 |
| Jessica | E.S. | n-NBCT | 24 | 475 | 14 | 72 | 14 | 6 | 8 |

*Note:* FRL = Free and Reduced Lunch. 'Other' = Students who listed themselves as Asian, Native American or other, and were combined due to space limitations.

## Target Behaviors (i.e., Dependent Variables)

### Dependent Variables

***Pretest-Posttest Gain scores.*** Gain scores were obtained by analyzing the results of student pre- and post-test scores. At the elementary level, the gain scores were obtained by analyzing the results of the technical execution in shooting, while at the secondary level students were tested on their ability to provide offensive support during a modified soccer game.

***ALT-PE.*** ALT-PE was defined as the amount of observed time students spent in motor activities at appropriate success rates (Siedentop et al., 1982).

***MVPA.*** MVPA was defined as the amount of observed time students spent engaged in physical activities that require the energy for at least a brisk walk (McKenzie et al., 1991).

### Independent Variable

The independent variable in this study was the Board Certification status of the participating teachers (i.e., National Board Certified v. non-National Board Certified).

### Procedures

Participating teachers were given an Experimental Teaching Unit (ETU), in order to standardize the content taught in the lessons at each school level. In addition, in order to reduce prior learning effects, the activity chosen was a relatively new activity (as stated by the teacher) to the students. An ETU is a standardized, short unit of instructional content, complete with specific learning objectives, pre- and post-tests and a

pre-determined instructional time span (Metzler, 1983). Teachers were provided with explicit instructional objectives (i.e., correct technical execution when shooting on goal and providing support during a 4v4 game of modified soccer). However, the teachers were free to choose their own teaching strategies (see Appendix F and Appendix G)

The teachers were videotaped over three lessons teaching the same student groups. All lessons included a 10-15 minute segment that was focused on warm-up fitness-related content that preceded the activities specific to the ETU. Only the segment of each lesson related to the ETU was videotaped. Therefore, each videotaped lesson that was later analyzed lasted an average of 18 minutes.

**Data Collection**

**Pre- and Post-test Protocols.** An investigator-designed instrument was designed to evaluate both the skill and tactical objective for the pre- and post-test. To assess student achievement, all students in the observed classes were pre- and post-tested on the targeted Soccer outcome measures (i.e., shooting technique and Support). For the elementary pre- and post-test, students were instructed to approach a stationary ball and kick into the goal with as much power as they could produce. During the pre-test, students had no previous instruction from the teacher, but during the post-test, students were told to remember what they were taught by their teacher during the soccer unit. Students were tested in groups of five, with each student taking a turn until all five students had gone, then the group would take another turn. For the assessment of the technical execution of shooting on goal (elementary) five critical elements were selected (Fronske, 2008). For a trial to be

considered a “correct trial”, all five elements needed to be demonstrated by the students (See Appendix H). Students were given two trials to execute the skill. Each time a student attempted the skill, the investigator evaluated made a decision as to whether the critical element was present. If the critical element was present, the student received a point. If not, they received a zero. Each trial was worth a potential 5 points, with both trials worth a potential 10 points.

At the secondary level, students were grouped into teams of four, and two groups were placed on the modified soccer field at one time to play a modified, 7-8 minute soccer game; teams were designated by colored vests. During the pre-test, students were just told to play, concentrating on offense and defense. During the post-test, students were asked to remember what they were taught during the soccer unit in regards to offensive tactics.

For the tactical assessment of Offensive Support (secondary) the definition developed by Mitchell, Oslin, and Griffin (2006) was used, and interval recording was used to collect the actual data (See Appendix I and Appendix J). The interval lengths were 6 seconds for observation and 6 seconds for recording. During the interval recording, the act of observation starts at the beginning of the interval and continues throughout the entire interval (van der Mars, 1989a). During the observation interval, the investigator observed whether the student in question was playing offensively or defensively. If the student was on defense, no further decisions needed to be made. If the student was on offense, a further decision needed to be made as to whether the student

was in possession of the ball or was considered “off the ball”. If the student was “off the ball”, a further decision had to be made as to whether the student was providing appropriate support or inappropriate support to her teammate who was in possession of the ball.

In order to score both the pre- and post-tests for the elementary and secondary learning objectives, students were videotaped while participating in the assessments. The videotapes were viewed and analyzed at a later date by the researcher and one other trained in the analysis to determine students’ level of competency before and after participating in the ETU.

**Observation Instruments**

The Academic Learning Time in Physical Education (ALT-PE) recording system was used to measure the amount of time a student spent in motor activity at an appropriate success rate (see Appendix K). The System for Observing Fitness Instructional Time (SOFIT) was used to measure the amount of time students spent engaged in moderate to vigorous physical activity (MVPA) during physical education class (see Appendix L). The videotapes were analyzed by the researcher as well two other researchers trained in both SOFIT and ALT-PE.

**ALT-PE.** The Academic Learning Time-Physical Education (ALT-PE) instrument is a two-level observation tool that captures data on both class context variables and learner involvement. The first level of the system is the context of the setting under observation. The context level categories are grouped into two major

subdivisions: General content, subject matter content. Subject matter content is further divided into subject matter knowledge content and subject matter motor content (Parker, 1989).

The general content category is class time in which students are not intended to be involved in physical activity. The categories included are transition (T), management (M), break (B), and warm-up (B). Subject matter knowledge content is when the primary focus is intended to be on knowledge related to Physical Education content. The categories include technique (TN), strategy (ST), rules (R), social behavior (SB), and background (BK). Subject matter motor content is class time that is devoted to motor involvement in Physical Education activities. The categories include skill practice (P), scrimmage/routine (S), game (G), and fitness (F).

The second level of the observation tool describes how individual learners are involved in the Physical Education setting described in the context level. The learner involvement level has two subdivisions: not-motor engaged and motor engaged.
The non-motor engaged category includes any motor involvement other than motor involvement with subject matter-oriented motor activities. The categories include interim (I), waiting (W), off task (OF), on task (ON), and cognitive (C). Motor engaged includes activities related to the goals of the setting. The categories include motor appropriate (MA), motor inappropriate (MI) and supporting (MS).

A standard 6s “observe”/6s “record” interval recording coding protocol was used for coding the video record of each lesson (see Appendix H). A student was observed for

the first 6 seconds of the interval and two decisions were made and recorded on the coding sheet for the next six seconds: one for the context level (general, subject matter knowledge, subject matter motor), and the other for the learner's involvement level (not motor or motor engaged). Following the observation, the intervals and their percentage in all categories and subcategories of the instrument were calculated. According to Parker (1989), the intervals in which the context level was subject matter motor and the learner's involvement level was motor appropriate, are considered to be the amount of academic learning time-physical education (ALT-PE). During the next 6 seconds of the interval the observer recorded the observation on the coding sheet. To keep observations in the proper order and time, a pre-programmed MP3 audio-file was used to provide observe/record cues.

Following the pre-test, each teacher was asked to provide a class list with each student ranked as to their level of skill (low skilled, medium skilled, or highly skilled). Three students were then chosen, one of each level, for purposes of observation. The target students (one high-, one medium, and one low-skilled), were observed in sequence during the ETU portion of the lesson. The teacher was also asked to keep these three students in the same general area during each ETU portion of the lessons in order to ensure they would all be visible on the video for analysis.

**SOFIT.** MVPA levels were collected using the System for Observing Fitness Instruction Time (SOFIT) (McKenzie, 2002; McKenzie, Sallis, & Nader, 1991). The system includes three coding levels: Student physical activity, lesson context, and teacher

behavior. The categories include 1) lying down, 2) sitting, 3) standing, 4) walking and 5) very active or vigorous (McKenzie, 2002; McKenzie et al., 1991). However, for the current project only the students' PA level coding level was used (see Appendix I). The sum of the proportion of time spent walking and very active or vigorous constitutes MVPA (Gehris, Myers & Whitaker, 2012; McKenzie et al. 1991).

Each observation interval lasted 20 seconds with the first 10 seconds spent observing the student's physical activity level and the next 10 seconds recording the level. When observing physical activity levels, the standard momentary time sampling coding tactic was implemented (van der Mars, 1989a). Momentary time sampling means that the actual observation act occurs at the end of each interval. After the observation is made the observer marks the observed behavior (van der Mars, 1989a). The same student was recorded for four consecutive minutes, after which the next student was observed (Gehris et al., 2012).

**Observer Training & Reliability**

Training for data collection of both the process variables during the videotaped ETU lesson segments and the pre-and post-test outcome measures was conducted by following the procedure similar to Shute, Dodds, Placek, Rife, and Silverman (1982). (i.e., instruction, discussion and clarification of category labels and written definitions, practice with group verbal coding, and practice with individual coding).

Data collection (i.e., coding) began only after Inter-Observer Agreement (IOA) percentages were obtained of at least 75%, using the Scored-Interval method (van der

Mars, 1989b). IOA checks were conducted on 25% of the videotaped ETU lesson segments and 25% of the students' pre-post test performance. The S-I method is the most rigorous way of estimating observer reliability, in that reflects the degree to which two independent observers saw the target behavior occur at the same time (Hawkins & Dotson, 1975; van der Mars, 1989b). The same IOA criterion was in effect for the data collected from the observed ETU lesson segments.

**Data Analysis**

Using the shooting technique skill pre- and post-test score differences as nominal data would be inappropriate as a score of three for one student might not be the same as a score of three for another student. Because there are five critical elements for the skill of shooting on goal, one student might correctly perform the first three elements, while another student correctly performs the last three, yet they receive the same score. Therefore, to test for between-group differences on the student outcome measure (i.e., gain scores), a Chi-Square test of Independence was conducted (i.e., the nonparametric version of the interaction term in ANOVAs) (Cronk, 2008).

Students taught by the NBCPET to those taught by the non-NBCPET in the secondary schools were compared on their ability to demonstrate offensive Support when their team was in possession during a modified soccer game. Mean between-group differences on the pre- to post-test gain scores for offensive Support were assessed using an Analysis of Variance (ANOVA).

Descriptive statistics (i.e., means and standard deviations) were calculated for all

the observed categories of both the ALT-PE and SOFIT observation systems (i.e., the process measures). Students' MVPA percentage levels were recorded as the number of intervals accumulated in walking and being very active combined during the physical education class. In addition, Repeated Measures Multivariate ANOVA was used to compare the levels of performance of the NBCPETs and the non-NBCPETs, on the SOFIT and ALT-PE instruments.

## Results

Interobserver agreement (IOA) percentages for the teaching process measures (i.e., observed ALT-PE and SOFIT categories) and the achievement outcome measure (i.e., pre-and post-test) are presented in Table 2. With exception of the Off-task category in the ALT-PE observation system, and the Player status behavior category for assessing offensive Support, all percentages met the S-I criterion of 75%, indicating observer reliability.

Table 2

*Category-specific and Mean Inter-Observer Agreement Percentages For Pre- and Post-test Outcome Measures, And ALT-PE and SOFIT Observation System Categories*

| ALT-PE Variables | | | | SOFIT Variables | | Elem Pre-Post-test | | Secondary Pre-Post test | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | % | Variable | % | Variable | % | Critical element | % | Variable | |
| Transition | 96% | Interim | 100% | Standing | 89% | #1 | 97% | GC | 81% |
| Management | 100% | Waiting | 83.5% | Walking | 77% | #2 | 78% | PS | 71% |
| Technique | 78% | Off-task | 66% | Vigorous | 82% | #3 | 72% | PE | 80% |
| Rules | 100% | On-task | 86% | | | #4 | 72% | AS | 100% |
| Skill Practice | 93% | Cognitive | 89% | | | #5 | 83% | | |
| Scrimmage | 82% | Motor | 82% | | | | | | |
| | | Appropriate | | | | | | | |
| Overall: | 91% | | 84% | | 83% | | 80.4% | | 83% |

*Note*. Only those variables observed during the lessons are reported.
See Appendix H for descriptions of Critical Elements; GC = Game Context; PS = Player Status; PE = Player Engagement; AS= Appropriate support.

**Student Learning Outcomes**

Secondary students' pre-test, post-test, and gain score data for offensive Support are presented in Figure 3.01. Students taught by the NBCPET had a mean pre-test score of 26.6% and a mean post-test score of 50.0%. The students taught by the non-NBCPET had a mean pre-test score of 28.5% and a mean post-test score of 34.0%. No significant differences in offensive Support were found during the pre-test or post-test between students taught by the NBCPET and the non-NBCPET ($F$[1,2]=.064, $p$ >.05; $F$[1,2]=1.0 $p$> .05). In addition, no significant difference was found in the gain scores of students taught by the NBCPET when compared to students taught by non-NBCPET ($F$[1,2]=2.00, $p$ >.05).

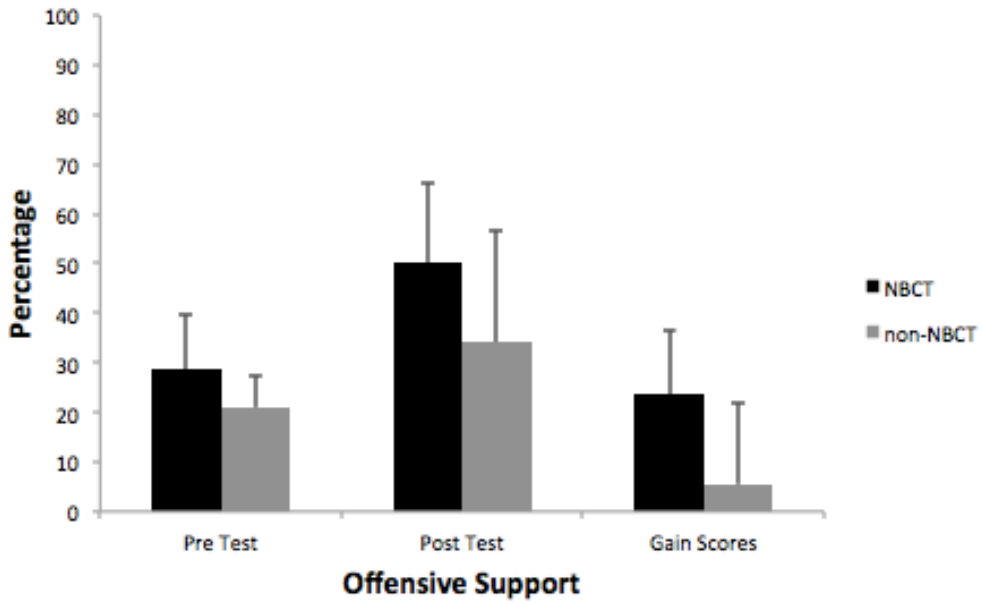


*Figure 3.01.* Comparison of average pre-, post-test and gain scores of offensive support for students taught by NBCPETs and those taught by non-NBCPETs with standard deviations.

Student achievement data (pre-test, post-test and gain scores) for students in elementary school on their technical execution of shooting on goal in Soccer are presented in Figure 3.02. The students taught by the NBCPET had an average pre-test score of 2.5, an average post-test score of 5 and average gain score of 3. Students taught by the non-NBCPET had an average pre-test score of 3, an average post-score of 5 and an average gain score of 2. Students from both groups of teachers (NBCPETs and non-NBCPETs) both improved from pre- to post-test. However, students' gain scores were not affected by whether or not they were being taught by an NBCPET or non-NBCPET ($x^2(1) = .376$, $p > .05$).

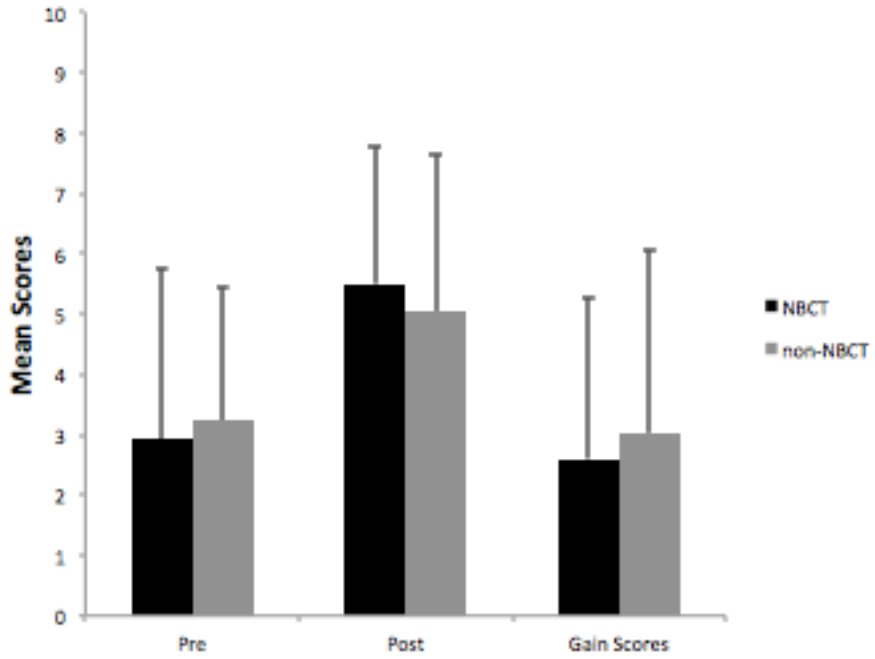


*Figure 3.02.* Comparison of average pre-, post-test and gain scores with standard deviations for shooting on goal for students taught by NBCPETs and those taught by non-NBCPETs.

**ETU Process Measures**

Figure 3.03 is a representation of how the NBCPETs and non-NBCPETs and their students spent their class time during the ETU. On average, NBCPETs and non-NBCPETs spent a similar amount of time (19%) in transition, while the non-NBCPETs spend more time performing management duties (1.4% as compared to zero for NBCPETs). The most noticeable differences occurred in the subject matter motor categories of skill practice and scrimmage. NBCTs spent more time engaged in skill practice than the non-NBCPETs (26% and 14%, respectively), while the non-NBCPETs spent more time engaged in scrimmage than their NBCPET counterparts (38% and 49%, respectively).

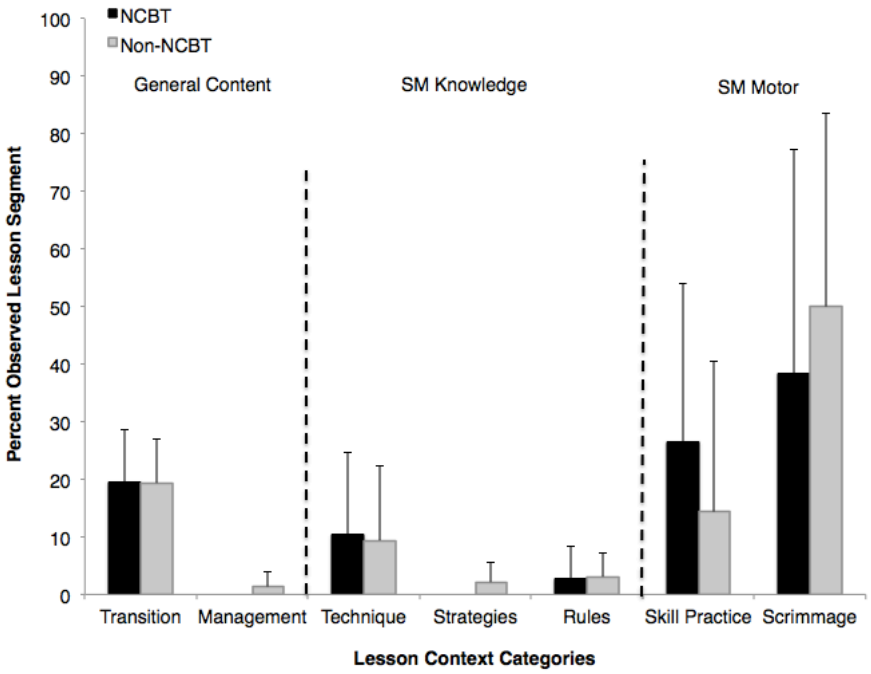


*Figure 3.03* Comparison of NBCPETs and non-NBCPETs Average Use of Class Time Across Classes With Standard Deviations.

Figure 3.04 describes the average learner involvement levels during the ETU. Students of non-NBCPETs spent more time in interim and waiting than students of NBCPETs (10% and 14% as compared to 14% and 19%, respectively). Students of non-NBCPETs spent more time on-task (19% compared to 16%) than students of NBCPETs. Off-task behavior was negligible to non-existent for both student groups. Cognitive engagement was also similar for both student groups (15.5% and 12% for non-NBCPETs and NBCPETs, respectively). Lastly, students taught by NBCPETs were engaged in motor activity at an appropriate success rate (ALT-PE) 33% of the time as compared to 27% of the time for students taught by non-NBCPETs.

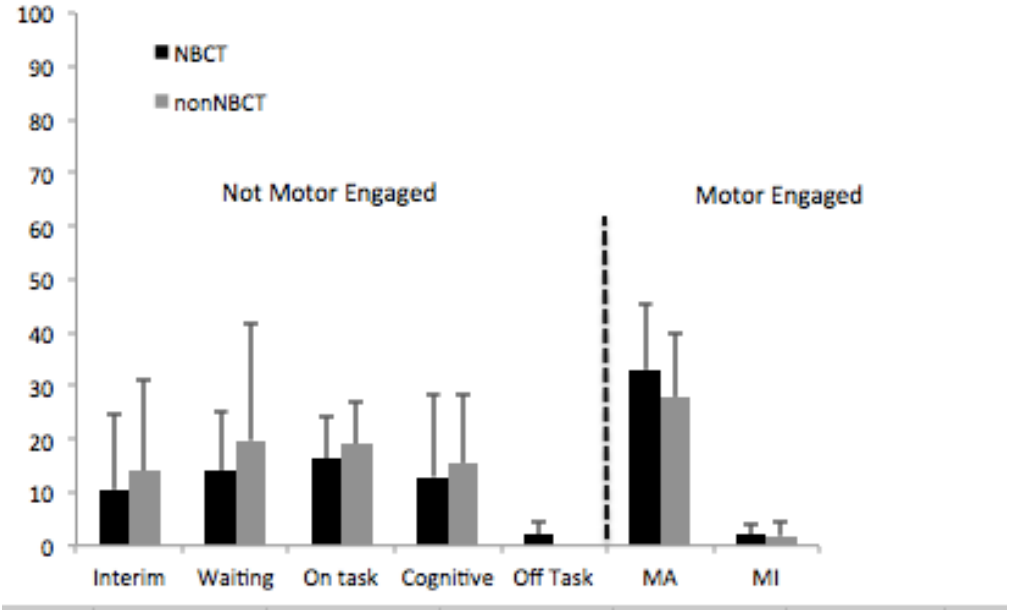


*Figure 3.04.* Comparison of NBCPET and Non-NBCPET Average Learner Involvement Across Classes With Standard Deviations.

As shown in Figure 3.05, students of non-NBCPETs on average reached higher

MVPA levels compared to NBCPETs (47%, and 42%, respectively). In addition, the non-NBCPETs had a lower percentage of sitting across when compared to NBCPETs with an average of 1.9% and 3% respectively. For both student groups, the most prevalent student behavior from a public health perspective was standing (i.e., a sedentary behavior) with percentages at 54.6% for students of the NBCPET and 51.4% for students of the non-NBCT.

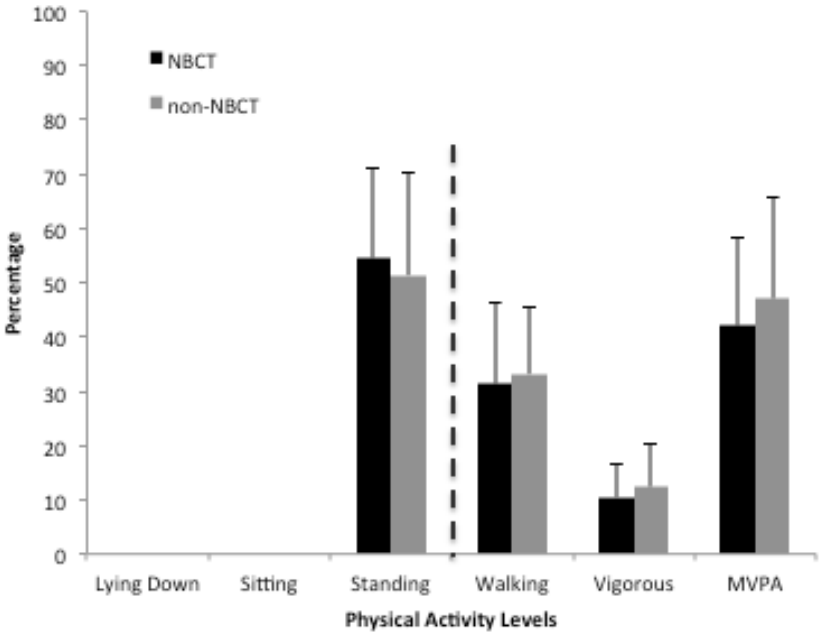


*Figure 3.05* Comparison of student physical activity levels taught by taught by either NBCT or non-NBCT with standard deviations, across classes.

A repeated measures multivariate analysis of variance (RM-MANOVA) was calculated, to examine the effect of Board Certification Status on students' ALT-PE and MVPA levels across the observed classes. Neither ALT-PE nor MVPA levels were significantly influenced by a teachers' certification status (NBCT or non-NBCT). The

mean ALT-PE levels for students taught by NBCTs were 33.8% (*sd* = 11.32), while the mean ALT-PE levels for students taught by non-NBCTs were 30.3% (*sd* = 15.04). No significant difference in the ALT-PE levels between the two sets of teachers was found ($F$[2,4])=4.455, $p$=.096).

The mean MVPA levels of students taught by NBCTs were 42% (*sd*=16.3), and the mean MVPA levels of students taught by non-NBCTs were 46.3% (*sd*=18.6). No significant difference in the MVPA levels between the two sets of teachers was found ($F$ [2,4]=.886, $p$=.480).

## Discussion

The intent of this study was to determine whether differences would appear in student achievement (i.e., outcome) measures, based on Board Certification status of Physical Education teachers. Moreover, this project was intended to investigate whether students of NBCPETs would engage in higher levels of MVPA and accumulate more ALT-PE that those of non-NBCPETs. In neither case, did any appreciable differences emerge. Although a visual analysis of the results implies a difference in the numbers, with the non-NBCPETs providing more opportunities for both, a statistical analysis of the results indicates no significance between the two groups of teachers. Although much of the previous research has documented results in which NBCTs have greater teaching effectiveness than their non-NBCT counterparts (e.g., Cantrell, Fullerton, Kane & Staiger, 2007; Cavalluzzo, 2004; Goldhaber & Anthony, 2007), the results of this study are consistent with other research in which few or no differences were found (in teaching effectiveness) between NBCTs and non-NBCTs (Sanders, Ashton, & Wright, 2005;

Gaudreault & Woods, 2012; McCloskey, et al., 2005).

In previous studies, students' ALT-PE percentages have generally ranged from 15 to 42% (e.g., Hastie, 1994; Parker, 1989; van der Mars, 2006). Students in the present study had average ALT-PE levels ranging from 33.8% to 30.3% (NBCPETs and non-NBCPETs, respectively). From these results it might be concluded that the participants in this study are highly effective teachers as "ALT will continue to serve as a thoroughly legitimate criterion variable for assessing teacher effectiveness; that is, teachers who produce higher levels of ALT-PE will be the more effective teachers" (Siedentop, 1983, p.4). Rhoades (2010) conducted a descriptive analysis of six NBCPETs and found their average ALT-PE levels to be 37%. The ALT-PE levels in Rhoades' 2010 study and the current study were within the range of what was previously reported by Placek and Randall (1986); Shute, Dodds, Placek, Rife and Silverman (1982; and Parker (1989). In addition, these scores are acceptable and within what would be acceptable within public schools (Parker, 1989).

An effective (or accomplished) Physical Education teacher is capable of achieving all the necessary goals of a quality, health-related Physical Education class while students are active. Thus, in order to provide a health optimizing Physical Education classes, teachers are responsible for providing opportunities for MVPA "educating through the physical" (Sallis, et al., 2012, p. 126). In order to assess the amount of time students spent engaged in MVPA, this study used the System for Observing Fitness Instruction Time, or SOFIT. Although the Institute of Medicine (Kohl III & Cook, 2013) recommended that Physical Education teachers provide opportunities for students to engage in MVPA at

least 50% of class time, typically students in physical education classes do not reach that goal (e.g. Chow, McKenzie & Louie, 2009; Gehris, Myers, & Whitaker, 2012).

Both groups of participating teachers in the present study provided ample opportunity for students to engage in MVPA during Physical Education classes, on average. Students of NBCPETs spent an average of 42% of the soccer lesson engaged in MVPA, while students of the non-NBCPETs spent an average of 47% of the soccer lesson engaged in MVPA. On the other hand, both groups of students also spent a great amount of time engaged in minimal activity. Students of NBCPETs spend an average 54% of the soccer lesson engaged in standing, while students of non-NBCPETs spent an average of 51% of that time standing.

At first glance, this might not make sense at students of the both the NBCPETs and non-NBCPETs spent an average of close to 40% of the class context engaged in scrimmage, which one would imagine involved a great deal of activity. However, the analysis of the lessons also revealed that students spent over 50% of the lesson standing, indicating that in spite of the inherent activity level of the scrimmage, students chose to stand around and not participate. In addition, during skill practice students encountered a great deal of waiting time (14% NBCPET and 19% non-NBCPET), which was recorded as standing.

Previous researchers using the SOFIT to measure student physical activity levels during Physical Education found that MVPA levels for middle school students were higher than in the elementary school (Simons-Morton, Taylor, Snider, Huang & Fulton, 1994), but only during about 20% of the lesson time, which is far below the Institute of

Medicine recommendation of 50% (Kohl III & Cook, 2013). The most extensive descriptive study of student physical activity levels in Physical Education involved observations in third-grade classes in 95 elementary schools across four states (McKenzie et al., 1995). Although significant differences were found for geographical region, teacher certification status, and lesson location, the classes provided students with only 25% of the vigorous activity and 12% of the MVPA recommended per week by national objectives for health purposes (McKenzie et al., 2000). McKenzie et al. (2000) found that middle school students who participated in coeducational Physical Educational classes engaged in an average of 48.5% MVPA. The average lesson length for this study was 34.3 minutes. The average length of the current study's observed lessons was 18 minutes, with only the ETU content being observed and analyzed.

One strength of this study was that it was conducted with intact classes in regular school settings, similar to Graham et al. (1983). Most of the previous experimental research on ALT-PE was conducted primarily in clinical settings (e.g., Housner & Griffey, 1985) or with a select group of students (e.g., Ashy, Lee & Landin, 1988). A second strength was that the current study involved actual in-service teachers, teaching their typical classes during regular school days, as opposed ot pre-service teaching interns.

Because this study was conducted with intact classes, there is an assumption that some students are experienced soccer players, and are therefore more skilled than others in the class. The students who were proficient during the pre-test were presumably going to be proficient during the post-test. It is possible that the assessments used would not be

able to discriminate between the two groups of students; those taught by NBCPETs and those taught by non-NBCPETs.

This study had two limitations: (a) the limited number of site visits, and (b) the limited number of participants. The number of site visits is considered a limitation because there is always a possibility that the researcher observed the participants on either a good day or a bad day. In addition, observing intact classes involves the risk of extra events such as lock down drills, fire drills, or student absences. Thus, the short duration of the ETU may have kept appreciable differences from developing between the two groups of students on the post tests. The second limitation is the small number of teacher participants that prevents the generalizability of the results. Third, all four of the participants were from the state of Arizona, which makes the results more difficult to transfer to other contexts. Finally, all four participants report that they worked in schools with students from middle-class socio-economic background, also limiting generalizability.

The National Board for Professional Teaching Standards claims that the process of certification is designed to develop, retain and recognize accomplished teachers (NBPTS, 2014b). In addition, completion of NBC is supposed to signify that a teacher has developed and demonstrated advanced teaching knowledge, skills and practices (NBPTS, 2014b). However, the results of this study show no difference in learning between students of NBCTs and non-NBCTs. Students who were taught by non-NBCTs received the same lesson and according to the data, gained the same amount of skill as the teacher with the NBC status. This leaves several questions: If the process measures

were not different, does the non-NBCPET deserve NBC status as well? Or maybe the impact of NBC had faded and these once accomplished teachers were no longer using best practices?. Or perhaps all of the teachers studied were effective teachers with positive student outcomes.

## Conclusion

The purpose of this study was to compare the teaching effectiveness of National Board Certified Physical Education Teachers (NBCPETs) and non-NBCPETs. Based on the student outcome measures on shooting on goal and offensive support as well as the ETU process measures, and given the design and limitations of this study, NBCPETs were not more effective than their non-NBCETs counterparts. Students of performed equally well regardless of NBC status. That is, NBC status in Physical Education does not inherently result in greater teacher effectiveness.

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Chapter 4 Manuscript #2

# What were they thinking? Planning and Decision-Making of National Board Certified and Non-Board Certified Physical Education Teachers

What prompts teachers to make the decisions they make while actively engaged with students during classes? This question implies that teaching is an intellectual process, and that teachers use professional judgment in managing what goes on in their classrooms (Clark & Peterson, 1976). In addition, much of the important thinking that teachers do occurs during the actual act of teaching. Planning (pre-active) and evaluation are also important, but the focus of this study is on teacher thinking that occurred during the interactive phase of teaching (Clark & Peterson, 1976).

Another question is, does employing such techniques imply that the teacher is a professional, or rather a very competent practitioner? Being able to do something and knowing how one does it are two aspects of being professional about something (Tripp, 2012). Understanding what it is one does and how one does it, however, involves a different aspect of professionalism: It is a matter of being intellectually expert about expert practice. For most individuals by actually performing the job one eventually becomes an expert practitioner. However, skilled professional teaching is also an intellectual matter (Tripp, 2012).

For most teachers, the intellectual side of teaching consists of two kinds of reflection: 1) evaluation (i.e., did it work? What else could/should I have done? How could I have done better?), and 2) common wisdom (i.e., there is more to discipline than just maintaining it: how the students feel about being disciplined affects how they will

respond next time). These reflective ideas are a kind of craft knowledge, some of which is included in teachers' pre-service education, but most tends to be transmitted by experts to novices as on-the-job advice (Tripp, 2012). This craft knowledge tends to run through a teacher's mind during instruction and will be reflected upon after the fact. A teacher who acts reflectively after successfully quieting down a noisy classroom would not only observe whether or not silence was achieved, but would also consider the students' feelings about the handling of the situation. The following sections related to teaching will be discussed: (a) NBC Teachers, (b) NBC Teachers and Physical Education, (c) NBC Teacher benefits, (d) stimulated recall, and (e) experimental teaching units (ETU).

**National Board for Professional Teaching Standards (NBPTS)**

In 1987, the National Board for Professional Teaching Standards published a set of policy statements, *the Five Core Propositions,* which formed a framework from which all of the National Board Professional Teaching Standards evolved. These Core propositions have been incorporated into teacher quality initiatives at all levels of teacher education, and they have been become the industry standard for the education profession (Berg, 2003). These propositions identify the values, beliefs and assumptions that underlie quality teaching: (a) teachers are committed to students and their learning, (b) teachers know the subjects they teach and how to teach those subjects to students, (c) teachers are responsible for managing and monitoring student learning, (d) teachers think systematically about their practice and learn from experience, and (e) teachers are members of learning communities. The non-profit NBPTS was founded in 1987 and grew out of the up and coming belief that teachers were a key factor in improving student

achievement and that the profession needed a way to recognize and reward exemplary classroom teachers (Vandevoort, Amrein-Beardsley, & Berliner, 2004).

Assessors for NBPTS evaluate and score a candidate's responses through the lens of rubrics developed from the Standards. As the assessors identify the evidence in the responses, they are trained to judge the candidate's responses performance solely on the basis of the criteria established by the Standards embodied in the rubrics. Each of the responses are scored holistically, in that, an assessor must look at the responses as a total work and score that work based on the overall match with a level of the rubric (NBPTS, 2014a). However, there is no published evidence that this evaluation process has been validated.

**Studies of NBC Teachers**

Approximately 200 studies have focused on the various aspects of NBC (NBPTS, 2014b), with many studies comparing student' achievement test scores of NBCTs with non-NBCTs. In some studies, students of NBC teachers did better on student achievement scores than students of non-NBC teachers (e.g. Cantrell, Fullerton, Kane, & Staiger, 2008; Cavalluzzo, 2004; Goldhaber & Anthony, 2007; Vandervoort, Amrein-Beardsley & Berliner, 2004). Conversely, McCloskey, Stronge, Ward, Howard, Lewis and Hindman (2005); Sanders, Ashton and Wright (2005) found that students of NBCTs did not have significantly better rates of academic progress than students of other teachers.

**NBC Teacher Benefits**

The NBPTS has published numerous benefits to achieving National Board

Certification. According to the NBPTS (2014b) benefits include strengthening teaching practice, helping students succeed, career advancement, providing portability, offering higher salary potential, and enhancing education. Moreover, achieving National Board Certification meets most states' definition of "highly qualified teacher" under No Child Left Behind (U.S. Board of Education, 2001).

The NBPTS claims that not only are NBCTs more effective than their non-certified counterparts, they (the NBPTS) also tend to be successful in identifying the more effective teachers among their applicants (Goldhaber & Anthony, 2007). However, the majority of the research studies are focused on the core academic subjects that use standardized academic achievement testing as a means of measuring student learning and teacher effectiveness (Smith, Gordon, Colby & Wang, 2005; Vandervoort et al., 2004).

**NBC Teachers in Physical Education**

The limited research base in the area of Physical Education does not allow for comparison of studies as in general education. To further complicate the issue, standardized achievement test scores do not easily measure student-learning outcomes in Physical Education. Thus, linking NBC to increased student learning is a relatively major undertaking (Woods & Rhoades, 2010).

To date, only five studies on National Board Certification Physical Education Teachers (NBCPETs) have been published (Phillips, 2008; Rhoades & Woods, 2012 Woods & Rhoades, 2010; Woods & Rhoades, 2012; Woods & Rhoades, 2013). Phillips (2008) compared NBCPETs and non-NBCPETs in South Carolina, using the South Carolina Physical Education Assessment Program (SCPEAP) (Rink & Williams, 2003).

Phillips (2008) observed that students of NBCPETs performed better on all four performance-indicators and on the overall measure of the SCPEAP assessment when compared with the students of the non-NBCPETs.

Woods and Rhoades (2010) investigated NBCPETs demographic characteristics and subjective warrants (i.e., that is the perceptions of skills and abilities necessary for an entrance into the profession), and reasons for seeking National Board Certification (NBC). NBCPETs were predominantly female (79%), Caucasian (78.9%), held masters degrees (71.1%), and worked in the elementary setting (55.1%). The mean age was 45 years, with about 20 years of teaching experience (Woods & Rhoades, 2010). NBCPETs pursued a career in teaching because of: (a) a joy of working with and helping children, (b) continued association with sport and physical activity, (c) lack of aspiration to coach; and (d) enjoyment of physical activity. When asked about the motivation to pursue NBC, teachers cited financial incentives, the challenge, and professional development (Woods & Rhoades, 2010).

Woods and Rhoades (2012) also examined NBCPETs' perceptions of change as a result of the NBC process. Using Lawson's Interactive Factors Influencing Workplace Conditions for the Physical Education Teacher Model (1989). The authors found that NBCPETs described more teaching reflection and a greater focus on student learning and assessment, including an increased emphasis on individualized instruction (Woods & Rhoades, 2012). In addition, NBCPETs perceived an elevation in their status and credibility along with expanded opportunities within the educational community as a result of the certification process.

Rhoades and Woods (2012) then investigated the task presentations and learning environments of NBCPETs, and found that students of the NBCPETs, on average, experienced 38% motor appropriate practice time, 4.4% motor inappropriate practice time, and 3.8% off-task time during observed classes. The same teachers also demonstrated proficiency in their task presentations as well as appropriate use of class time. In addition, they expressed their beliefs that their task presentation and use of class time changed as a result of the NBC process. The authors concluded that the NBC process may be functioning as a positive agent of socialization (Rhoades & Woods, 2012).

Lastly, Woods and Rhoades (2013) sought to describe the teaching efficacy of NBCPETs, as well as NBCPET's perceptions of their teaching efficacy as compared to the teaching efficacy of their non-NBCPET counterparts (Woods & Rhoades, 2013). Teacher efficacy scores of the participants revealed strong Personal Teaching Efficacy (PTE) and their PTE scores were higher than their General Teaching Efficacy scores (Woods & Rhoades, 2013). In addition, most NBCPETs expressed confidence in their abilities to influence student learning (Woods & Rhoades, 2013). While comparing their own teaching effectiveness with non-NBCPETs, most participants articulated a tendency to reflect on practice, a deeper understanding of and commitment of teaching effectiveness, and greater motivation to excel (Woods & Rhoades, 2013).

**Stimulated Recall**

First attributed to Bloom (1953), stimulated recall has been used as a method for accessing thought processes in various activities such as counseling, problem-solving,

medical consultations, and teaching. The study of interactive decision-making has been conducted almost exclusively through the use of stimulated recall during videotape replay (Housner & Griffey, 1985). Teachers become involved in decision-making only when the planned lesson is perceived as going poorly and that teachers consider only a few courses of alternative actions in such situations (Clark & Yinger, 1979; Joyce, 1978; Morine-Dershimer & Vallance, 1976). Snow (1972) described teacher thinking during classroom interaction with students as a cyclical process of observation of student behavior. Table 3 represents the four possible paths through the model, while Appendix A is a model of this sequence of events.

Table 3.

*Four Alternative Paths for Teacher Information Processing During Instruction*

| **Decision Points** | **Path 1** | **Path 2** | **Path 3** | **Path 4** |
|---|---|---|---|---|
| **Student behavior within tolerance** | **Yes** | **No** | **No** | **No** |
| **Alternatives available?** | **-** | **No** | **Yes** | **Yes** |
| **Behave differently?** | **-** | **-** | **No** | **Yes** |

In this model, the teacher begins with a teaching plan, which is composed during the pre-active phase of teaching – before the teacher is in actual contact with the students. The teacher begins the interactive phase of teaching with some teaching performance that is part of the teaching plan. This initial move by the teacher produces some changes in both the teacher and the students (Clark & Peterson, 1976). Some of these changes are observable by the teacher and some are not. The most important observable changes are called ‘cues’. The teacher observes these cues and makes judgments about whether or not

these cues fall within the range of acceptable values or 'within tolerance' for this teaching plan. If the cues happen to fall within an acceptable range, the teacher decides to continue with the teaching plan and the cycle is repeated as before. If however, some of the cues fall outside of acceptable limits, the teacher may either decide to continue with the teaching plan (ignoring the cues, hoping things improve) or to modify the play in a way that will restore the cues to acceptable values (Clark & Peterson, 1976). The primary cue used by teacher to judge the effectiveness of their lessons appears to be student involvement or participation (Peterson & Clark, 1978).

It might be expected that the decisions of Physical Education teachers are different from those of classroom teachers, strictly because the Physical Education environment and subject matter differs from that of the classroom. Few studies of teacher decision-making have been conducted outside of clinical settings. Furthermore, there were no studies found of teacher decision-making done in the actual Physical Education environment with teachers engaged with 30 of more students.

**Experimental Teaching Units (ETU)**

In order to investigate the effect of what teachers do on student learning, researchers in Physical Education have used a modified version of the ETU paradigm (Paese, 1986). Although researchers have investigated various teaching behaviors, criterion process variables and teacher presage variables, the most common novel skill taught in ETUs in Physical Education has been a novel golf task (Paese, 1986). Paese reported that effective Physical Education teachers in their ETU lessons had higher rates of appropriate practice and teacher skill feedback to students (Paese, 1986).

The process-product research paradigm was at one point regarded strongest design for studying teacher effectiveness (Dunkin & Biddle, 1974). This model studies the relationship between observed activities in the learning environment (process) and subsequent student behavior (product) (Metlzer, 1983). However, these designs can be expensive and time consuming. One alternative to the long-term, expensive process-product design is the experimental teaching unit (Arehart, 1979; Berliner & Tikunoff, 1976; Gage, 1976). An experimental teaching unit (ETU) is typically a series of one to ten lessons on a topic that is taught to a particular grade level. All of the teachers involved in the ETU study teach the same lesson content and are provided with pretests, posttests and possibly instructional materials, depending on the needs of the participants, as well as a specific learning objective (Paese, 1986).

Experimental teaching units have been used in Physical Education teacher effectiveness research since the mid 1970s (Paese, 1986). (Yerg & Twardy, 1982, as cited in Yerg, 1983) found that effective Physical Education teachers in their ETU lesson has higher rates of student practice and teacher skill feedback to students. Graham, Soares and Harrington (1983) used experienced teachers in an ETU and noted students taught by more effective teachers spent more time engaged in activity and less time waiting. On the other hand, students taught by less experienced teachers spend less time engaged in activity and more time waiting (Graham et al., 1983).

Metzler (1983) had a statistically significant improvement, or decrease in the number of strokes (-1.67) with a group of students using an ETU with 30 minutes of class time. The group with the most allocated time of 40 minutes did not demonstrate a

significant improvement, despite a drop of -1.54 strokes per trial. This finding, according to the author, suggests that improved performance in the ETU was not a direct function of increase allocated time for students (Metzler, 1983). Ashy, Lee and Landin (1988) examined the relationship between the total number of practice trials and practice trials using correct technique and achievement in a soccer kick-up skill. The results showed a high and significant relationship between the number of correct practice trials and achievement. In contrast, the total number of practice trials was not significantly related to student achievement.

Ashy, Lee and Landin (1988) are the most recent researchers to use ETU in the traditional sense, meaning teachers are given specific objectives for the teaching unit, a description of the motor task, and they were permitted to teach the class any way they wished. Solmon and Lee (1996) investigated the relationships between entry characteristics, in-class behavior, self-report measures of student cognition, and achievement during motor skill instruction using what they called an instructional unit (Solmon & Lee, 1996). Although the teachers were given the specific skill to be taught, they, together with the researchers, designed the lesson plans for then unit and all participating teachers taught according to the same plan (Solmon & Lee, 1996). In a true experimental teaching unit, teachers are free to instruct any way they wish (Metzler, 1983).

The founders of the NBPTS envisioned that articulating the standards of accomplished teaching and recognizing teachers who meet these standards would result in large-scale improvements in the practice of teaching (Carnegie Task Force on

Teaching as a Profession, 1986; NBPTS, 1991). The founders suggest in these documents that improvements would be realized by making the standards available to teacher preparation programs and by having a growing cadre of board-certified teachers in schools throughout the country who would implement better practices and share their skills with other teachers. While the founding documents do not specifically state that individual teachers' practice will improve as a direct result of the certification process itself, more recent NBPTS publications make this claim " the certification process helps teachers improve their teaching" (NBPTS, 2001, p.1). However, several research studies have shown little difference in NBCT status and student achievement (e.g., Clotfelter, Ladd & Vigdor, 2006; Harris & Sass, 2006; McCloskey et al., 2005; Sanders, Ashton, & Wright, 2005). Therefore, completion of the certification process may increase the teacher's effectiveness, but completion of the certification process may also indicate preexisting teaching effectiveness. In other words, is the process of certification producing more effective teachers or are the more effective teachers more likely to seek out certification?

Although recent research in Physical Education has demonstrated a relationship between NBC and student competency levels in motor skills, fitness knowledge, outside-of-class participation, and health-related fitness (Phillips, 2008), more research is necessary in the area of NBC, Physical Education and student achievement. With the abundance of research having examined the impact of NBC on teaching practices only five studies have investigated NBC and Physical Education. However, no studies were found on the use of stimulated recall in the area of Physical Education. In order to

investigate the decision-making process of NBCPETs and non-NBCPETs during interactive teaching, this study was based on the stimulated recall/ teacher thought processes literature by Clark & Peterson (1976; 1981; 1984).

The conceptual framework for this study is the research and literature base focused on stimulated recall and teacher thought processes. The thinking, planning, and decision making of teachers constitute a large part of the psychological context of teaching (Clark & Peterson, 1986). It is within this context that curriculum is interpreted and acted upon; where teachers teach and students learn (Clark & Peterson, 1986). Although questionnaires and interviews have been used to access teachers' aims, goals and objectives for teaching (Calderhead, 1981), such variables have generally been measured independently of classroom interaction. However, stimulated recall has been used to identify teachers' thoughts and decision-making (the reasons they have for acting as they do) during interactive teaching (Calderhead, 1981).

The purpose of the present study was to describe and compare the decision-making processes employed by National Board Certified Physical Education Teachers (NBCPETs) and non-NBCPETs as they taught three lessons in Physical Education using ETUs. The main research question was: Are there differences in the decision making process between National Board Certified Physical Education Teachers and non-National Board Certified Physical Education Teachers? The main objectives of the study were (1) to describe the information cues that NBCPETs and non-NBCPETs attend to during instruction or interactive teaching of the provided experimental teaching unit (ETU); and (2) to describe the decisions that are made by NBCPETs and non-NBCPETs during

interactive teaching of the provided ETU.

## Methods

### Participants and Settings.

The participants for this study were two National Board Certified Physical Education Teachers (NBCPETs), and two non-board certified Physical Education teachers (non-NBCPETs) who reside in the western United States. Two teachers (one board certified and one non-board certified) taught in a middle school setting, while two teachers (one board certified and one non-board certified) taught in an elementary school setting. Once the NBCPETs had agreed to be a part of this project, all non-board certified Physical Education teachers in the same two districts were contacted through information on the district websites in order to recruit two comparison teachers. The comparison teachers were matched at closely as possible on the following variables: (a) gender, (b) age, (c) ethnicity, (d) teaching level, (e) teaching experience, and (f) district.

All four participants were female, Caucasian and certified Physical Education teachers. Each teacher was assigned a pseudonym in an effort to maintain her anonymity. Katie, Sallie, Jessica and Beth were employed at two different districts in central Arizona. For the purpose of this study, these districts will be referred to as Johnson Elementary District and Harrison High School District. These names are pseudonyms and have no relationship to the actual identity of the individual school districts.

Table 4

*Demographic Information of Participating Teachers*

| Teacher | School Level | NBC Status | Years of teaching | Student Body | % FRL | % Caucasian | % Hispanic | % Black | % Other |
|---|---|---|---|---|---|---|---|---|---|
| Katie | M.S | NBCT | 9 | 1,280 | 29 | 70 | 20 | 5 | 5 |
| Sallie | M.S. | n-NBCT | 12 | 900 | 29 | 67 | 20 | 7 | 9 |
| Beth | E.S. | NBCT | 24 | 514 | 26 | 64.3 | 16.3 | 8 | 11.4 |
| Jessica | E.S. | n-NBCT | 24 | 475 | 14 | 72 | 14 | 6 | 8 |

*Note:* FRL = Free and Reduced Lunch. 'Other' = Students who listed themselves as Asian, Native American or other, and were combined due to space limitations.

Human Subjects approval was obtained from the University and teachers provided Informed Consent (see Appendix B). Parents also provided Informed Consent (see Appendix C and D)

**Experimental Teaching Units (ETU*).*** Similar to Ashy, Lee and Landin (1988), a very specific task was given to each participating teacher. For the elementary school teachers, the ETU objective was for students to demonstrate technically correct shooting on goal in Soccer (see Appendix F). The criteria for correct performance included: (a) student approaches the ball at an angle, (b) student runs up to ball with the last step being a slight jump, landing on the supporting leg beside the ball, (c) kicking leg come through with the ball being contacted with the instep or laces of the foot (not the toes), (d) the kicking leg follows through in direction of the goal, and (e) the student hops with the opposite foot, landing on the kicking foot (Fronske, 2008) (See Appendix K).

Teachers in the secondary schools were given the ETU objective to have students improve their Offensive Support during a modified 4 v 4 Soccer game, using the Support definition of Mitchell, Oslin and Griffin (2006). For example, the student appears to support the ball carrier by being in or moving to an appropriate position to receive a pass. (See Appendix G). While the objective was pre-determined and agreed to by the four teachers, all teachers were given freedom on how to plan, design and instruct around the respective objectives.

Teachers were asked to rank their students by ability level. Three students were chosen at random from each skill level; one highly skilled student, one medium skilled student and one low skilled student and the teachers (for the most part) made sure those

three students were in the same area each day. During each day of filming, the researcher focused on these three students each day. Data on those three students were collected each day.

**Data Collection**

**Testing Protocol.** An investigator-designed instrument was designed to evaluate both the skill and tactical objective for the pre- and post-test. To assess student achievement, all students in the observed classes were pre- and post-tested on the targeted Soccer outcome measures (i.e., shooting technique and Support). For the elementary pre- and post-test, students were instructed to approach a stationary ball and kick into the goal with as much power as they could produce. During the pre-test, students had no previous instruction from the teacher, but during the post-test, students were told to remember what they were taught by their teacher during the soccer unit. Students were tested in groups of five, with each student taking a turn until all five students had gone, then the group would take another turn. For the assessment of the technical execution of shooting on goal (elementary) five critical elements were selected (Fronske, 2008). For a trial to be considered a "correct trial", all five elements needed to be demonstrated by the students (See Appendix K). Students were given two trials to execute the skill. Each time a student attempted the skill, the investigator evaluated made a decision as to whether the critical element was present. If the critical element was present, the student received a point. If not, they received a zero. Each trial was worth a potential 5 points, with both trials worth a potential 10 points.

At the secondary level, students were grouped into teams of four, and two groups

were placed on the modified soccer field at one time to play a modified, 7-8 minute soccer game; teams were designated by colored vests. During the pre-test, students were just told to play, concentrating on offense and defense. During the post-test, students were asked to remember what they were taught during the soccer unit in regards to offensive tactics.

For the tactical assessment of Offensive Support (secondary) the definition developed by Mitchell, Oslin, and Griffin (2006) was used, and interval recording was used to collect the actual data (See Appendix J). The interval lengths were 6 seconds for observation and 6 seconds for recording. During the interval recording, the act of observation starts at the beginning of the interval and continues throughout the entire interval (van der Mars, 1989a). During the observation interval, the investigator observed whether the student in question was playing offensively or defensively. If the student was on defense, no further decisions needed to be made. If the student was on offense, a further decision needed to be made as to whether the student was in possession of the ball or was considered "off the ball". If the student was "off the ball", a further decision had to be made as to whether the student was providing appropriate support or inappropriate support to her teammate who was in possession of the ball.

In order to score both the pre- and post-tests for the elementary and secondary learning objectives, students were videotaped while participating in the assessments. The videotapes were viewed and analyzed at a later date by the researcher and one other trained in the analysis to determine students' level of competency before and after participating in the ETU.

## Instruments

**Stimulated Recall.** Following each lesson, a stimulated recall technique was implemented to elicit reports of the cues attended to and the decision making processes used during interactive teaching (Housner & Griffey, 1985). Teachers were shown short segments of a lesson in sequential order. After viewing each segment, the teachers were asked to respond to a set of questions. These questions were based on the work by Peterson and Clark (1978) in their study on teacher decision-making. The questions asked were as follows:

1) What are you doing in this segment and why?

2) What were you noticing about the students? How were the students responding?

3) Were you thinking of any alternative actions or strategies at that time?

4) Did any student reactions cause you to act differently than you had planned?

A fifth question, "What was your ultimate objective for today's lesson?", was also included. These stimulated recall interviews following each lesson lasted between 5 and 15 minutes, depending on the teacher and the day.

## Post-Study Interview

At the conclusion of the study, after all lessons have been videotaped and analyzed, all four teachers participated in a final interview which lasted 45 minutes to one hour in length (see Appendix M). The questions were modified from an interview conducted by Woods and Rhoades (2012) in which the researchers investigated the NBCPET perceived changes related to the certification process. NBCPETs answered 30 questions, while non-NBCPETs answered only 13 questions, as some of the interview

questions were specific to achieving NBC status.

According to Clark (2014) the results of the post-test do not really matter; what matters instead is what teachers think about the teaching process. How did the stimulated recall affect their teaching /planning? This particular question was asked during a final interview after all filming had been concluded and participants had seen the results.

Housner and Griffey's (1985) classification system for coding teachers' perceptions to categorize the cues teachers attended to during instruction. The system consisted of two substantive categories for coding teacher perceptions, 1) student behavior cues and 2) teacher/context cues. Student behavior was then classified into seven categories: 1) performance; student cognitive or psychomotor performance, 2) involvement; student on task behavior, 3) interest; student interest or enjoyment, 4) verbalizations/requests; student statements, questions or requests, 5) interactions; student interactions or relationships with other students, 6) mood/feeling; student mood, attitude, feelings, and 7) other. Teacher/context cues were classified into four categories; 1) instructional behavior; behaviors exhibited by the teacher, 2) mood/feeling; the mood, attitude, or feelings of the teacher, 3) time, and 4) equipment/facility (Housner & Griffey, 1985).

Short, stimulated recall interviews were conducted each day after the conclusion of the lesson and after the teacher had an opportunity to view segments of the lesson from the videotape. These interviews lasted between 5 and 15 minutes. At the conclusion of the study, a longer structured interview was conducted with teach teacher. At this time, teachers were shown the results of the pre- post-tests and were asked questions about

their feelings in regards to being involved in the study and their interpretations of the results.

Transcripts of the stimulated recall interviews were segmented by question, using the constant comparison method. Codes were collapsed by grouping together related or similar codes under new headings, and coding was refined until three main themes emerged.

**Document Analysis.** In addition to the transcripts of the stimulated recall interviews, daily lesson plans were collected from each teacher. These plans were collected in order to provide some sort of plan that outlined her daily practices in regards to the ETU. These documents were utilized as both stand-alone data and as supportive data in triangulation.

## Data Analysis

**Constant Comparison.** Transcripts of the stimulated recall interviews were segmented by question, using the constant comparison method (Saldaña, 2013). This process allowed for comparisons between participants as well as cumulative responses between answers. They then were scrutinized for commonalities that could reflect categories or themes. In this way, similar comments [or incidents and events, i.e. phenomena] are grouped together to form categories.

Open coding was used as a process of reducing the data to a small set of themes that appear to describe the phenomenon (Strauss & Corbin, 1990). Once the data were categorized, they were examined for properties that characterized each category. A secondary analysis, often classified as axial coding was used to interconnect the categories (Strauss & Corbin, 1990). This was achieved by exploring the conditions,

context, action/interactional strategies, and consequences, which influenced the recall and teaching behaviors that were being studied. As additional data were collected, the researcher moved back and forth amongst the data collection, all the time open coding and axial coding and continually refining the categories and those interconnections.

Selective coding was used to confirm any core categories and to organize the results. In selective coding, the categories and their interrelationships are combined to form a storyline that describes what happens in the phenomenon that is being studied (Pitney & Parker, 2002).

**Data Trustworthiness**

Lincoln and Guba (1985) describe four criteria to measure the trustworthiness of qualitative data. These criteria are 1) internal validity or credibility; 2) external validity or transferability; 3) reliability or dependability; and 4) objectivity or confirmability. Several measures can be implemented to increase the probability that these criteria are met. For example, credibility can be established by utilizing prolonged engagement, persistent observation, triangulation, peer debriefing, negative case analysis, and member checks. Transferability is established through thick descriptive data (i.e., a narrative of the context in which the study is taking place; Schwandt, Lincoln, & Guba, 2007). Dependability and confirmability can be established through an external expert audit (Schwandt et al., 2007).

This study implemented analyst triangulation or peer debriefing, negative case analysis and member checks in order to establish credibility.

*Triangulation.* The practice of triangulation adds credibility to a qualitative

inquiry (Patton, 2002). The process of triangulation is described as the process of comparing data from multiple sources. Triangulation in this study was conducted between interview data, systematic observation from the ALT-PE and SOFIT, and document analysis.

*Member checks.* In the process of member checking, each of the participants reviewed the stimulated recall transcripts as well as the final interview transcripts to ensure the information itself is accurately portrayed. This provided the researcher with corrections to the transcripts or even further elaborations as a participant reflected on what was said during the stimulated recall (Brenner, 2006) In this study, the transcribed interview data were presented to the participants prior to developing the main themes.

*Peer debriefing.* Peer debriefing was used to aid in probing the researcher's thinking around the research process. The researcher asked for assistance from a non-interested peer to explore aspects of the transcript and resulting themes that otherwise might remain only implied in the researcher's mind (Cooper, 1997). A fellow doctoral student of similar standing to the investigator of this study independently reviewed the data and findings prior to final submission.

*Negative Case Analysis.* The negative case is a case that does not necessarily fit the pattern. It is the exception to the action/interaction/emotional response of others being studied (Corbin & Strauss, 2008). Instead of discarding this "outlier" from the data collection, the "outlier" can be accounted for, and, therefore, explained when compared against theoretical foundations (Lincoln & Guba, 1985). The researcher and peer debriefer reanalyzed data for negative cases after themes were identified. No negative

cases were identified.

*Investigator Bias.* According to Patton (2002), in any naturalistic inquiry it is necessary to acknowledge investigator bias, as bias is part of all investigations. However, as a check on this bias, an acknowledgement of it serves as a filter in which to analyze the results of this investigation. The primary researcher for this study is a National Board Certified Physical Education Teacher since 2006. This created an inherent bias potential in that the researcher might have valued the NBPTS as an avenue for the creation of highly qualified Physical Education teachers. On the other hand, the researcher also believes that the NBPTS attracts highly qualified teachers and merely provides a method of recognition.

## Results

Each teacher participated in a stimulated recall interview session following each ETU lesson. This afforded the teacher an opportunity to reflect upon the lesson's events. In addition, at the conclusion of the study, each teacher participated in a final interview lasting between 45 minutes to one hour. During this final interview, teachers had the opportunity to answer questions about their feelings regarding participation in the study. In the following section, responses to the stimulated recall questions will be discussed. Each question will be discussed individually, with the responses recorded as frequencies. In other words, each question was asked to each teacher twelve times during the course of the study. The following section will discuss how many times a question was responded to affirmatively or negatively and with what kind of specific responded. Those results are followed by the emergent themes from post-lesson and post-project interview data.

**Stimulated Recall Questions**

The first question in the stimulated recall interview was "what were you doing in this segment?" The purpose of this question was to help teachers recall not only what they were doing, but also what they were thinking about as they taught that part of the lesson. All four teachers responded similarly to this question by saying they were observing or monitoring students to see if they were following directions. Two of the four teachers said they were offering feedback to students at they participated in the activities. Katie (secondary NBC) explained, "in general, to facilitate the skills that were going on and to help modify, correct and encourage, I would say". Sallie (secondary non-NBC) said "walking around monitoring, checking to make sure they understood what they were supposed to be doing at each station, making sure they were doing it correctly".

The following question asked to participating teachers was "what were you noticing about the students?" This question was intended to elicit cues regarding student behavior in relation to the teaching process (Clark & Peterson, 1976). While all four teachers commented on the general state of the class, two of the teachers, Katie (secondary NBC) and Jessica (elementary non-NBC) explained that they tended to also focus their attention on individual students. Katie (secondary NBC) explained, "I think some of the kids did pretty good, but then I saw other groups and I'm like...like the one girl. 'All right, throw 'em with two hands', and she chucks it with the one like a baseball throw. I'm like, okay". Similarly Jessica (elementary NBC) explained, "I feel like with that kind of thing, there's a lot of standing around. I hate that. That's a pet peeve number one for me. But if I'm gonna watch and give 'em feedback, then it almost has to be that,

because otherwise I can't see it all at one time".

The general emergent theme was focused on task, however three of the four teachers also made comments about their students "standing around", "wired and out of control", or "clumping together and not successful". Katie (secondary NBC) mentioned her students were "really wired today, so there were some more adjustments or modifications...". Similarly Sallie (secondary non-NBCT) mentioned, "I just think they would get more turns. You would have a partner versus a group of three or four, and they would be moving. I think, a lot more, rather than just standing around waiting for your turn to come".

The next question, "were you thinking of any alternative strategies at this time?" The teachers in this study responded affirmatively 8 times to this question. Katie (secondary NBC) and Jessica (elementary non-NBC) responded affirmatively three times (each day they were asked), while one teacher responded affirmatively twice. After the first day of observations Katie (secondary NBC) explained, " . . . in my head I'm always changing things up". After the second day of observations when asked the same question, she explained, "my lesson plan is different from what I actually – every time you go out there you modify as you see things...always in my head I'm modifying, depending on what I see". Beth (elementary NBC) responded that she would not change her lesson at all as she felt everything was going as planned, "I was sticking to my plan pretty much".

When asked about specific changes, Katie (secondary NBC), Sallie (secondary non-NBC) and Jessica (elementary non-NBC), who answered affirmatively wanted to increase the amount of physical activity opportunities for their students, or they felt as if

they needed more equipment to reduce the wait time. Specifically, Sallie (secondary NBC) explained, “I was thinking of how to add more stations so that there are less people at each station”. Jessica (elementary non-NBC) felt she did not allow her students enough skill practice and she wanted to change the lesson to allow her students to “run through another time; to correct their first mistake”.

The next question, “Did any student’s reaction cause you to act differently than you had planned?” was expected to elicit some judgment on the part of the teacher as to whether the observed behavior (cues) fell in the range of acceptable as defined by the teacher’s plan (Clark & Peterson, 1976). Beth (elementary NBC) and Beth (secondary NBC) explained they would not act any differently. Katie (secondary NBC) despite having said, “I don’t’ know if that objective was met cuz it was really rough”. When asked why she would not make a change to her plan, Katie (secondary NBC) responded that she wanted her students to figure it out on their own. “Part of me needed to step back and say, okay, let ‘em play it out because I think sometimes as a teachers, and sometimes when we see things not working, we wanna step in too quickly instead of letting them try to figure it out. I think at this stage I need to step back and let them try”. The other two teachers, who answered affirmatively, explained some students’ reactions caused them to act differently and react to students’ unexpected behavior. Jessica (elementary non-NBC) voiced her frustration with the large class size by saying, “ there’s 30 kids in that – 31 kids in that class or something ridiculous. I wanted to get to that game, so I only went through it (skill practice) once. They still heard feedback, but still they weren’t given a chance to practice the feedback”. Sallie (secondary non-NBC) explained, “I noticed they

were all clumping together in the middle going after the ball at the same time, so was trying to encourage them to pass the ball and make themselves available to be passed to so that they weren't all just running after the ball in a big, massive clump". Similarly, Katie (secondary NBC) spoke on skill development, explaining that, "instead of having them dribble there and back, I had 'em dribble and then dribble on the outside, so another person could go, hopefully decrease the wait time". Conversely, Beth (elementary NBC) explained after watching her students' reaction to being placed on certain teams "no, cuz I expected that...I'm sticking to my plan even though you don't like it".

The last question referred to the main objective for the entire lesson. Knowing that the teachers had been provided with (and agreed to plan for) specific learning objectives for the ETU, it was expected that their lessons would be focused on those particular objectives. However, the lesson content unfolded quite differently. For example, Sallie (secondary non-NBC) when asked this question responded "basically trying to give them different experiences in soccer skills within the different stations, so making them feel more comfortable with the passing and with the dribbling…". Conversely, Beth (elementary NBC) replied with "learning control of the ball, keeping it in front of you, passing with a partner. That was the main part of the lesson right there, was just dribbling and passing". Neither Sallie (secondary non-NBC) nor Beth (elementary NBC) mentioned the specific learning objective related to the ETU.

**Emergent Themes**

Research members discovered three main themes that emerged from the data, (a) Where's the difference? (b) Building on past skills, (c) Modifications to increase physical

activity, and (d) Goal directed instruction. These themes related to both NBCPETs and non-NBCPETs.

**Theme 1: Where's the difference?**

The most notable theme among the four teachers, whether an NBCPET or non-NBCPET, is there seemed to be no difference in the way they taught or in the way they presented the lessons. Each teacher started the lesson with a warm-up or introductory activity, which consisted of some sort of tag game, followed by a fitness activity. The fitness activity was followed by the ETU portion of the lesson, which lasted an average of 18 minutes. All four teachers included stations where students were instructed to work on specific skills, followed by modified game play. In addition, none of the teachers spelled out the learning objective for the students. Jessica (elementary non-NBC) told her students they were going to learn to shoot on goal as if they were playing kick ball, but she never gave them the five critical elements. "I'm not sure if in the beginning if they knew what my overall objective was for them". Katie (secondary NBC) told her students they were to move the ball down the field by yelling "I'm open", but she never instructed the students on how to create open space or how to move to an appropriate space to receive a pass. Sallie (secondary non-NBC) never mentioned the objective to her students. Instead she just talked to them about moving the ball down the field toward the goal. "I guess I would probably tell them what the objective was, since I didn't do that this time".

Beth (elementary NBC) did not teach shooting on goal until the last day of the unit and did not give her students the critical elements of success. " I don't think I really

caught what exactly I was doing until that second lesson. I know you wanted that goal kick but I didn't know it was like that's specifically what you wanted was that goal kick". Whether this was a lack of content knowledge or a strict adherence to a particular curriculum remains unanswered.

**Theme 2: Building on past skills.**

Participating teachers were asked, "What were you doing during this segment?" Research members found that all four made a reference to monitoring or watching students to see if they were implementing skills learned in previous lessons. Sallie (secondary non-NBC) on the first day of observations explained:

> Checking to see that they were building on their past learning, making sure that they were passing correctly, dribbling correctly, and then just a general understanding of what they were supposed to be doing.

Similarly, Beth (elementary NBC) commented, "I was monitoring the students, seeing if they were following the original direction, which was passing with your partner and throwing, the skills that we learned last week…." Jessica (elementary non-NBC) went further and related the skill of shooting on goal to a previous activity, "What I did was I had them dribble up, but I've done that before with the fifth graders. Plus with them I feel it's like kickball".

Katie (secondary NBC), although still addressing the theme of building on past skills did not relate this to her class as a whole. Instead, she worked very hard at recognizing the fact that some students have a great amount of experience in an activity while other students may have never touched a soccer ball. She noted: "Trying to get the ones that are beginners so they're not so afraid to attempt it, but yet still interest the

people who have been playing soccer for years and giving that a little challenge, too."

**Theme 3: Modifications to increase physical activity.**

The third theme that emerged from the data was the teachers referring to alternative strategies that decreased student wait time and increased physical activity. Katie (secondary NBC), during the second day of observations explained:

> I was thinking of maybe how to add in more stations so that there are less people at each station, or I did notice there were a couple that maybe could have used a little bit more equipment, maybe a couple more soccer balls to make it a little bit easier for 'em to work in smaller groups.

She followed this up by commenting on her station set-up: "Instead of having 'em dribble there and dribble back, instead I had 'em dribble and then dribble on the outside, so another person go to hopefully decrease that wait time."

Sallie (secondary non-NBC), made a similar comment after the first day of observations when her students also participated in stations geared toward specific skills such as dribbling and passing:

> I just think they would get more turns to—yeah, more turns. Chance to be more active. You would have partners versus a group of three or four, and they would be moving, I think, a lot more rather than just standing waiting for their turn to come.

Jessica (elementary non-NBC), having mentioned the strain of large class sizes and feeling as if she was not providing enough opportunity for physical activity or skill practice mentioned, "there's just so many kids in that class I feel like I needed to break it down, plus if I'm doing that, it's hard for me to give feedback".

Beth (secondary NBC) had noticed during her first day of soccer that while

several of her students did not appear to know how to play soccer, several others appeared to be very skilled, “I think the higher kids were pulling the lower kids up, forcing them to play more. I felt like that made it a little bit more even among the teams”. On the second day of observations, Beth (elementary NBC) said “they were more actively engaged in the game ‘cuz we made it a more concentrated effort – or I made a more concentrated effort- to make sure there were various levels in their group”. Sallie (secondary non-NBC) on the third day of observations stated, “that there was a huge improvement over the first day that we did soccer. There was a lot more passing and moving, a lot less screaming and ducking”.

**Theme 4: Goal Directed Instruction**

The fourth and final common theme among all participants was that of goal directed instruction. All four participating teachers were given the ETU and were asked to ensure they were clear on the student learning objectives. Both Katie (secondary NBC) and Jessica (elementary non-NBC) asked a variety of questions regarding the study via e-mail. Jessica (elementary non-NBC) was concerned before the study even started because her students are used to engaging in each activity for two weeks (two days of instruction) and this study gave her the opportunity to engage her students in one activity for a much longer period of time. “So let me make sure I get this…. My curriculum only has soccer for 2 weeks at the 3-5$^{th}$ grade level, so do I need to keep playing soccer for 5 weeks, or can I stick with my curriculum?”

In a subsequent e-mail, she sent this question: **“**My concern is that only having PE once per week that my students will not get my curriculum and when they are assessed

they will not know what I'm assessing them on if they have been doing other activities".

Katie (secondary NBC) asked questions specifically about the learning outcome of offensive support, "What do you mean exactly when you say offensive support? How do you teach the students how to move the ball offensively?" This question was answered by providing her with the definition of support from Mitchell, Oslin & Griffin (2006). Katie was still concerned that her students were not going to get the concept of soccer as a whole:

> I am still a bit confused about your offensive support- do you want all the lesson plans to have this theme in mind or a lesson plan. Usually, I do not focus on one objective for the whole unit- the major concern is that students learn the skills and have a better comprehension of the game and confidence by the end of the unit. On the pre and post-test days do you expect that to take the whole hour?

After all the questions were answered and concerns addressed, the researcher was confident that the teachers would be able to provide their students with opportunities to focus on the learning objectives. On the contrary, Beth (elementary NBC) indicated that:

> As I was watching it I was thinking—I was reflecting back to my segment where I did the outside skill and the goal kick and I was thinking, 'You know, this should've probably been presented as one of the first things rather than leaving it at the end of this unit of soccer.

During all three days of observation, Beth only presented and demonstrated the technique of shooting on goal during the last ETU lesson. On the other hand, Jessica (elementary non-NBC) presented the skill of shooting on goal each day, but it was practiced in isolation as opposed to during modified game play. After Jessica's students

were given the opportunity to practice their shots on goal, they were put into teams for soccer games.

The first day of game play consisted of small teams, 5-6 players. However, during the next two lessons students were placed on two fields, either the advanced field or the 'still learning' field and those students were divided up into two teams. Therefore, the class was playing 11 v 11 Soccer, and only a select few students had the opportunity to practice shooting on goal during game play. When asked about this following the lesson, her response was as follows:

> I only went through it once. There's 30 kids in that—31 kids in that class or something ridiculous. I wanted to get to that game, so I only went through it one time. They still heard feedback, but still they weren't given a chance to practice the feedback. That would be my issue.

Similar to Beth (elementary NBC), Jessica (elementary non-NBC) also admitted that initially her focus was not the learning outcome for the study, but rather the learning outcomes of the district approved curricular model:

> I think, in the beginning, I was trying to somewhat stay with the Pangrazi outcomes, you know what I mean, and thinking about, also, what the general outcome for soccer is; but then after we took it past that two or three weeks, I guess, I think I narrowed the focus down more into the shooting and that kind of thing.

At the secondary level, students were expected to develop their ability to provide offensive Support, which implies students need to be involved in modified game play in order to practice and come to understand its role in the game. However, the first day of the soccer unit, Katie (secondary NBC) provided a lecture on the rules of soccer. During

the second and third day the students were engaged in several skill stations, working on skills such as heading, dribbling through cones and juggling the soccer ball. Katie's (secondary NBC) students did not engage in an actual modified soccer game until the final two days of the ETU, one of which was the post-test day. When asked whether Katie (secondary NBC) felt her lesson plans aligned with the learning outcome, her response was:

> I really try to incorporate the learning objectives into my lessons, to be able to slowly be able to get them to that objective. It is kinda hard in our short week to be able to do that and try to make a really big difference. I try to create drills and opportunities for them to be able to meet those objectives when the time came. That way, they could be confident in that.

**Post-study Interview Emergent Themes**

The post study structured interview included questions regarding the participants' motivations to become teachers, their perceptions about collaboration with other teachers on campus as well as questions regarding their participation in this study. During the final interview, the participants were shown the results of their students' pre- and post tests and asked to reflect on them. Beth (elementary NBC) replied that "maybe I needed to, up front, spend more time. I know there was a good one lesson that went by and I didn't even talk about it, so that could be". Sallie (secondary non-NBC) when asked specifically what she might do differently if ever involved in a similar study replied "I guess I would probably tell them what the objective was, since I didn't do that this time. Kinda give them a better idea of that's expected of them 'cuz they didn't really have any idea coming into it. They just knew we were gonna be taped and we were doing soccer". Similarly,

Jessica (elementary non-NBC) said “I’m not sure if they knew in the beginning what my overall objective was for them. I think in the beginning I didn’t do such a great job of ‘this is where I want you at the end’ for that particular skill”. When asked whether she thought her lesson plans were aligned with the learning objective of Offensive Support, Katie (secondary NBC) explained “I try to create drills and opportunities for them to be able to meet those objectives when the time came. That way, they could be confident in that”. However, the majority of the drills Katie had her student participate in involved isolated skills such as dribbling around cones, juggling the soccer ball, heading and shooting. She did have one station where the students were instructed to spread themselves out with one person in the goal box, one person playing offense and one person playing defense, and the offensive person was to try and score. If the offensive person could not score after three tries, the defensive person was to let them shoot. After the lesson, she informed the researcher this was her station for the students to work on offensive support; another example of a lack of content knowledge.

In a separate study with the same teachers, it was determined that the ETU produced no differences in pre- to post-test gain scores between the two groups. It was therefore determined that students in this study learned the same amount of content from non-NBC teachers as those with NBC status.

## Discussion

The research on the decision-making processes of teachers describes the differences among experienced and inexperienced teachers (Housner & Griffey, 1985). In the case of this study, the NBCPETs and non-NBCPETs were matched by as many

factors as possible, including years of teaching experience for comparison purposes.

Housner and Griffey (1985) stated that during interactive teaching experienced teachers in Physical Education focused most of their attention on individual student performance while the inexperienced teachers attended most frequently to the interest level of the entire class. This phenomenon was true for the secondary teachers in this study. Katie, the secondary NBCT did focus her attention during teaching on what each individual student was doing and she provided constant, corrective feedback and praise. Sallie on the other hand, the secondary non-NBCT tended to focus on what the entire class wanted to do. Sallie even admitted to the researcher that having the microphone on forced her to walk around and talk more during class than she normally would.

Conversely, some of the actions of the elementary teachers in this study were inconsistent with previous research (Housner & Griffey, 1985). Although both teachers had been teaching elementary school for over 20 years, Jessica (elem non-NBCT) asked several questions before the study began. During her teaching she focused her attention on individual students. Beth (secondary NBC) on the other hand, tended to focus on small groups of students instead of individual students, unless there was a behavioral issue. Each day when asked what she noticed about her students she responded with "they were active, they were moving", which was apparently the main concern.

Participating teachers were given an ETU with a specific learning objective for their students. As the ETU unfolded, a clear disconnect emerged between the learning objective and the lesson content actually presented to the students. For example, the secondary teachers were presented with a tactical (offensive Support) objective, yet the

majority of the unit was spent in small groups working on techniques such as dribbling through cones or shooting on goal. Conversely, the elementary teaches were presented with a technique-related objective (shooting on goal), yet the majority of the ETU was spent in modified game play. Either the teachers did not understand the objective of the ETU or they did not know the content they were to teach (soccer). According to Phillips (2009), NBCTs not only have to demonstrate appropriate content development but this content development has to obviously be a means to an end.

Proposition Two of the Five Core Propositions states teachers know the subjects they teach and how to teach those subjects to students (NBPTS, 2014c). After receiving the ETU objective of Offensive Support, the secondary NBC (Katie) asked me "what exactly is Offensive Support and how do I teach that to my students?". How is it that a teacher has achieved the most respected professional certification available in education, but she does not know the basics of her own content area? One of the components of the certification is a written assessment of content knowledge, yet this teacher was unclear on how to teach a fundamental aspect of sport.

Both elementary teachers even commented that they wanted their students to be comfortable with the rules of soccer along with knowing how to move the ball down the field effectively. In addition, Beth, (elementary NBC) did not even introduce or focus on the intended objective until the last day of the unit, making the comment "I don't think I really caught what exactly what I was doing until probably that second lesson. I know you wanted that goal kick, but I didn't know it was like that's specifically what you wanted was that goal kick. Then I think I maybe would make sure…".

The questions that remain unanswered include: Why was there such a disconnect between the specific learning objective and the instructional content, across both groups of teachers? In addition, have the teachers become too focused on physical activity and not focused enough on student learning? Various factors have influenced the current Physical Education curriculum, (e.g., USDHHS, 2000; Kohl III & Cook, 2013) with recommendations of 50% MVPA during Physical Education classes. Have teachers, both NBCPETs and non-NBCPETs now have made physical activity the main objective, sidelining motor learning and the documentation of cognitive assessment.

Butler (2005) discussed the issue of teachers being reluctant to change from their habits. Specifically, can teachers ('old dogs) adopt a curriculum that differs from the traditional technique based approach (Butler, 2005)? Physical Education teachers go through five teaching stages: 1) fantasy, 2) euphoria, 3) survival, 4) apprenticeship, and 5) rediscovery (Butler, 2005). Once teachers reach the apprenticeship stage, a stage where they are no longer under the scrutiny of a mentor teacher and are teaching their own groups of students, they are free to explore and implement various curricula. However, changing from the way a teacher was taught while in grade school, what they learned in their Physical Education Teacher Education program, and from the way their mentor teachers taught, involves stepping out of the comfort zone, which was difficult to achieve (Butler, 2005).

Because of the current obesity crisis and the importance of reducing the risk of chronic diseases during childhood (CDC, 2014), it stands to reason that all of the participating teachers were most concerned with providing enough physical activity, or

MVPA during the class time. It is unclear if this was the normal protocol, or if they were trying to provide more opportunities for MVPA strictly because they were being video recorded and later analyzed.

In addition, the secondary teachers, in spite of the specified learning outcome of Offensive Support, chose to implement lessons in which the students practiced individual skills in isolation. This reflects a technique-first approach to teaching sport games and is appropriate for elementary students who are first learning a new skill. However, the students in the seventh grade classes, although the majority may not have been part of an afterschool soccer team, it can be assumed they have been exposed to the game of soccer during their elementary years. Therefore, a more appropriate curriculum for secondary teachers might be teaching games for understanding (TGfU; Bunker & Thorpe, 1982) or the Sport Education Model (SEM; Siedentop, 1984). Both these curricula offer students the opportunity to be engaged in more game play and the learning of tactics, while at the same time practicing skill techniques in an authentic environment (Mitchell & Oslin, 2010; van der Mars & Tannehill, 2010).

According to Ward (2013), teaching and student behaviors are highly related and some teaching and student behaviors in a lesson impact student learning and some do not. In addition, in-class learning affects student achievement and teachers vary in their use of effective managerial and instructional behaviors and thus in their effectiveness as teachers (Ward, 2013). Interestingly enough, the teachers in this study did not differ in their managerial or instructional behaviors. Their routines were essentially the same, starting with a warm-up, a fitness component, which led into the ETU portion of the

class, followed by a short closure. In addition, teachers were strict about providing the warm-up and fitness portion of the lesson no matter what. During the last day of observations with Katie (secondary NBC), the school had a fire drill, which left approximately 15 minutes for class. Instead of going directly into the ETU of the lesson, she insisted on providing her students with the fitness portion of the class so they would be sure to get at least 5 minutes of MVPA. This is despite her lesson plan for the day included modified game play of 4 v 4 soccer, which if all students gave 100%, would engage them in MVPA for the entire ETU.

Proposition four of the Five Core Propositions states that teachers think systematically about their practice and learn from experience (NBPTS, 2014c). Specifically, teachers must at times face choices that force them to sacrifice one goal for another. For example, during this study, teachers were asked to teach specifically to one learning objective. However, from the resulting data it appears the teachers, both NBCPETs and non-NBCPETS, were not willing to sacrifice their typical lesson plans for that of the ETU. Beth (elementary NBC) "I wanted them to learn the game first", even though the elementary learning objective was shooting on goal. In addition, Beth admitted that she wanted to teach her students many different ways to kick and "I don't think it was my third lesson that I actually showed them how to do a goal kick. I was like, 'I should have probably did that at the beginning so we could see some improvement."

The previous research mentioned using the ALT-PE instrument was conducted primarily in clinical setting (e.g., Housner & Griffey, 1985) or with a select group of

students (e.g., Ashy, Lee & Landin, 1988). One strength of this study was that it was conducted with intact classes in regular school settings, similar to Graham et al. (1983). This study also involved actual in-service teachers, teaching their typical classes during regular school days. Because this study was conducted with intact classes, there is an assumption that some students are experienced soccer players and are therefore more skilled than others in the class. The students who were proficient during the pre-test are presumably going to be proficient during the post-test. It is possible that the assessments used would not be able to discriminate between the two groups of students; those taught by NBCPETs and those taught by non-NBCPETs.

This study had two limitations: (a) the limited number of site visits, and (b) the limited number of participants. The number of site visits is considered a limitation because there is always a possibility that the researcher observed the participants on either a good day or a bad day. In addition, observing intact classes involves the risk of extra events such as lock down drills, fire drills, or student absences. The second limitation is the small number of teacher participants that prevents the generalizability of the results. Third, all four of the participants were from the state of Arizona, which makes the results more difficult to transfer to other contexts. Finally, all four participants report that they worked in schools with students from middle-class socio-economic background, also limiting generalizability.

## Conclusion

The National Board for Professional Teaching Standards claims that the process of certification is designed to develop, retain and recognize accomplished teachers

(NBPTS, 2014). In addition, completion of NBC is supposed to signify that a teacher has developed and demonstrated advanced teaching knowledge, skills and practices (NBPTS).

The purpose of the present study was to describe the decision-making processes employed by National Board Certified Physical Education Teachers (NBCPETs) and non-NBCPETs. The common themes that emerged from the analysis of the stimulated recall interviews included building on past skills, modifications to increase physical activity and goal directed instruction. Although the participants were interested in their students meeting the specific objectives of the ETU, all four teachers discussed their concern for students "being active and moving", which is reverting to the concept of simply keeping students "busy, happy and good" (Placek, 1983). Based on this study's findings, its methods, and its limitations, the decision-making processes employed by NBCPETs were not different from those of non-NBCPETs

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## Chapter 5 – Summary

The National Board for Professional Teaching Standards (NBPTS) defines an "accomplished teacher" as one who has demonstrated the high level of knowledge, skills, abilities and commitments that are reflected in the Board's five core propositions, as well as shown their ability to enhance student learning (Vandevoort, Amrein-Beardsley & Berliner, 2004). The purpose of this project was to investigate the differences in teaching effectiveness between National Board Certified Physical Education Teachers (NBCPETs) and non-NBCPETs. Recent review of the literature research on teaching infers that teachers are powerful contributors to students' academic achievement. However, the characteristics that make for high-quality and effective teaching have yet to be satisfactorily determined (Vandevoort, Amrein-Beardsley, & Berliner, 2004). Required state tests, together with locally determined assessments are the usual source of data on student performance for classroom teachers. Berliner (2014) discusses the issue of value-added assessments of teachers as a method of identifying the most effective and the most ineffective in a school system (Berliner, 2014). However, these assessments do not take into account the effects of countless exogenous variables on student achievement (e.g., peer classroom effects, school compositional effects, class size, neighborhood characteristics in which some students live) (Berliner, 2013).

While it is necessary to ensure that our teachers are effective, many educational leaders oppose the idea of connecting student test scores to teacher evaluations (Darling-Hammond, Amrein-Beardsley, Haertel, & Rothsetin, 2012). According to Good (2014), researchers have attempted to link teaching practices to student outcomes since the 1970s

(Good, 2014). However, the research has failed to consider other outcomes of schooling other than achievement, such as creativity, adaptability, problem finding and problem solving (Good, 2014).

The Five Core Propositions on the NBPTS form the foundation and frame the rich mixture of knowledge, skills, dispositions and beliefs that characterize National Board Certified Teachers (NBCTs). The Five Core Propositions represent what all accomplished teachers share in their expertise and dedication to advance student achievement: (a) teachers are committed to students and their learning, (b) teachers know the subjects they teach and how to teach those subjects to students, (c) teachers are responsible for managing and monitoring student learning, (d) teachers think systematically about their learning practice and learn from experience, and (e) teachers are members of learning communities.

To date, there are approximately 200 published research studies that have investigated the impact of National Board Certification (NBC) on teaching practices and student achievement. However, the research is unclear about whether teachers with NBC are more effective than teachers without NBC. The NBPTS has also published numerous benefits to achieving National Board Certification. According to the NBPTS, these benefits include strengthening your practice, helping students succeed, advancing your career, providing portability, offering higher salary potential, enhancing education, and achieving National Board Certification meets most states' definition of "highly qualified teacher" under No Child Left Behind (NCLB). However, the majority of the research studies are focused on the core academic subjects that use standardized testing as a means

of measuring student achievement and teacher effectiveness (Smith, Gordon, Colby & Wang, 2005; Vandervoort et al., 2004), and Physical Education is not considered a core subject area.

This current study is only the second study in which the teaching effectiveness of National Board Certified Physical Education Teachers (NBCPETs) and non-NBCPETs was compared using evidence-based indicators of teaching effectiveness. Academic Learning Time-Physical Education (ALT-PE) is specifically defined as being the percentage of class time during which students are effectively and successfully engaged into Physical Education content activities (Godbout, Brunelle, & Tousignant, 1983). The time that students spend engaged successfully is considered a key indicator of teacher effectiveness, because of its relationship with student achievement (van der Mars, 2006).

The other systematic observation tool used during this study was the System for Observing Fitness Instruction Time (SOFIT) (McKenzie, 2002; McKenzie, Sallis & Nader, 1991). The current project investigated the opportunities provided by teachers for students to engage in moderate to vigorous physical activity (MVPA).

The main purpose of this study was to investigate and compare the teaching practices of NBCPETs and non-NBCPETs in regards to: (a) providing opportunities to engage in MVPA, (b) opportunities to participate in motor activity at an appropriate success rate, and (c) the decision making processes employed by both sets of teachers. Four teachers from two different school districts in the western U.S. participated in this study. The small sample size is due to several factors including the time constraints of a doctoral dissertation, financial resources and districts approval.

The results from the current sample however do not show any significant difference in the amount of time spent engaged in MVPA by students taught by a NBCPET when compared to students taught by a non-NBCPET ($F$ (2,4) = .886, $p$ = .480. Nor is there a significant difference in the amount of time students taught by a NBCPET spend engaged in motor activity at an appropriate success rate as compared to students taught by a non-NBCPET ($F$ (2,4) = .4.455, $p$ = .096.

A Chi-Square test of Independence was conducted, and there were no significant differences found in the results of the student achievement gain scores ($x^2$(1) = .376, $p$ > .05). In other words, based on the data, project design and limitations, the results indicate that the student's gain scores were not affected by whether they were being taught by an NBCPET or non-NBCPET.

The three main themes that emerged from the analysis of the stimulated recall interviews were (a) building on past skills, (b) modifications to increase physical activity, and (c) goal directed instruction.

This project had two identifiable limitations that were common to both studies (a) the limited number of site visits, (b) the limited number of participants. The number of site visits is considered a limitation because there is always a possibility that the researcher observed the participants on either a good day or a bad day. The second limitation, the limited number of participants limits the generalizability of the results. In addition, all four of the participants were from the western U.S., which makes the results more difficult to transfer to other contexts.

**Future Investigations**

More research needs to be done in the area of NBC and Physical Education. The lack of current literature limits the availability of information necessary for in-service Physical Education teachers to make an informed choice as to whether they should pursue NBC. In addition, more research needs to be done in order to establish a link between NBC for Physical Educators and academic achievement in order to encourage policy makers to provide incentives for those who choose to go through the process.

Although the NBPTS utilizes the Five Core propositions and its certification process to identify and certify teachers who have met the high and rigorous standards, this study's non-NBCTs were able to provide their students with similar learning environments as the NBCTs. The evaluation process used to identify and certify teachers who chose to go through National Board certification does not utilize evidence based indicators of teaching effectiveness such as ALT-PE and SOFIT. Instead, candidates submit a portfolio which includes four separate examples of either teaching or student work. It would be beneficial to investigate this process further, possibly determining whether an alternative process for certifying Physical Education teachers might be more effective.

In addition, further investigations on the connection between ALT-PE levels, opportunities to engage in MVPA and student learning are warranted in the context of the National Board Certification process. Although Woods and Rhoades (2010) mentioned that linking NBC to increased student learning is a relatively major undertaking, research in Physical Education has considered both the context in which instruction occurred and

the nature of the task, which indicated engaged time was related to achievement (Silverman, Tyson, & Morford, 1988).

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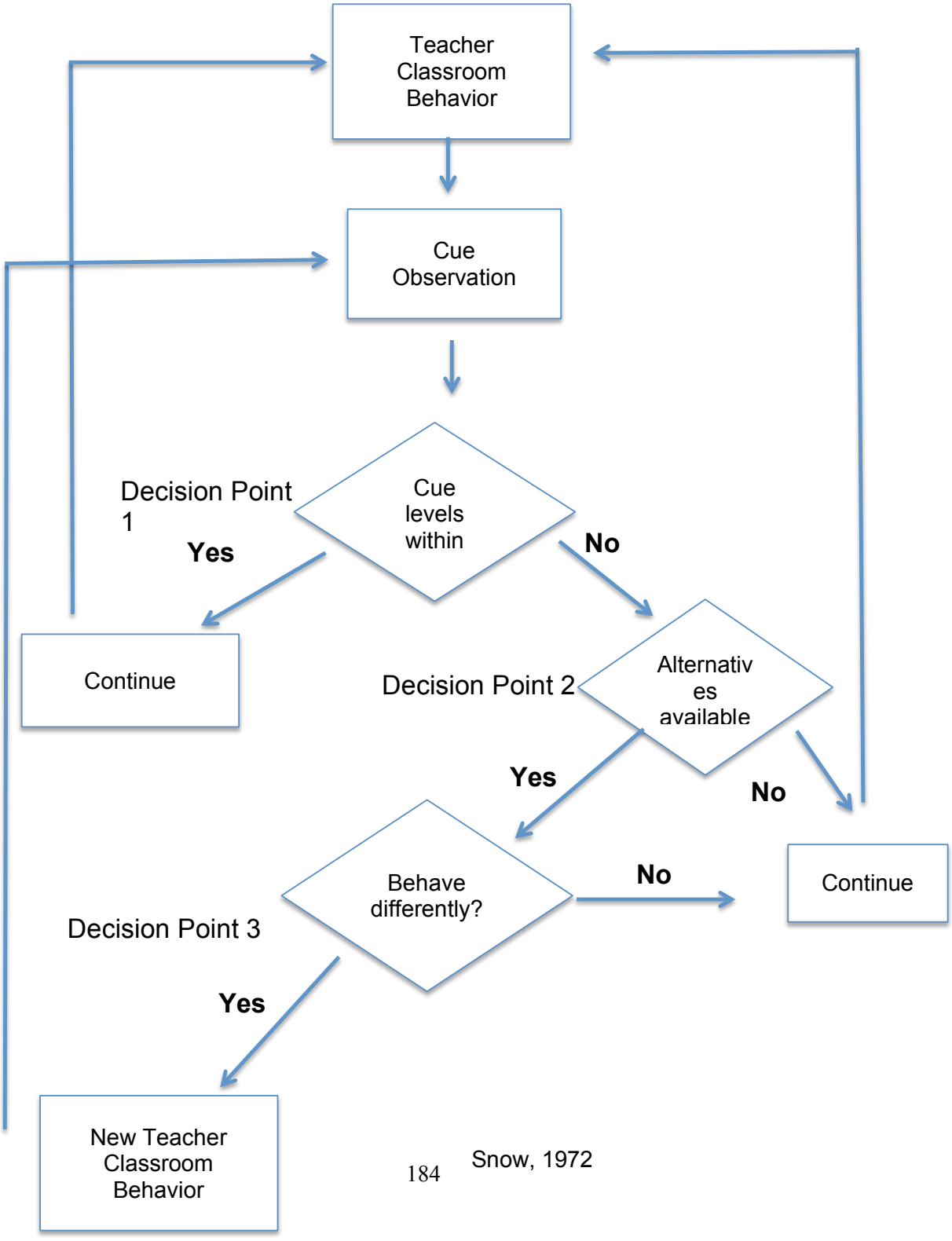
# APPENDIX A

## MODEL OF A TEACHER'S COGNITIVE PROCESSES DURING TEACHING


Teacher Classroom Behavior
Cue Observation
Decision Point 1
Cue levels within
Yes
No
Continue
Decision Point 2
Alternativ es available
Yes
No
Continue
Behave differently?
No
Decision Point 3
Yes
New Teacher Classroom Behavior



Snow, 1972

# APPENDIX B

## TEACHER INFORMED CONSENT FORM

You are invited to participate in the above-titled research project that is being conducted by Dr. Hans van der Mars, Responsible Project Investigator and Professor in the Department of Physical Education at Arizona State University and Jennifer Houston, Doctoral Candidate in the Department Physical Education at Arizona State University. The purpose of this project is to descriptively analyze your classroom practices and teaching methods. Descriptive analysis will involve examining video recordings of your classes, interview data, and survey results, in an effort to accurately describe your practices as a physical educator. This research has no specific benefit for you; however knowledge that will be gained may be utilized by teacher educators in the production of excellent physical education instructors.

If you agree to participate, you will be asked to: (a) allow the investigators to observe and video record five to eight of your classes in the spring of 2013; (b) complete a brief survey instrument. These lessons will be video recorded for the entirety of the lesson and the survey will take approximately 45 minutes to complete.

There are minimal foreseeable risks from participating in this project. You may also discontinue participation in the project at any time without prejudice. Participation is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you would otherwise be entitled. You understand that you will receive no monetary compensation for your participation.

The results from this study will be used primarily for research presentations and publication in professional journals. Any information that is obtained in connection with this study and that can be identified will remain confidential. The only document with your name will be this signed consent form. Only the researchers in the study will have access to the data.

If you have any questions about the research at any time, please call or write Dr. Hans van der Mars, Arizona State University, Division of Educational Leadership and Innovation, Physical Education Department, Santa Catalina Hall, Rm #330-S, Mesa, AZ 85212 (phone 480-727-1653, or email hans.vandermars@asu.edu).

_____ _____

Primary Investigator's Signature Date

I have read and understand the above consent form and I voluntarily agree to participate in this study.

# APPENDIX C

## PARENT'S INFORMED CONSENT FORM – NBCT

Your child is invited to participate in a research study about National Board Certified Physical Education Teachers. This research is being conducted by Dr. Hans van der Mars, Responsible Project Investigator and Professor in the Department of Physical Education at Arizona State University, and Jennifer Houston, Doctoral Candidate in the Physical Education at Arizona State University.

As you may be aware your child's physical education teacher is a National Board Certified Teacher. Because of his/her certification, a research team from the Arizona State University is interested in analyzing his/her teaching in the classroom. As part of this study, the researchers would like to videotape several your child's physical education classes. The videotaping will allow the researchers to closely study your child's physical education teacher. This research has no specific benefit for your child; however knowledge that will be gained may be utilized by teacher educators in the production of excellent physical education instructors. The results from this study will be used primarily for research presentations and publication in professional journals. Any information that is obtained in connection with this study and that can be identified will remain confidential.

The video recording would be for five to eight class periods during a two week period in the Fall semester, 2013. Your child will not be singled out during videotaping. These tapes will be used to analyze how your child's physical education teacher organizes and teaches lessons. The videotaped classes will be viewed only by the researchers involved in this study. The videotapes of the classes will be kept for four years and then destroyed. Your child's identity would remain completely confidential.

Participation in this study is completely voluntary. There is no known risk to participation in this study beyond that of normal participation in your child's physical education class. There will be no penalty to your child if you choose not to allow him/her to be videotaped as part of these classes. Your child will also be given the opportunity to refuse participation. If a child is not a participant in this study they will attend class as normal, when video recording occurs, the camera will be set to make sure your child remains out of frame.

If you have any questions about the research at any time, please call or write Dr. Hans van der Mars, Arizona State University, Division of Educational Leadership and Innovation, Physical Education Department, Santa Catalina Hall, Rm #330-S, Mesa, AZ 85212 (phone 480-727-1653, or email hans.vandermars@asu.edu), or Jennifer Houston (phone 480-334-4721, e-mail jehousto@asu.edu).

Name of Student _____

School your child Attends _____

Name of Parent/Guardian _____

I have read and understand the above consent form and I voluntarily agree to allow my child to participate in this study.

Parent/Guardian signature_____Date_____

Please check the following:

_____My child may be video recorded during physical education class

# APPENDIX D

## PARENT'S INFORMED CONSENT FORM – NON-NBCT

Your child is invited to participate in a research study about the teaching practices of Physical Education teachers. This research is being conducted by Dr. Hans van der Mars, responsible Project Investigator and Professor in the Department of Physical Education at Arizona State University, and Jennifer Houston, Doctoral Candidate in the Physical Education at Arizona State University.

As part of this study, the researchers would like to videotape several your child's physical education classes. The videotaping will allow the researchers to closely study your child's physical education teacher. This research has no specific benefit for your child; however knowledge that will be gained may be utilized by teacher educators in the production of excellent physical education instructors. The results from this study will be used primarily for research presentations and publication in professional journals. Any information that is obtained in connection with this study and that can be identified will remain confidential.

The video recording will be for five class periods during a one week period in the spring semester, 2014. Your child will not be singled out during videotaping. These tapes will be used to analyze how your child's physical education teacher organizes and teaches lessons. The videotaped classes will be viewed only by the researchers involved in this study. The videotapes of the classes will kept for four years and then destroyed. Your child's identity would remain completely confidential.

Participation in this study is completely voluntary. There is no known risk to participation in this study beyond that of normal participation in your child's physical education class. There will be no penalty to your child if you choose not to allow him/her to be videotaped as part of these classes. Your child will also be given the opportunity to refuse participation. If a child is not a participant in this study they will attend class as normal, when video recording occurs, the camera will be set to make sure your child remains out of frame.

If you have any questions about the research at any time, please call or write Dr. Hans van der Mars, Arizona State University, Division of Educational Leadership and Innovation, Physical Education Department, Santa Catalina Hall, Rm #330-S, Mesa, AZ 85212 (phone 480-727-1653, or email hans.vandermars@asu.edu). You will be given a copy of this form for your records.

Name of Student _____

Name of Parent/Guardian _____

School your child attends _____

I have read and understand the above consent form and I voluntarily agree to allow my child to participate in this study.

Parent/Guardian signature_____Date_____

Please check the following:

_____My child may be video recorded during physical education class

# APPENDIX E

## CHILD 8-17 YEARS OF AGE INFORMED ASSENT FORM

You are invited to be a part of a research study that is being done by Dr. Hans van der Mars, a teacher at Arizona State University. Hans has sent a student of his to observe your class, her name is Jennifer Houston. Your teacher is a very special type of teacher, and Jennifer would like to learn more about your teacher.

If you would like to be a part of this study Jennifer will watch your physical education class. She will need to video tape your class so she and Hans can study your teacher closer when she gets back to Arizona State University. No one but Jennifer and Hans will ever see the tape of your classes. After four years the tapes will be destroyed.

No one will know who you are on the video and the only paper with your name on it will be this signed assent form. Only the people researching for this study will be able to see anything about you.

If you sign below you are letting us know that you have read this paper and are agreeing to participate in the study.

There is no penalty for not participating in the study. However, if you decide to not participate, you will be placed in an alternative Physical Education class for the duration of the study as deemed appropriate by your teacher.

Participants Signature Date

Please check the following:

_____I agree to be video taped

# APPENDIX F

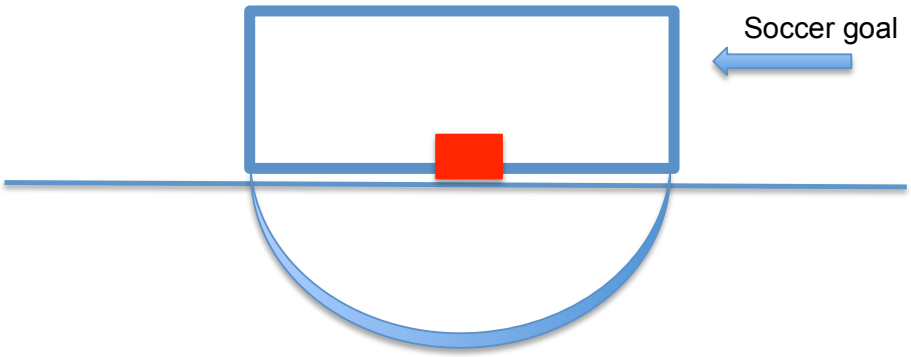
## ELEMENTARY LEARNING OBJECTIVE

Elementary Learning Objective

Shooting: Students will properly demonstrate the skill of shooting the soccer ball at a goal from a specified spot (*) 8 meters from the goal line.

Criteria for success:

- Student approaches the ball at an angle
- Student runs up to ball with last step a slight jump, landing on supporting leg beside the ball.
- Kicking leg comes through with ball being contacted with the instep or laces of the foot
- Kicking leg follows through in direction of the goal
- Hop with opposite foot, landing on kicking foot

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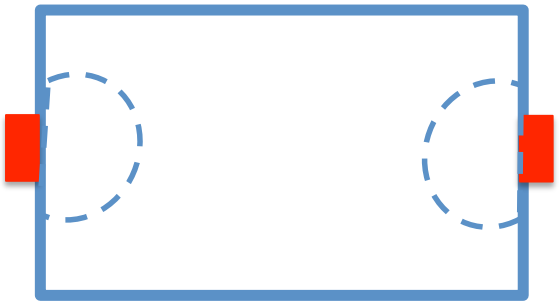
# APPENDIX G

## SECONDARY LEARNING OBJECTIVE

Secondary Learning Objective
Offensive tactic: students will effectively demonstrate the concept of support during a modified soccer game (i.e., 4 v 4, w. modified field size; small goals, no goalies).

Criteria for success:

- Student is appropriately supporting teammate with ball by moving into the proper position in order to receive a pass with sufficient space from opposing player.



# APPENDIX H

## SCORING GUIDE FOR SHOOTING ON GOAL PRE – POST-TEST

| Student # | | trial 1 | trial 2 | |
|---|---|---|---|---|
| Critical Element #1 | Approaches ball at an angle | | | |
| Critical Element #2 | Runs, last step slight jump, lands on supporting leg beside ball | | | |
| Critical Element #3 | Kicking leg comes through making contact with ball with the instep or laces of the foot | | | |
| Critical Element #4 | Kicking leg follows through in direction of goal | | | |
| Critical Element #5 | Hop with opposite foot, land on kicking foot. | | | |

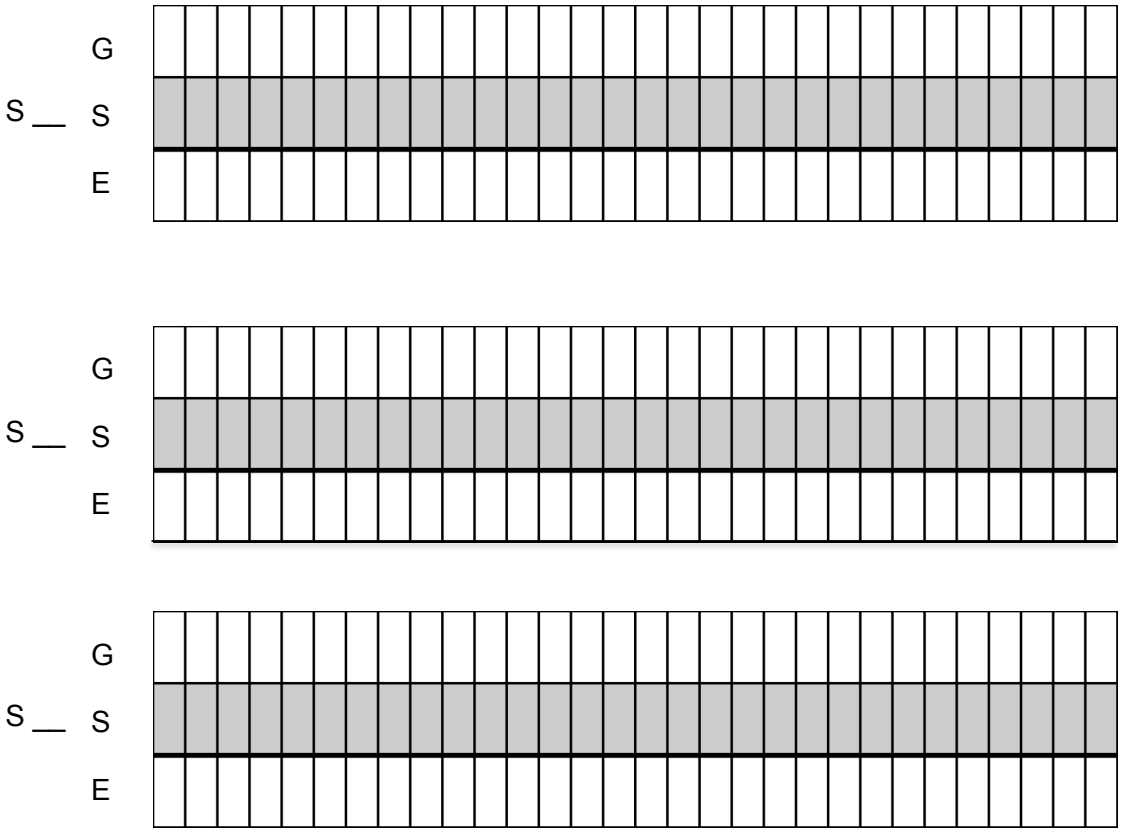
Source: Fronske, H. (2008). *Teaching sport cues for sport skills for secondary school students* (4th ed). San Francisco, CA: Pearson

# APPENDIX I

## OFFENSIVE SUPPORT PRE – POST-TEST CODING FORM

Offensive Support Coding Form

Teacher Name: _____Length of Obs: _____
Observer: _____ Date of class: _____
Content: _____ Obs. #:_____




**Game Context (G)**
Defense (D)
Offense (O) →
Instructor Stop (I)
Restart (R)

**Player Status (S)**
In Possession (P)
Off the Ball (OF) →

**Player Engagement (E)**
Appropriate Support (AS)
Inappropriate Support (IS)
Waiting (W)
Off-Task (OFT)
Other (OTH)

# APPENDIX J

## SUPPORT DEFINITIONS

**Game Context: (C)**
**Offense (O):** is the action of attacking or engaging an opposing team with the objective of scoring points or goals

Y = the student is engaged in an offense role

N = the student is engaged in a defense type role

**Instructor Stop (I)**
**Restart (R)**

**Player Status: (S)**
**Possession (P) =** Student is in actual possession of the ball, either dribbling, receiving a pass or in the process of passing to a teammate.
**Off the ball (O)** = Student is in a support role, on the offense but currently NOT in possession of the ball

**Player Engagement: (E)**

**Appropriate Support (AS):** student appears to support the ball carrier by being in or moving to an appropriate position to receive a pass.

**In appropriate Support (IS):** student does not appear to support the ball carrier as he/she is not in or does not move to an appropriate position in order to receive a pass.

**Waiting:** Student is engaged in game play, but ball went out of bounds or goal was scored so they are waiting for game play to resume

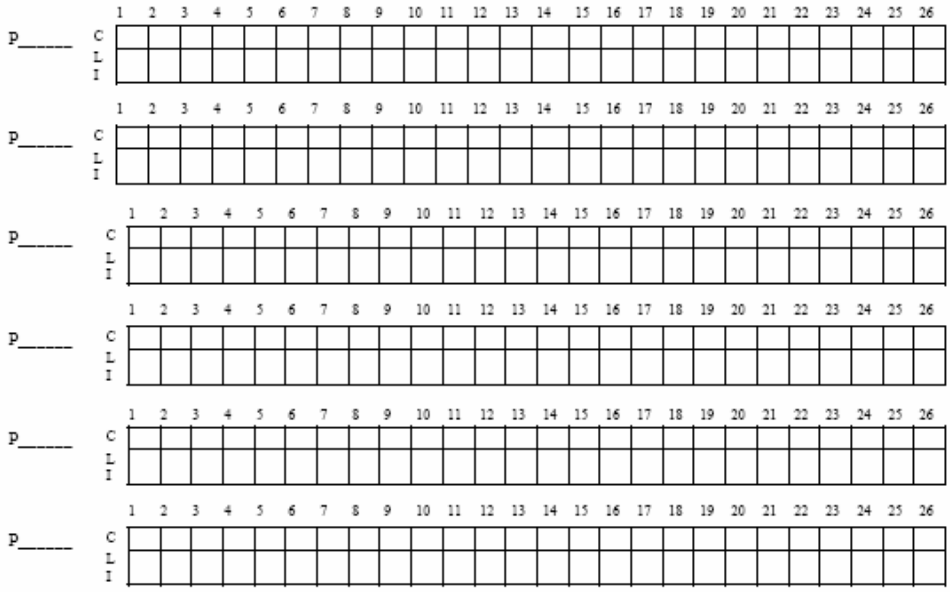
**Off task (OF)** player may still be moving, but not in such a way that she provides support to the person who is in possession of the ball.

**Other (O)** The player is on the field but is not engaged in game play, not paying attention and does not seem to care about the game outcome.

Source: Mitchell, S.A., Oslin, J.L., Griffin. L.L. (2006). *Teaching sport concepts and skills: A tactical games approach (*2nd Ed). Champaign, IL: Human Kinetics

# APPENDIX K

## ACADEMIC LEARNING TIME-PHYSICAL EDUCATION DATA COLLECTION SHEET




P = Pupil
C = Context of the interval
LI = Level of involvement of pupil

| Context Level (C) | | | Learner involvement level (LI) | |
|---|---|---|---|---|
| *General content* | *Subject matter knowledge* | *Subject matter motor* | *Not motor engaged* | *Motor engaged* |
| Transition (T) | Technique (TN) | Skill practice (P) | Interim (I) | Motor appropriate (MA) |
| Management (M) | Strategy (ST) | Scrimmage/routine (S) | Waiting (W) | Motor inappropriate (MI) |
| Break (B) | Rules (R) | Game (G) | Off-task (OF) | Supporting (MS) |
| Warm-up (WU) | Social behaviour (SB) | Fitness (F) | On-task (ON) | |
| | Background (BK) | | Cognitive (C) | |

Date: _____ Teacher: _____ School: _____

Class/Activity: _____Observer: _____
Start time: _____ Stop time: _____ Duration: _____ Page___ of ____

This observation is day ___ of ___ days in this unit.

The teacher allocated _____ minutes of activity time for this lesson.

The source of this allocation information was (teacher, lesson plan).

Observation comments on this class:

Data summary
Total Time: _____ Allocated practice time: _____ ALT-PE:
_____

Context level data: general content: _____
Subject matter knowledge: _____ Subject matter motor _____

Learner involvement data: not motor engaged: _____ Motor engaged: _____

APPENDIX L

SOFIT RECORDING FORM

## SOFIT RECORDING FORM

Date _____ School _____ Grade __/Period ___ Teacher _____ Teacher Gen: M F SERIES__
Time start _____ Observer _____ Ret obs ____ No girls ____ boys ____ Location: O I
Time end _____ Lesson Length _____ No of obs. ____ Page 1 2 3 4 of __

| Interval | | Student Activity | Lesson Context | Interactions | NOTES |
|---|---|---|---|---|---|
| | 1 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 2 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 3 | 1 2 3 4 5 | M K F S G O | I O N | |
| o | 4 | 1 2 3 4 5 | M K F S G O | I O N | |
| n | 5 | 1 2 3 4 5 | M K F S G O | I O N | |
| e | 6 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 7 | 1 2 3 4 5 | M K F S G O | I O N | |
| m/f | 8 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 9 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 10 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 11 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 12 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 13 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 14 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 15 | 1 2 3 4 5 | M K F S G O | I O N | |
| t | 16 | 1 2 3 4 5 | M K F S G O | I O N | |
| w | 17 | 1 2 3 4 5 | M K F S G O | I O N | |
| o | 18 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 19 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 20 | 1 2 3 4 5 | M K F S G O | I O N | |
| m/f | 21 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 22 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 23 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 24 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 25 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 26 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 27 | 1 2 3 4 5 | M K F S G O | I O N | |
| t | 28 | 1 2 3 4 5 | M K F S G O | I O N | |
| h | 29 | 1 2 3 4 5 | M K F S G O | I O N | |
| r | 30 | 1 2 3 4 5 | M K F S G O | I O N | |
| e | 31 | 1 2 3 4 5 | M K F S G O | I O N | |
| e | 32 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 33 | 1 2 3 4 5 | M K F S G O | I O N | |
| m/f | 34 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 35 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 36 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 37 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 38 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 39 | 1 2 3 4 5 | M K F S G O | I O N | |
| f | 40 | 1 2 3 4 5 | M K F S G O | I O N | |
| o | 41 | 1 2 3 4 5 | M K F S G O | I O N | |
| u | 42 | 1 2 3 4 5 | M K F S G O | I O N | |
| r | 43 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 44 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 45 | 1 2 3 4 5 | M K F S G O | I O N | |
| m/f | 46 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 47 | 1 2 3 4 5 | M K F S G O | I O N | |
| | 48 | 1 2 3 4 5 | M K F S G O | I O N | |
| SUM | | | | | |

SOURCE; McKenzie, 2009

# APPENDIX M

## FINAL STRUCTURED INTERVIEW GUIDE

Interview Guide

This conversation is being tape recorded so that I can have our discussion formally transcribed for data analysis.

Demographic Information Survey: NBCTs/NON-NBCTs
**Questions in BOLD are for NBCT's only**

1) How long have you been a physical education teacher?
2) Was physical education your first teaching career choice?
3) **How many years had it been since your first achieved National Board Certification?**
4) **When your certification runs out, do you plan on re-certifying? Why or why not?**
5) What type of physical education curriculum do you typically teach? In other words, do you implement a multi-activity curriculum or do you focus on one activity such as yoga, fitness or do you use another curriculum such as Sport education?
6) I am going to list the career stages, and I would like for you to indicate at which career stage you place yourself.

The relevant career stages are:

- Competency Building
- Enthusiastic and Growing
- Career Frustration
- Stable and Stagnant
- Career Wind-Down
- Career Exit --retirement

7) Why do you place yourself in that stage?
8) **Have you changed career stages as a result of the certification process?**
9)

General Questions
1. Why did you seek a career in the teaching profession?

2. **Overall, how would you describe the experience of obtaining your National Board Certification?**

3. **How are you different as a NBC teacher than you were before you gained certification?**
**How is your teaching different?**

4. As the role of the Physical Educator is changing, how involved are you in other school activity programs, i.e., intramurals, walking club, fitness program?

6. Is there any other service that you provide to your school, school district, profession?

Motivations

4. **What was your primary motivation for securing your National Board Certification?**

5. **Has the administration of your school district (i.e., principal, superintendent or school board) provided any incentives, financial or other, to complete National Board Certification. Were you reimbursed for the initial application fee?**

6. **(Skip if already answered) Does your state board of education provide any type of incentive, financial or other, to complete National Board Certification?**

7. Would you describe yourself as a self-motivated individual or do you need outside motivation to complete difficult tasks?

8. How would you describe your ability to motivate students, co-workers, and peers?

Dispositions

9. What do you think makes you different from other teachers in your school?

10. **How would you rate your teaching effectiveness relative to physical education teachers who do not have National Board Certification?**

11. Describe your method for getting through to even the most difficult students?

12. How would you describe your educational beliefs?

Work environment

13. Describe your work environment?

- Type of school
- SES of students
- Type of department
- Facilities and equipment

14. How often and to what capacity do you collaborate with colleagues at your school? Elsewhere?

15. **At the time that you sought National Board Certification, were there other teachers who you knew who were also pursuing certification?**

- Other teachers in your school
- Other physical educators in your school or at other schools

16. Would you describe your work environment as difficult or pleasant? Explain.

17. **Were there individuals who were supportive of your pursuit of National Board Certification?**
    - students
    - colleagues
    - teachers who were already National Board Certified
    - administrators
    - support staff
    - family members
    - university faculty

18. Describe the level of appreciation you feel (or don't feel) from your students, colleagues, or administrators?

19. Describe your satisfaction level in your current teaching position?
    - How long do you intend to stay in your current position?

20. **How would you describe your experience as a National Board Certified teacher overall?**

Study questions:

21. During this study process, we have engaged in several conversations after I have observed and videotaped your lessons. Do you feel these conversations have affected your teaching at all? If so, how?

If not, do you think my presence has affected the way you might have taught these lessons? Why or how?

22. Looking at the learning outcomes for the study (the ETU) and your lesson plans (planned activities), how do you think they match-up?

23. What was your initial reaction to the ETU? What were your concerns, questions, etc?

24. How do you think that being video-and audiotaped affected your teaching?

25. What made you pick the activities you did, given the specific learning objective?

26. How much time did you devote to planning?

27. To what extent did the prevalent curricular approach (i.e., D.P.E.) influence your planning?

28. After seeing the results, what have you learned fro participating in this project?

29. Apart from more time (recognizing that you currently only have 45min/week), what do you feel (if anything) would help students become 'better' at learning (i.e., how do kids learn?)?

30. If you were to ever be involved in something like this again, would you do anything differently?

# BIOGRAPHICAL SKETCH

Jennifer Ellen Houston was born in Walnut Creek, California, on July 4, 1967. Though her elementary education began at Arredondo Elementary School in Tempe, AZ, Jennifer grew up on the east coast, completing her secondary education at Princeton High School, in Princeton, NJ. In 1985, Jennifer entered the University of Delaware, majoring in Physical Education Studies. In 1994, Jennifer entered graduate school at California State University, Hayward (now East Bay) to pursue a master's degree in Kinesiology and Motor Control and to obtain her K-12 California Teaching License. From August 1997 to June 2010, Jennifer taught Physical Education in a variety of settings, including Adapted Physical Education and secondary Physical Education. In addition, in November 2006 Jennifer achieved her National Board Teaching Certification in early to middle childhood Physical Education. August 2010 Jennifer entered graduate school at Arizona State University to pursue her doctorate in Curriculum and Instruction, Physical Education. Upon completion of her PhD from Arizona State University in 2014, Jennifer had accepted an offer as an assistant Professor of Curriculum and Kinesiology at Texas A&M University, San Antonio.