

PEDAGOGY

Measured Effectiveness and Decision-Making Processes of National Board and Non-Board Certified Physical Education Teachers

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Abstract

The conceptual framework for this study was the Five Core Propositions of the National Board Certification (NBC) for teachers. This study evaluated teaching effectiveness and the decision-making processes employed by NBC and non-NBC physical education teachers. Process measures of teaching effectiveness were used (e.g., Academic Learning Time–Physical Education and the System of Observing Fitness Instruction Time), along with stimulated recall interviews. Four teachers (2 with/without certification) were given an experimental teaching unit and explicit student learning outcome objective that they implemented over three lessons. All analyses suggested NBC physical education teachers were not more effective than their non-NBC counterparts, and teacher decisions were similar. Three themes emerged across groups: (a) previous lessons painted the future, (b) mind on the physical, and (c) goal-directed instruction. The NBC organization claims that the process of certification is designed to develop/retain/recognize accomplished teachers; however, these outcomes need more study in this setting.

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Teaching Effectiveness and Decision-Making Processes

Teachers and effective teaching have been examined for decades, with studies offering key characteristics and practices a teacher must possess and use to be successful. To be successful, teachers should obtain a profound level of content knowledge, pedagogical knowledge, and pedagogical content knowledge (e.g., Shulman, 1986; Ward, Kim, Ko, & Ki, 2015). Effective teachers have an ability to present a topic of instruction and reconstruct it to where learners can comprehend the instructional content. Beyond the need for deep content knowledge, Clark and Peterson (1976) discovered that teaching is a highly intellectual process that includes continual professional judgments throughout a lesson. Housner and Griffey (1985) in their study describing the decision-making processes of physical education teachers found that during teaching, experienced teachers focused most of their attention on individual student performance, while inexperienced teachers attended most frequently to the interest level of the entire class. Others have expanded the body of research in this area and found teachers to undergo two kinds of intellectual processes: (a) evaluation (i.e., Did it work? What else could/should I have done? How could I have done better?) and (b) 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; e.g., Tripp, 2012).

Next to smoking, physical inactivity has been the major contributor to a growing epidemic of chronic and preventable disease in the United States (U.S. Department of Health and Human Services, 2008). Therefore effective physical education teachers should provide health optimizing physical education classes where teachers are responsible for providing opportunities for moderate to vigorous physical activity (MVPA; Sallis et al., 2012, p. 126). Although the Institute of Medicine recommended that physical education teachers provide opportunities for students to engage in MVPA at least 50% of class time, according to Chow, McKenzie, and Louie (2009), students in physical education classes generally do not reach this recommended goal (Kohl & Cook, 2013). Increasingly, physical education programs and physical education teachers may be considered

effective to the extent that they contribute to the goals of children's physical activity and health (Rink & Hall, 2008).

National Board for Professional Teaching Standards

Community of Practice

The theoretical framework of community of practice guided this study. Communities of practice are formed by people who engage in a process of collective learning in a shared domain. In other words, communities of practice are groups of people who share a concern or a passion for something they do and learn how to do better as they interact regularly (Wegner, 2011). This theory was used during the research phase and development of the National Board Certification Standards (National Board for Professional Teaching Standards [NBPTS], n.d.). Social scientists have used versions of the concept of community of practice for a variety of analytical purposes, but the origin and primary use of the concept has been in learning theory. The first applications of the community of practice were in teacher training, and it has evolved in the interest of peer-to-peer professional development activities (Wegner, 2011), such as the National Board Certification (NBC) process.

Five Core Propositions

In 1987, the NBPTS (2014) set out to identify and recognize expert teachers who have assimilated the necessary qualities to teach. NBPTS published a set of Five Core Propositions, which formed a framework from which all of the NBPTS evolved, have become the standard for the education profession in the United States (Berg, 2003), and provide a conceptual framework for this study. The Five Core Propositions include (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. Each certificate area includes content-specific standards, but all standards are grounded in the Five Core Propositions, which articulate the actions that accomplished teachers employ to advance student learning (NBPTS, 2016).

Of the 12 standards specific to physical education, this study focused on four: Standard III, Curricular Choices; Standard IV, Wellness Within Physical Education; Standard V, Learning Environment; and Standard VIII, Assessment.

National Board Certified Teachers (NBCTs) have been examined in over 200 studies, with studies attempting either to compare abilities of NBCTs or to compare their students' achievement test scores with non-NBCTs (NBPTS, 2014). In multiple classroom studies, students of NBCTs achieved higher performance scores than students of non-NBCTs (e.g., Goldhaber & Anthony, 2007). Some of the benefits to achieving NBC have been reported as strengthening teaching practice, helping students succeed, career advancement, providing portability, offering higher salary potential, and enhancing education (NBPTS, 2014). According to Goldhaber and Anthony (2007), the NBPTS model not only can help separate more effective teachers from their noncertified counterparts, but can also identify the more effective teachers among their applicants.

NBC in Physical Education

Only six published research studies were located on NBCTs in physical education (Phillips, 2008; Rhoades & Woods, 2012; Woods & Rhoades, 2010, 2012, 2013). This is complicated by the fact that few ecologically valid standardized achievement tests can easily measure student-learning outcomes in physical education. Woods and Rhoades (2010) noted that linking NBCT to increased student learning in physical education is a major and complex undertaking because learning in physical education cannot be easily measured through achievement test scores. Woods and Rhoades (2010) discovered that 79% of NBCTs who teach physical education (NBCPETs) are female, 78.9% are Caucasian, 71.1% hold a master's degree, and 55.1% work in an elementary setting. In addition, the mean age of NBCPETs is 45 years with approximately 20 years of teaching experience. Through the inductive and deductive methods recommended by Miles and Huberman (1984) and the process of constant comparison (Lincoln & Guba, 1985), several themes emerged in regard to the subjective warrants of NBCPETs. These include a joy of helping and working with children, continued association with sport and physical activity, lack of aspirations to coach, and enjoyment

of physical activity (Woods & Rhoades, 2010). However, the most frequent reasons for pursuing NBC relate to financial incentives, the challenge, and professional development. Woods and Rhoades (2012) investigated the self-perception of teacher change as a result of certification. The themes that emerged from their study included more teaching reflection, a greater focus on student learning and assessment, and an elevation in their perceived status and credibility as teachers. Further, Woods and Rhoades (2013) investigated the teaching efficacy beliefs of NBCPETs. Not only did the NBCPET's produce strong scores on the Personal Teaching Efficacy (PTE) scale, their PTE scores were higher than their General Teaching Efficacy (GTE) scores. Some of the themes that emerged relating to their perceptions about their own teaching success included differentiated instruction, persistence, connection with and care for students, and work in a content area conducive to influencing students (Woods & Rhoades, 2013).

NBCPET Outcomes. Phillips (2008) compared NBCPETs with non-NBCPETs on selected student outcomes measure. Phillips sought to describe the differences of teachers with and without NBC in relation to their percentages of student competency in physical education. Compared to students of non-NBCPETs, students of NBCPETs had significantly higher levels of performance in motor skill competency, fitness knowledge, and fitness testing, and reported higher levels of outside physical activity (Phillips, 2008). Motor skill competency was defined as student ability to perform the skill safely and having adequate skill to make performing in the activity enjoyable and to allow continuity in performance (Rink & Williams, 2003, p. 485). Because of the paucity of research studies in this area (i.e., only Phillips, 2008), this study sought to confirm and extend the Phillips' finding, to learn more about the differences between NBCPETs and non-NBCPETs in their decisions and student outcomes related to skill performance. Because South Carolina is the only state to use the South Carolina Physical Education Assessment Program (SCPEAP), this study sought to implement other means of assessment, including skill competency and game knowledge.

The research questions guiding this study included (a) do students in classes taught by NBCPETs accumulate higher levels of academic learning time in physical education (ALT-PE) and MVPA

compared to students taught by non-NBCPETS? (b) are there differences in posttest skill achievement scores across groups? and (c) what are the information cues and decisions made during interactive teaching of the provided Experimental Teaching Unit (ETU)?

Method

Participants and Setting

Two female NBCPETS and two female non-NBCPETS, along with their students, served as study participants. For a “level playing field,” the comparison teachers were matched as closely as possible on (a) gender, (b) age, (c) ethnicity, (d) teaching level, (e) teaching experience, and (f) district. All four teachers were Caucasian and certified physical education teachers. The NBCTs reported 9 and 24 years of teaching, while the non-NBCTs reported 12 and 24 years of teaching. The ethnic breakdown of all four schools was similar with 64–72% Caucasian, 5–8% Black, 14–20% Hispanic, and 5–11% other. Similarly, the two elementary schools had an enrollment at 475 and 514, while the middle schools had 800 and 1,280 students. Each teacher and school was assigned a pseudonym. All four teachers had been trained in the use of the Dynamic Physical Education Curriculum (Pangrazi & Beighle, 2013), yet only the two elementary teachers reported implementing the curriculum into their programs. The two secondary teachers did not have a district-adopted curriculum. However, both mentioned using parts of the Fitness for Life curriculum (Corbin & Le Masurier, 2014).

Research Design and Procedures

Research design. This study, using a mixed-method design, utilized quantitative and qualitative data collection and analysis. Because the experimental teaching units (ETU) were considered an intervention, this study was conducted using a pre–post intervention design.

Experimental teaching units. ETUs were used with three planned lessons in this study so that the content taught was standardized. Although it controlling all outside factors is impossible, all four teachers were asked which physical activity/sport they felt their students had the least amount of experience with. All four teachers responded with soccer. Hence, two game play dimensions of soccer

were selected as the target objectives of the the ETUs. Teachers were provided with explicit instructional objectives (i.e., correct technical execution when shooting on goal and providing support during a 4-v-4 game of modified soccer).

While the objectives were predetermined and agreed on by the teachers, teachers were given freedom on how to plan, design, and instruct around the respective objectives. This method differs slightly from those in previous studies (e.g., Solmon & Lee, 1996) in which all teachers taught the same lesson. This accommodated the differing schedules of the four teachers and each teacher's independent approaches to teaching skills and games. Providing the teachers with an ETU establishes an objective learning environment, which is directly related to the National Board Standard V for physical education teachers, which states accomplished physical education teachers establish high learning expectations and create well-managed classrooms that engage students in a safe and respectful culture of learning (NBPTS, 2016).

Prior to the start of the ETU, the secondary school teachers were asked to rank their students by ability level. Three students were chosen at random from each skill level (i.e., high-, medium-, and low-skilled). They (for the most part) made sure those three students were in the same area of the field each day to ensure the researcher was able to film those students. If those students were spread out around the entire playing area, it would not have been possible to get them all on film together.

For the elementary school teachers, the objective of the ETU was for students to demonstrate technically correct shooting (i.e., penalty kick but without a goalkeeper) on goal in soccer. The students were not assessed on achievement of a goal, but instead on their motor skill proficiency as dictated by the state standards for Grades K–5. 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 comes 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. The observation instrument was modified from Fronske (2008).

Teachers in the secondary schools were given the ETU objective to have students develop their offensive support (a tactical dimension of game play in invasion games) during a modified 4-v-4 soccer game, using the offensive support definition of Mitchell, Oslin, and Griffin (2006). Support was defined as being in a proper position to receive a pass from a teammate and either move the ball further up the field or shoot toward the goal (Mitchell et al., 2006). For example, the student appears to support the ball carrier by being in or moving to an appropriate position to receive a pass.

Procedures. All lessons included a 10- to 15-min segment 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 (average of 18 min, 12 lessons, 3 lessons for each teacher). For assessment of student achievement, all students in the observed classes were pretested and posttested on the targeted soccer outcome measures (i.e., shooting technique and support). For the pretest and posttest, students were assessed individually and given two opportunities to shoot on goal (two for the pretest and two for the posttest). This was done so the researcher could focus on the skill being performed in assessing skills.

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- to 8-min soccer game; teams were designated by colored vests. Following the pretest, each teacher was asked to provide a class list with all students ranked by their level of skill (low-, medium-, or high-skilled). Three students were then chosen, one of each level, for purposes of data collection. The teacher was also asked to keep these three students in the same general area during each ETU portion of the lessons, which ensured these students would be visible on the video for subsequent data collection. The target students were observed in sequence during the ETU portion of the lesson.

Student learning outcomes assessed. Two proxy measures of student learning were selected. The first, ALT-PE, was defined as the amount of observed time students spent in motor activities at appropriate success rates (Siedentop, Tousignant, & Parker, 1982). The second, MVPA, measured use of the System for Observing Fitness Instruction Time (SOFIT; physical activity component only) and was defined as the amount of observed time students spent engaged

in physical activities that require energy for at least a brisk walk (McKenzie, Sallis, & Nader, 1991).

One additional variable was the decision-making and thought processes employed by NBCPETs and non-NBCPETs as measured via the stimulated recall interviews (e.g., Clark & Peterson, 1986).

Instruments

Academic Learning Time–Physical Education. Many descriptors have been applied to the concept of student engagement with the subject matter as a powerful predictor of achievement (Parker, 1989). However, Berliner in 1979 coined the phrase “academic learning time,” which refers to the portion of allocated time a student was actually involved with the subject matter (Parker, 1989). ALT-PE is an application of this concept in the physical education setting (Parker, 1989). ALT-PE is specifically defined as being the percentage of class time that students are appropriately/successfully engaged in physical education content activities (for validation and protocol information, see Parker, 1989). Using the ALT-PE instrument allows the researcher to assess a teacher’s curricular choices (Standard III), the learning environment (Standard V), and assessment practices (Standard VIII; NBPTS, 2016).

System for Observing Fitness Instruction Time. Students’ MVPA levels were collected via SOFIT (McKenzie, 2006; McKenzie et al., 1996). The system includes three coding levels: student physical activity, lesson context, and teacher behavior. However, this study used only the students’ PA level coding level. The categories include (1) lying down, (2) sitting, (3) standing, (4) walking, and (5) very active or vigorous (McKenzie, 2006; McKenzie et al., 1996). The sum of the proportion of time spent walking and very active or vigorous constitutes MVPA (McKenzie, 2006; McKenzie et al., 1996). For validation and protocol information, see McKenzie et al. (1996).

Measuring physical activity levels of students during physical education directly relates to the National Board Standards III (curricular choices), IV (wellness in physical education), and VIII (assessment). Engagement in light, moderate, and vigorous physical activity has been reported to have substantial health benefits and is being promoted as a national objective for disease prevention (Office of Disease Prevention and Health Promotion, 2017). School physical education has been recognized as the most widely available

resource for promoting physical activity among children and adolescents (McKenzie, Marshall, Sallis & Conway, 2000). By providing opportunities to engage in MVPA during physical education, and thus measuring the actual physical activity levels, physical education teachers implement programs in support of lifelong physical activity and wellness (NBPTS, 2016). Both the ALT-PE and SOFIT measurements were taken during live lessons and game play.

Z pretest and posttest gain data. For the assessment of the technical execution of shooting on goal (elementary school level), five critical elements were selected (Fronske, 2008). For a trial to be considered “correct,” students needed to demonstrate all five elements. Students were given two trials to execute the skill. Each time a student attempted the skill, trained observers evaluated the presence or absence of the critical element. If a critical element was present, the student received a point. If not, they received a 0. Each trial was worth a potential 5 points (10 points total). During the pretest, students had no previous instruction from the teacher, but during the posttest, 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, and then the group would take another turn.

For the tactical assessment of offensive support (secondary level), the definition developed by Mitchell et al. (2006) was used, and interval recording was used for collecting the data (McKenzie & van der Mars, 2015). During the pretest, students were told to play, concentrating on offense and defense. During the posttest, students were asked to remember what they were taught during the soccer unit about offensive tactics. An alternating “observe” and “record” sequence (with each 6 s in length) was used. During the observe interval, the trained observers made three determinations: (a) whether the target student’s team was on offense or defense (if on defense, no further decisions needed to be made); (b) if on offense, whether the student was handling the ball or “off the ball”; and (c) if on offense and “off the ball,” whether the student provided appropriate support or inappropriate support to her or his teammate who was in possession of the ball on offense.

Stimulated recall. This study followed the stimulated recall method (pre-active, interactive, and reactive phase) and a tool for evaluating participating teachers' decision-making and thought processes. Immediately following each lesson, the lead author used the stimulated recall technique to elicit reports of the cues attended to and the decision-making processes used during each participant's interactive teaching (Housner & Griffey, 1985). Teachers were shown short segments of a lesson from the video recordings in sequential order. After viewing each segment, the teachers were asked to respond to a set of questions. Peterson and Clark's (1978) recommendations provided the framework for the stimulated recall questions: (a) What are you doing in this segment and why? (b) What were you noticing about the students? (c) How were the students responding? (d) Were you thinking of any alternative actions or strategies at that time? (e) Did any student reactions cause you to act differently than you had planned? and (f) What was your ultimate objective for today's lesson? Stimulated recall interviews followed each of the three-recorded lessons and lasted between 5 and 15 min (12 total lessons), depending on responses across the four teachers. In addition, the lead investigator also took field notes, noting key aspects of the teaching practices and format of the lessons employed by all four teachers.

Observer training and reliability. In training for data collection of the student outcome variables during the videotaped ETU lesson segments and of the pretest and posttest outcome measures, all observers followed the standardized protocols for ALT-PE and SOFIT (Sallis et al., 2012; Siedentop et al., 1982). Data collection began only after interobserver agreement (IOA) percentages of at least 75% were obtained, via the scored-interval method (van der Mars, 1989). IOA checks were conducted on 25% of the videotaped ETU lesson segments and 25% of the students' pre-post test performance. The scored-interval method is the most rigorous way of estimating observer reliability in that it reflects the degree to which two independent observers saw the target behavior occur at the same time (van der Mars, 1989). See Table 1.

Table 1
Interobserver Agreement Percentages for ALT-PE and SOFIT Observation System Categories and Pretest and Posttest Outcome Measures

Variable	%	Variable	%	Variable	%	Critical element		Variable	%
						#	%		
Transition	96	Interim	100	Standing	89	#1	97	GC	81
Management	100	Waiting	84	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	ALT-PE	82						
M	91		84		83		80		83

Note. Only those variables observed during the lessons are reported. GC = game context; PS = player status; PE = player engagement; AS = appropriate support

Data Analysis

ALT-PE and SOFIT. Descriptive statistics (i.e., means and standard deviations) were calculated for all the observed categories of 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. A repeated measures multivariate ANOVA compared the levels of performance of the NBCPETs and the non-NBCPETs on the data from the SOFIT and ALT-PE instruments.

Student skill outcomes. Using the shooting technique skill at the elementary level, pretest and posttest score differences as nominal data may be inappropriate, as a score of 3 for one student might not be the same as a score of 3 for another student. Because there are five critical elements for the skill of shooting on goal, one student might have correctly performed the first three elements, while another student correctly performed the last three, yet they receive the same score. Moreover, it is possible, albeit unlikely, for students to earn the same score by performing different elements correctly. Therefore, to test for between-group differences on the student outcome measure (i.e., gain scores), a chi-square test of independence was conducted.

Students taught by the NBCPET were compared to those taught by the non-NBCPET in the secondary schools on their ability to demonstrate offensive support (Mitchell et al., 2006) when their team was in possession during a modified soccer game. Mean between-group differences on the pretest to posttest gain scores for offensive support were compared via an analysis of variance (ANOVA).

Field notes/observations/interviews. Transcripts of the stimulated recall interviews were analyzed with the constant comparison method (Saldaña, 2013). Data analysis began with a particular incident, which was then compared with another incident. In the first cycle, two researchers established their individual personal coding scheme and initial themes separately. Researchers then compared their initial codes and themes and negotiated findings (collapsed and reduced themes). Data trustworthiness was demonstrated through peer debriefing, negative case analysis, and member checking. Two member checks were conducted during this study. The first consisted

of returning all interview transcripts to teachers and asking them to make any needed or desired changes to the transcripts. The teachers made only minor editorial and semantic changes. The second member check involved sending the intervention participants a draft of the themes of this study and asking for their comments regarding the authors' interpretations. A search for disconfirming evidence was then conducted by two researchers, who independently searched for negative cases that could provide an alternative viewpoint or disprove the themes. No negative or disconfirming cases were identified in this process. The first author achieved NBC in 2006. This created an inherent bias potentially 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

With exception of the Off-Task category in the ALT-PE observation system, and the Player status behavior category for assessing offensive support, all IOA percentages met the S-I criterion of 75%, indicating observer reliability (van der Mars, 1989) for both the ALT-PE and SOFIT instruments. See Table 1.

ALT-PE and SOFIT

Students taught by NBCPETs were engaged in motor activity at an appropriate success rate (ALT-PE) 33.8% of the time as compared to 27% of the time for students taught by non-NBCPETs. As Figure 1 shows, non-NBCPET students on average reached higher MVPA levels compared to NBCPET students (46.3%, and 42%, respectively). In addition, the non-NBCPET students had a lower percentage of sitting compared to NBCPET students, with an average of 1.9% and 3%, respectively. For both student groups, the most prevalent student behavior, which is a critical finding from a public health perspective, was standing (i.e., a sedentary behavior), with percentages at 54.6% for NBCPET students and 51.4% for non-NBCPET students.

The effect of board certification status on students' ALT-PE and MVPA levels across the observed classes were examined with repeated measures multivariate analysis of variance analyses (RM-MANOVA).

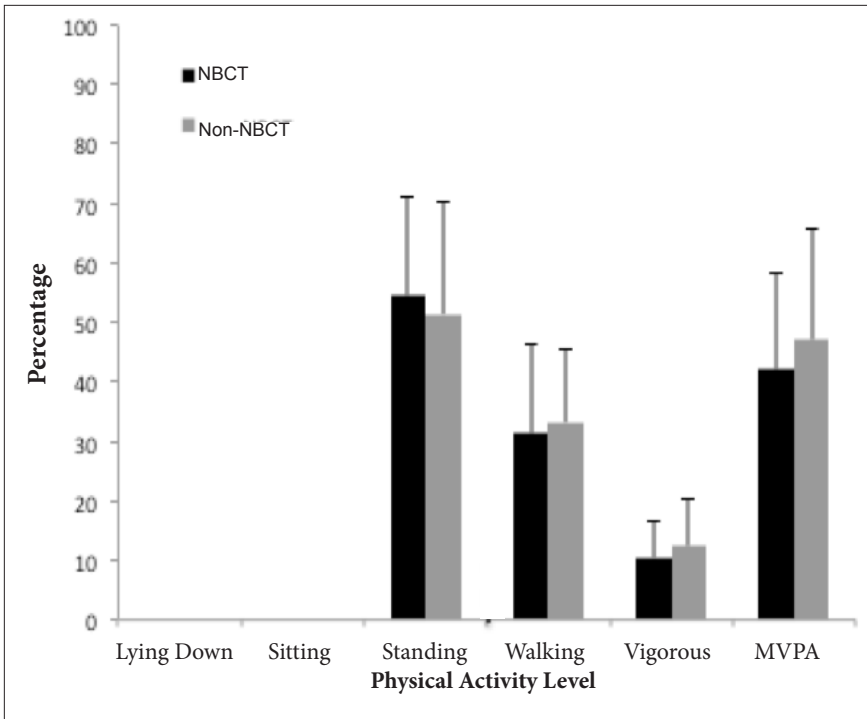


Figure 1. Mean learner involvement levels (with standard deviations) across NBCPETs and non-NBCPETs during ETU portion of lessons.

Students' mean ALT-PE levels were 33.8% ($SD = 11.32$) and 27% ($SD = 15.04$) for NBCPETs and non-NBCPETs, respectively. However, this between-student group difference was not statistically significant, $F(2, 4)=4.455, p = .096$. Students' mean MVPA levels were 42% ($SD = 16.3$) and 46.37% ($SD = 18.6$) for NBCPETs and non-NBCPETs, respectively. However, this between-group difference in MVPA levels was not statistically significant, $F(2, 4) = .886, p = .480$.

Figure 2 shows 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 spent more time performing management duties (1.4% as compared to 0% for NBCPETs). The most noticeable differences occurred in the subject matter motor categories of skill practice and scrimmage. NBCPETs spent more time engaged in skill practice than the non-NBCPETs (26% and 14%, respectively), while the non-NBCPETs spent more time engaging

students in scrimmaging than their NBCPET counterparts did (38% and 49%, respectively).

Figure 2 also includes the mean learner involvement levels throughout the ETU. Non-NBCPET students spent more time in interim and waiting than NBCPET students (10% and 14% as compared to 14% and 19%, respectively). Non-NBCPET students spent more time on-task (19% compared to 16%) than NBCPET students. Off-task behavior was negligible to nonexistent for both student groups. Cognitive engagement was also similar for both student groups (15.5% and 12.0% for non-NBCPETs and NBCPETs, respectively).

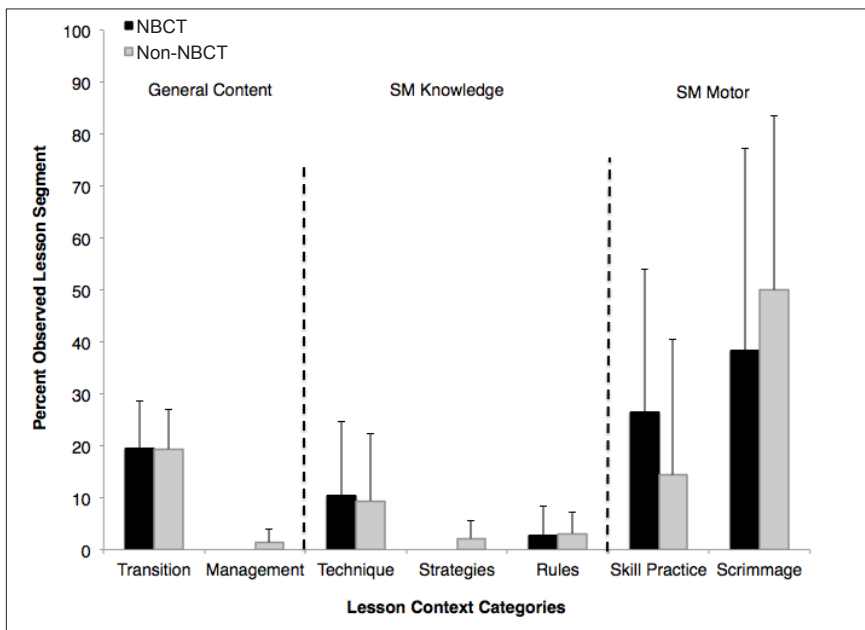


Figure 2. Mean use of class time (with standard deviations) across NBCPETs and non-NBCPETs during ETU portion of lessons.

Figure 3 presents secondary students' pretest, posttest, and gain score data for support. Students taught by the NBCPET had a mean pretest score of 26.6% and a mean posttest score of 50.0% (time observed in support). The students taught by the non-NBCPET had a mean pretest score of 28.5% and a mean posttest score of 34.0%. No significant differences in support were found during the pretest or posttest between students taught by the NBCPET and the

non-NBCPET, $F(1, 2) = .064, p > .05$, $F(1, 2) = 1.0, p > .05$, nor was there a statistically significant difference on the groups' gain scores, $F(1, 2) = 2.00, p > .05$.

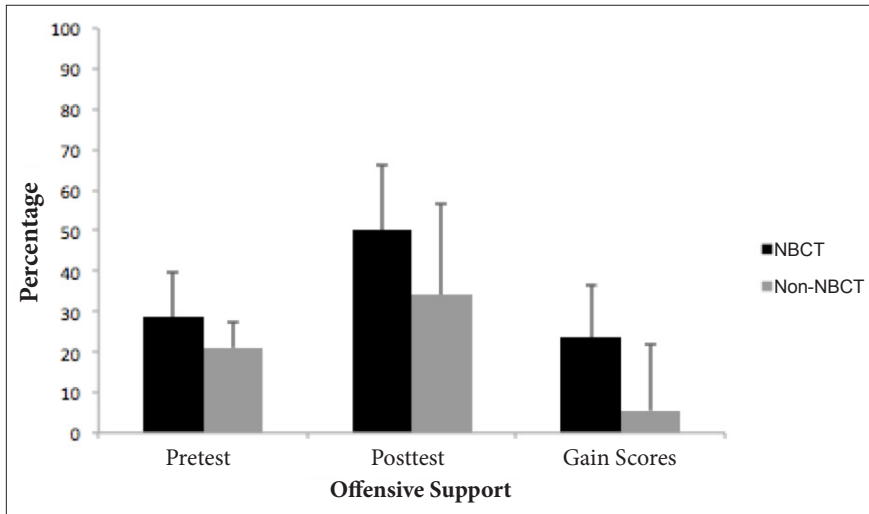


Figure 3. Mean pretest, posttest, and gain scores (with standard deviations) for Offensive Support for students of NBCPETs and non-NBCPETs.

Student skill outcomes. Figure 4 presents student achievement data (pretest, posttest, and gain scores) for students in elementary school on their technical execution of shooting on goal in Soccer. Students taught by NBCPETs and non-NBCPETs improved from pretest to posttest. The students taught by the NBCPETs had an average pretest score of 2.5, an average posttest score of 5.0, and an average gain score of 3.0. Students taught by the non-NBCPETs had an average pretest score of 3.0, an average posttest score of 5.0, and an average gain score of 2.0. However, students' gain scores were not affected by the teachers' NBC status, $\chi^2(1) = .376, p > .05$.

Overview and Key Themes

This section of the results is presented in two stages. These include (a) descriptive overview of teaching and (b) key teaching themes.

Teachers approached the lessons and instructed similarly. All teachers were observed beginning their lessons with a warm-up and fitness activity, with the subsequent activity incorporating the ETU. All four teachers designed their soccer ETUs into stations, offering

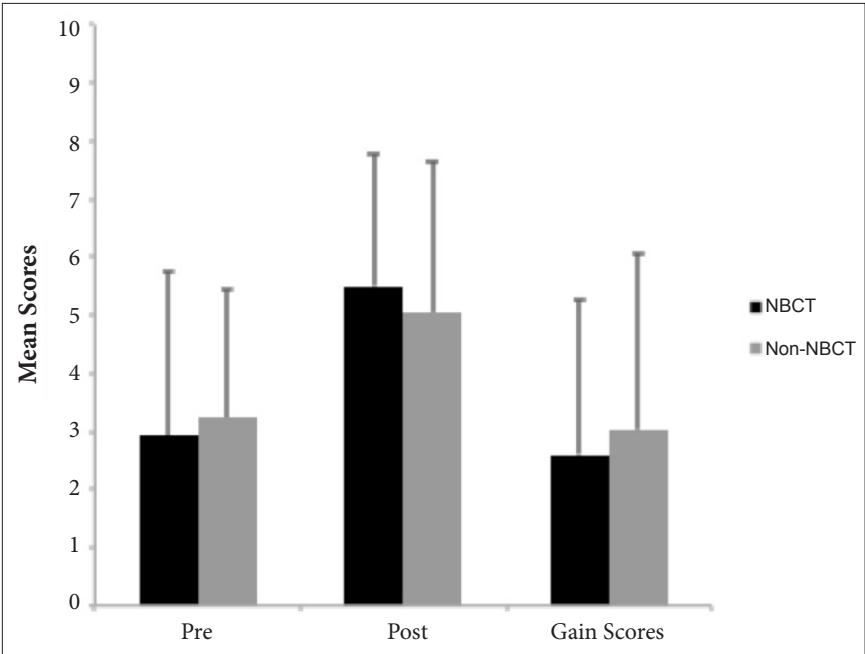


Figure 4. Mean pretest, posttest, and gain scores (with standard deviations) for Shooting on Goal for students of NBCPETs and non-NBCPETs.

specific skills per station in which students were expected to move from one station to another after a given time. This segment then was followed with a small-sided (4-v-4 or 5-v-5) modified game.

In addition, none of the four teachers identified the learning objectives to their students during any of the observed lessons, a key component necessary according to the NBCTs. Although two of the participating teachers did realize this mistake. Jessica asked her students to shoot on a goal as if they were playing kickball, but she never gave her students the necessary five critical elements. She later explained, “I’m not sure if in the beginning they knew what my overall objective was for them.” Katie (secondary NBCT) told her students 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-NBCT) also forgot to mention the objective to her students. Instead, she spoke with her students on how to move the ball down the field toward the goal, later expressing after watching herself on

video, “I guess I would probably tell them what the objective was, since I didn’t do that this time.”

The next sections present example responses to the stimulated recall questions and emergent themes including (a) previous lessons painted the future, (b) mind on the physical, and (c) goal-directed instruction.

Theme 1: Previous lessons painted the future. Participating teachers were asked, “What were you doing during this segment?” Research members found that all four participants were referencing a monitoring and observational instructional method, as they all described watching the students to see if they were implementing skills from the previous lesson. For example, after the first ETU lesson following the pretest, Sallie (secondary non-NBCT) explained that she was

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 NBCT) commented, “I was monitoring the students, seeing if they were following the original directions, which was passing with your partner and throwing, the skills that we learned last week. . . .” Jessica (elementary non-NBCT) 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.”

Theme 2: Mind on the physical/technical. All teachers reported thinking of alternative ways to decrease student wait time and increase physical activity. For example, Katie (secondary NBCT), during the second ETU lesson, explained, “I was thinking of maybe how to add in more stations so that there are less people at each station. . . .” She followed by commenting on her station design: “Instead of having ‘em dribble there and dribble back, I had ‘em dribble and then dribble on the outside, so another person could go to decrease the wait time.” Sallie (secondary non-NBCT) 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...you would have partners versus a group of three or four, and they would be moving...a lot more.” Beth (elementary NBCT) said, “I wanted them to learn the game first,” even though the primary learning objective was shooting on goal. In addition, Beth admitted that she wanted to teach her students different ways to kick and “I don’t think it was until my third lesson that I actually showed them how to do a goal kick. I was like, ‘I should have probably done that at the beginning so we could see some improvement.’”

Theme 3: Goal-directed instruction . . . or lack thereof. Goal-directed instruction was the third common theme that emerged. It was clear that all four teachers were not only concerned with meeting a specific objective for the lesson, but also wanted to ensure students were following the teacher’s directions. Both Katie (secondary NBCT) and Jessica (elementary non-NBCT) asked a variety of questions regarding the study via e-mail. Jessica (elementary non-NBCT) was concerned before the study even started because her students were used to engaging in each activity for 2 weeks (2 days of instruction) and this study would potentially give her the opportunity to engage her students in one activity for a much longer time. In an 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 NBCT) 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?” Similar to Beth (elementary NBCT), Jessica (elementary non-NBCT) also admitted her focus was not on the learning outcome, but rather the learning outcomes of the district-approved curricular model.

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 to practice and come to understand its role in the game. However, the first day of the soccer ETU, Katie (secondary NBCT) 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 NBCT) students did

not engage in a modified soccer game until the final days of the ETU, one of which was the posttest day. When asked whether she (secondary NBCT) felt her lesson plans aligned with the learning outcome, Katie replied,

I really try to incorporate the learning objectives into my lessons, to slowly 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.

Discussion

This study intended to determine whether differences would appear in student process or achievement (i.e., outcome) measures, based on board certification status of physical education teachers. In neither case (elementary or secondary), did any appreciable differences emerge. Although a visual analysis of the results implies a difference in the numbers, there were no statistically significant differences between the two groups. Previously, NBCTs were shown to demonstrate greater teacher effectiveness than their non-NBCT counterparts (e.g., Goldhaber & Anthony, 2007). However, the results of this study align with other classroom research on the effect of NBC where no between-group differences were observed (e.g., Gaudreault & Woods, 2012; Sanders, Ashton, & Wright, 2005). In previous studies, students' ALT-PE percentages have generally ranged from 15% to 42%, and the ALT-PE levels of students in the present study were similar to upper levels reported in previous research (e.g., Shute, Dodds, Placek, Rife, & Silverman, 1982; van der Mars, 2006). From a teaching process perspective, it might be argued that all four participants in this study (regardless of NBC status) demonstrated effective teaching throughout the ETU intervention. In addition, these percentages are acceptable and typical in public schools (Parker, 1989).

To provide a health-optimizing physical education classes, teachers are responsible for providing opportunities for MVPA (Sallis et al., 2012, p. 126). Although the Institute of Medicine (Kohl & Cook, 2013) recommends that physical education teachers provide

opportunities for students to engage in MVPA at least 50% of class time, according to Chow et al. (2009), students in physical education classes generally do not reach the recommended goal (Kohl & Cook, 2013). In this study, regardless of teachers' NBC status, students' MVPA was below the recommended 50% level throughout the ETU lessons. Rather, the most predominant activity level for students in both groups was being sedentary, even in the secondary classes where a substantial amount of "scrimmage" was observed. Researchers noted that in spite of the inherent activity level of the scrimmage, students chose to stand around and not participate.

One 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., 1996). Authors reported students accumulated only 25% of vigorous activity and 12% of the MVPA recommended per week by national objectives for health purposes (McKenzie et al., 2000). Moreover, middle school students who participated in coeducational physical education classes have been shown to be engaged in an average of 48.5% MVPA (McKenzie et al., 2000). Similarly, in the observed ETU lesson portions in this study, students' MVPA levels averaged 47% for those taught by non-NBCTS and 42% for those taught by NBCTs, which is close to the recommended 50% of class time.

In regard to teacher thought processes, both the NBCPETs and non-NBCPETs demonstrated similar teaching formats and thought processes, with few minor differences. Based on interviews and observations/field notes, the NBCPETs' and non-NBCPETs' methods of instruction and thought processes of teaching the provided ETUs were indistinguishable.

According to Proposition 4 of the Five Core Propositions, NBCTs think systematically about their practice and learn from their experiences (NBPTS, n.d.). From the resulting data, it appears that both NBCPETs and non-NBCPETs were either unwilling or unable to shift their focus from their typical practices to those presented as part of the ETU where specific learning outcomes were targeted. Beth, an NBCPET, however, reflected on her lessons and noted that she was intending on altering the timing for introducing the ETU objective, demonstrating competency of Proposition 4 (teachers

think systematically about their practice and learn from experience) of the NBCTs.

Both the NBCPETs and non-NBCPETs had their “Mind on the Physical,” focusing attention on physical activity levels rather than the given ETU. As a consequence of the heavy emphasis on the public health concerns around the levels of overweight and inactivity and the importance of reducing the risk of chronic diseases during childhood, the teachers focused on physical activity. The achievement of the U.S. Department of Health and Human Services recommendation of 50% of class time engaged in MVPA has been shown to be challenging (e.g., Scruggs et al., 2003), especially when other goals need to be met (i.e., developing motor skills and developing knowledge and understanding about health behaviors). Proposition 2 of the Five Core Propositions states teachers must know the subject area they teach and how to teach that subject to students (NBPTS, n.d.). According to Phillips (2008), not only do NBCTs have to demonstrate appropriate content development, but also this content development has to be a means to an end, a key missing component found among all participating teachers. In this study, the NBCPETs and non-NBCPETs lacked a command of the knowledge and understanding of the essential components of the learning objective of the soccer ETU (e.g., Ward, 2013).

There is a need for further research on NBCPETs and the NBPTS program as a whole. In this study, researchers examined the thought process, decision making, and instructional approaches in elementary and secondary settings among NBCPETs and non-NBCPETs. Throughout the ETU implementation, it became increasingly clear that NBCPETs and non-NBCPETs were uncomfortable deviating from their district curriculum, in spite of the ETU’s goal of targeting specific student learning outcomes. In addition, both secondary teachers were unfamiliar with the tactical dimension of game play in soccer (i.e., support), which is a key concept of teaching students to be competent game players (Mitchell et al., 2006).

This study was not without limitations. First, there were only a limited number of site visits (three per teacher). Second, the degree to which findings might be generalized to other teachers was limited. Finally, this study was done with intact classes, and some students may have been experienced soccer players. The NBPTS program

claims that it can successfully identify the more accomplished teachers among the applicants (Goldhaber & Anthony, 2007). The lack of differences in thought and decision-making processes in this study leaves two possible explanations. First, the non-NBCPETs were also worthy of NBC status. The number of questions asked by all participants prior to and during the study might support this claim. The second explanation might be that the “holistic” screening process used by the NBPTS assessors is not sufficiently sensitive to capture the critical dimensions of exceptional or accomplished performance in teaching physical education. The lack of sufficient generic and specialized content knowledge across all participants (but importantly among the two NBCPETs) may indicate that the current process does not capture whether the NBC applicant has the expected breadth and depth of content knowledge.

The NBPTS (2014) claims that the process of certification is designed to develop, retain, and recognize accomplished teachers. In addition, completion of NBC is supposed to signify that a teacher has developed and demonstrated advanced teaching knowledge, skills, and practices (NBPTS, 2014). However, the results of this study showed no difference in learning between students of NBCPETs and non-NBCPETs. Students who were taught by non-NBCPETs received the same lesson and gained the same amount of skill as the students with teachers 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

Based on the student outcome measures on shooting on goal and offensive support as well as the ETU process measures (ALT-PE and SOFIT), and given the design and limitations of this study, the following conclusions can be drawn. NBC status did not reflect a higher level of effectiveness for delivering instruction. That is, instructional methods and approaches remained similar and indistinguishable, and NBC status in physical education did not produce differences in student learning outcomes. Further analysis on NBCPETs’ versus

non-NBCPETs' thought processes/decision making and instructional practices should continue. Moreover, the process for awarding board certification deserves further study for assurance that it truly discriminates between accomplished teachers and those still developing.

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