A Comparison of National Board Certified Teachers with Non-National Board Certified Teachers on Student Competency in High School Physical Education

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Abstract

The purpose of this study was to describe the differences of teachers with and without National Board Certification in relation to their percentages of student competency in high school physical education. Data from the South Carolina Physical Education Assessment Program (SCPEAP) were used as the measure of student competency. Student competency was measured on motor skill performance, cognitive fitness knowledge, outside-of-class participation, and health-related fitness levels. A total weighted student competency score was calculated by a linear combination of scores. The results were analyzed descriptively. Mean differences were identified in student competence between National Board Certified Teachers (NBCTs) and non- NBCTs. NBCTs were stronger on all four-performance indicators and on the overall measure of student competency.

Over the past two decades, a movement targeting higher standards for acceptable student achievement has been the basis of educational reform (Goldhaber, Perry, & Anthony, 2003). Higher quality teachers are necessary in order to achieve higher levels of student achievement (Goldhaber et al., 2003). As a means for improving the teaching profession by acknowledging high quality teachers, the National Board for Professional Teaching Standards (NBPTS), a non-profit organization, was founded in 1987.

The mission of NBPTS was three-part and served 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, 2004). The first 86 candidates were able to provide evidence that students were learning as a result of their teaching and were awarded a National Board certificate in January of 1995 (NBPTS, 2004). Approximately half of the teachers that have applied for National Board certification have been successful (NBPTS, 2004).

The NBPTS did not publish standards for physical education until 1999 (NBPTS, 2001). As of November 2004, only 576 physical education teachers were National Board Certified Teachers (NBCTs). Physical educators who are candidates for National Board certification endure a rigorous and time-consuming application process. Applicants must provide evidence of teaching effectiveness in the following four areas: (1) instruction to facilitate student learning, (2) assessment for student learning, (3) creating a productive learning environment, and (4) contributions to student learning (NBPTS, 2004). Candidates are also

required to participate in Assessment Center Exercises.

Assessment Center Exercises are the second phase of the application process. Applicants are assessed to determine the extent of their content knowledge and their ability to apply their content knowledge when teaching the physical education content to students. The areas assessed in physical education 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, 2004).

Advocates of the NBPTS believe that the certification process will develop teachers who are more aware of their own practices (Buday & Kelly, 1996; NBPTS, 1989; Serafini, 2002). NBCTs agree that, as a result of participating in the National Board process, they have become more reflective about their own teaching (Education Research Group, 2001). Teachers become more reflective because the NBPTS process gives them an opportunity to examine their teaching (Russell & Sayers, 2002). When teachers reflect, they have an array of opportunities to strengthen their practices (Belden, 2002). For example, when teachers reflect on their practice, they become more capable of making appropriate decisions for their students (Serafini, 2002). Teachers make better decisions as a result of the National Board Certification process (Berg, 2003), and justify those decisions as being for the benefit of students (Lustick, 2002).

Student outcomes resulting from being taught by an NBCT have been largely overlooked. In one study, however, Bond, Smith, Baker, and Hattie (2000) set out to determine whether or not the NBPTS process distinguished what it actually purported to distinguish: expert from non-expert teachers. Students were interviewed to determine their levels of understanding of the content of the day's lesson as part of the study. NBCTs produced higher levels of student understanding of content when compared with non Board-certified teachers (29%).

Goldhaber and Anthony (2004) reported results from research conducted to establish whether or not a relationship existed between NBCTs and elementary level student achievement. Permanent student records were used, which included information on student background and test results for grades 3-5. The researchers examined results for NBCTs, non-NBCTs, teachers who had attempted certification unsuccessfully, and teachers who had never been involved in the NBPTS process. The researchers discovered that NBCTs were more effective than non-NBCTs at producing higher levels of student achievement.

Cavalluzzo (2004) also addressed the question of whether or not students taught by NBCTs had higher achievement gains than students taught by a teacher without National Board Certification. The researcher also distinguished among teachers who had applied for certification, but had not yet successfully completed the certification process and those who never attempted certification. The results indicated that achieving National Board certification was a good indicator of teacher quality. Students taught by an NBCT demonstrated significant gains in end-of-grade math testing. Teachers whose applications were pending also produced higher student gains, but the gain was one-fifth of the size of those who had attained certification.

In a study by Vandervoort, Amrein-Beardsley, and Berliner (2004), the relationship between National Board certification and student achievement was measured through student performance on the Stanford Achievement Test-9th Edition (SAT-9). Results from students' performances on the SAT-9 were analyzed across four school years and as a total. In all but one year, students of NBCTs scored significantly higher than students of non-certified teachers. In that year, students of NBCTs still scored higher, but the results were not statistically significant at the $p<.05$ level. As a total, students of NBCTs performed higher than

students of non-NBCTs on approximately 73% of the comparisons. Students of non-NBCTs occasionally (25%) outperformed their counterparts, but the difference was never significant.

Vandervoort et al. (2004) also examined differences across subject areas measured by the SAT-9. In reading, the students of NBCTs outperformed their counterparts 75% of the time, with 42% being significant at $p<.05$. In math, the students of NBCTs experienced greater achievement than students of non-NBCTs approximately 68% of the time. In language, students of NBCTs scored higher than students of non-NBCTs (75%). In all cases, when students of non-certified teachers performed better than students of NBCTs, the difference was not statistically significant. The researchers also discovered an effect size across all subject areas of over +.012, which indicated, "The students of NBCTs have over a one month advantage in achievement in comparison to the students taught by non-NBCTs" (p. 34).

Few studies have used student outcomes as a measure of the effectiveness of the NBPTS, but some researchers have established relationships between National Board certification and student achievement (Bond et al., 2000; Cavalluzzo, 2004; Goldhaber & Anthony, 2004; Vandervoort et al., 2004). No such studies exist in physical education; therefore, the purpose of this study was to compare student competency percentages of teachers with and without National Board Certification in high school physical education.

Methods

The competency scores of students taught by NBCTs were compared to the competency scores of students taught by non-NBCTs. The percent of competent students in a class for each of four performance indicators (PIs) of the South Carolina Physical Education Assessment Program (SCPEAP) were used as data for the study. Data were collected by teachers and confirmed as accurate by the SCPEAP assessment process.

The South Carolina Physical Education Program (SCPEAP)

The SCPEAP was developed as a method of evaluating physical education programs in the state of South Carolina. The SCPEAP is "unique in that student performance is used to do program evaluation" (Rink & Williams, 2003, p. 482). At the high school level, the SCPEAP assessment consists of four measurable and achievable performance indicators that describe what students should know and be able to do as a result of a one-year, required physical education class:

- PI-1: Demonstrate competency in two movement forms
- PI-2: Design and develop a personal fitness program to reach a desired level of health-related fitness
- PI-3: Participate regularly in physical activity outside the physical education class
- PI-4: Meet the health-related fitness standard for their age and gender as described by Fitnessgram

Before implementation of the program, South Carolina schools were randomly assigned to one of three groups or cycles. Each group would be assessed every three years. Teachers (n=161) from cycle 1 schools submitted data for the 2001-2002 school year, teachers (n=143) from cycle 2 schools submitted data for the 2002-2003 school year, and teachers (n=112) from cycle 3 submitted data for the 2003-2004 school year. One full round of assessment had been completed at the time of this study. Teachers (n=80) from cycle 1 schools submitted data a second time for the 2004-2005 school year.

Teachers are responsible for collecting data on all four PIs during the school year. Teachers analyze the data using scoring rubrics developed by the SCPEAP. Then, the data are submitted to SCPEAP at the end of the school year. After data have been submitted, a random sample of 25% and 50% is taken of each class. Then, a monitoring committee comprised of 12-16 teachers determines the degree to which teachers

followed the testing protocols and the degree of accuracy of data submitted.

If the teacher's scores are accepted as being accurate, then the monitoring committee has agreed with the teacher's assessment of student competency in his/her class. For PI-1 (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). For PI-2 (cognitive fitness), a cognitive test score of 70% was determined to be competent. To meet competency for PI-3 (outside physical activity), students must complete a contract with the teacher to participate in outside activity at least three days per week for a period of six weeks. The teacher must verify the student participated in the physical activity by contacting the person designated by the student on the contract. Competence in PI-4 (fitness) involves the student meeting the health-related fitness standard for their gender and age as defined by Fitnessgram in the areas of cardiovascular efficiency, muscular strength and endurance, and flexibility.

Participants

All high school physical education teachers (n=415) in the state of South Carolina that submitted accepted data to SCPEAP were participants in this study. Both male (n=250) and female (n=165) physical educators were participants in this study. The control group (n=404) included all non-NBCTs who submitted accepted data to SCPEAP. The experimental group (n=12) included all NBCTs who submitted accepted data to SCPEAP. Seventy-five percent (n=9) of the NBCTs attended training sessions for the SCPEAP. Seventy-two percent (n=289) of non-NBCTs attended training. Teachers in both groups who submitted unacceptable data were excluded from the study. Therefore, the sample size for each performance indicator varied. NBCTs successfully submitted data for PI-1 (n=10), PI-2 (n=10), PI-3 (n=10), and PI-4 (n=2). Non-NBCTs successfully submitted data for PI-1 (n=360), PI-2 (n=358), PI-3 (n=360), and PI-4 (n=243). For total student competency, the experimental group (n=12) and the control group (n=396) submitted accepted data.

Procedures

An ex post facto design was used to investigate the relationship of National Board Certification and student competency in physical education in South Carolina. This design allowed for analysis of the relationships using the competency data of students of NBCTs and students of non-NBCTs. The two groups under study consisted of the experimental group (NBCTs) and the control group (non-NBCTs). In this study, the independent variable was the National Board certification status of the teachers. The dependent variable was the competency scores of the students of NBCTS and non-NBCTs.

A SCPEAP assessment database listed the scores of students by class and school for each performance indicator. Student scores were recorded as competent or not competent for each performance indicator. The percentage of students deemed competent was computed for each class, each performance indicator, and an overall total. The student competency percentages of students taught by NBCTs were compared to the student competency levels of students taught by non-NBCTs for each performance indicator. Overall scores, which represented the weighted total of all performance indicators for teachers, were also compared (PI-1 (50%), PI-2 (20%), PI-3 (10%), and PI-4 (20%)).

Data Analysis

The percent of student competency for each teacher was analyzed for each of the four performance indicators and an overall measure. The same weighted scale was used to calculate the total percentage of student competency in this study. If a teacher had missing data because the monitoring committee did not accept it as accurate (NC/NA), the overall score was calculated by the

values accepted and converted to a 100% scale. For example, Teacher A had student competency levels at 80% for PI-1, 60% for PI-2, and 90% for PI-3. The teacher's data were scored as NC/NA for PI-4. Since PI-4 is worth 20% of the total score, the remaining scores were calculated and divided by 80 to convert it to a 100% score. The researcher wanted to measure student competency accurately; therefore, there was no need to penalize the teacher for the NC/NA. Data were analyzed descriptively due to a small number of NBCTs in the state of South Carolina at the time of this study, and statistical significance would be difficult to achieve with such a small number of participants.

Results

Results are reported for each of the indicators and the overall scores.

Performance Indicator One: Motor Skill Competency

Students must demonstrate competency in at least two movement forms in order to be considered competent for Performance Indicator One (PI-1). NBCTs produced higher levels of student competency in motor skill performance (n=12, M=73.27, SD=19.78) than non-certified teachers (n=363, M=59.78, SD=30.02).

Performance Indicator Two: Cognitive Fitness Knowledge

A cognitive test score of 70% or higher was required of students to be considered competent for PI-2. NBCTs produced higher levels of student competency in cognitive fitness knowledge (n=12, M=80.63, SD=20.61) than non-certified teachers (n=363, M=67.94, SD=28.12).

Performance Indicator Three: Outside Activity

Students must participate in a teacher-approved physical activity outside of class at least three times a week for a six-week period and have this activity verified by an adult to be considered competent for Performance Indicator Three. NBCTs (n=12) produced slightly higher levels of student competency in outside of class participation (M=84.92, SD=24.04) than non-certified teachers (n=364, M=68.73, SD=34.21).

Performance Indicator Four: Fitness Testing

Students must satisfy the gender and age requirements published by Fitnessgram in order to be competent in Performance Indicator Four. NBCTs (n=3) produced higher levels of student competency in fitness levels (M=55.57, SD=12.84) than non-certified teachers (n=247, M=33.85, SD=26.40). Many teachers from both groups submitted unacceptable data for this performance indicator.

Overall Score

Overall student competency scores considered a linear combination of scores on PI-1 (50%), PI-2 (20%), PI-3 (10%), and PI-4 (20%). NBCTs (n=14) produced higher levels of overall student competency (M=76.04, SD=17.37) than non-certified teachers (n=401, M=62.65, SD=22.53).

Discussion

Students of NBCTs had higher levels of student competency on all four-performance indicators and on the overall measure when compared with students of non-NBCTs. Differences between the means for NBCTs and non-NBCTs were consistent throughout the performance indicators. NBCTs demonstrated student competency levels 13.5% higher than students of non-certified teachers in motor skill competency, 12.68% in cognitive fitness knowledge, 16.19% in the outside-of-class participation and 21.82% higher for NBCTs than non-certified teachers on fitness testing. On the overall measure, NBCTs had higher student competency levels than the non-NBCTs by 13.38%.

Standard deviations were high due to the degree of variability in the scores of teachers. Lower standard deviations for NBCTs indicated

less variability in the scores than that of non-board certified teachers. It is likely there are effective teachers who are not board certified. On the other hand, it is encouraging to think the lower standard deviation may mean that teachers who are board certified are effective.

Critics of the research on NBPTS cite two weaknesses in the current research: (1) The studies lack independence from the NBPTS as an organization, and (2) The studies have focused on teaching methods rather than student outcomes (Goldhaber et al., 2003). The current study attempted to address these complaints by (1) being independent from the NBPTS, and (2) analyzing student performance to establish effectiveness of NBCTs. Furthermore, critics are concerned that significant amounts of government funding have gone to support the NBPTS despite the fact research has yet to establish its effects on increasing levels of student achievement (Stone, 2002). The NBPTS does not claim to increase teaching effectiveness but to identify effective teachers. The results from this study support the success of NBPTS in identifying effective teachers in relation to student achievement. Therefore, it is the researcher's opinion that government funding should continue the support the NBPTS.

Furthermore, state and local governments should continue to offer substantial monetary rewards for teachers who achieve certification. The National Board certification process is said to be a rigorous process, one that requires a significant amount of time and effort. The monetary rewards serve as external motivation for teachers to engage in such a time-consuming process.

Teacher education programs at colleges and universities are redesigning the curriculum to reflect the standards of the NBPTS (Digby & Avani, 2003; Eckmier, Ericson, Huetinck, & Sato, 2003; Unrau, 2003). Preservice and inservice teacher education programs could use some of the tools used by the NBPTS for evaluation of teacher effectiveness. Furthermore, the tools could be used to promote reflection. Research is needed on the effectiveness of using such tools in pre- and in- service teaching programs.

Although a beginning descriptive study, this study supports previous research that has established relationships between National Board certification and student achievement (Bond et al., 2000; Cavalluzzo, 2004; Goldhaber & Anthony, 2004; Vandervoort et al., 2004). NBCTs in the current study had higher percentages of their students that were competent than teachers who were not certified on every measure. Recently, legislation was passed in South Carolina requiring teachers to submit data to the SCPEAP. Therefore, the database should be expanded within the next few years.

This study can be replicated with an increase in the number of board certified teachers. Participants of this study were all high school physical education teachers. Within the next few years, the database will include elementary, middle and high school teachers. Furthermore, all NBCTs will have submitted data to the SCPEAP. This study should be replicated once such data is available. Furthermore, statistical significance can be tested once the sample is larger.

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