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Original article

Effectiveness of quality physical education in improving students' manipulative skill competency

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Abstract

Purpose: This study aimed to examine the extent to which the quality physical education teaching (QPET) practices contributed to improving 4th- and 5th-grade students' manipulative skill competency.
Methods: Participants were 9 elementary physical education (PE) teachers and their 4th- and 5th-grade students ($n = 2709–3420$). The students' skill competency was assessed with 3 manipulative skills using PE metrics assessment rubrics. The PE teachers' levels of QPET were assessed by coding 63 videotaped lessons using the assessing quality teaching rubrics (AQTR), which consisted of 4 essential dimensions including task design, task presentation, class management, and instructional guidance. Codes were confirmed through inter-rater reliability (82.4%, 84.5%, and 94%). Data were analyzed through descriptive statistics, multiple R^2 regression models, and independent sample t tests.
Results: This study indicated that the 4 essential dimensions of QPET were all significant contributors to students' manipulative skill competency. These predictors were significantly higher for boys than for girls in soccer and striking skills, while they were significantly higher for girls than for boys in throwing skill competency. Of the 4 essential dimensions of QPET, task presentation played the most significant role in contributing to all 3 skill competencies for both boys and girls. Further, students who experienced high QPET were significantly more skillfully competent than those students who did not have this experience.
Conclusion: It was concluded that the QPET practices played a significantly critical role in contributing to students' manipulative skill competency.

Keywords: Assessment of quality teaching; Essential dimensions of teaching; Manipulative skill competency; Skill assessment

1. Introduction

Demonstrating competency in a variety of motor skills and movement patterns is a desired learning outcome that U.S. National Standard 1 describes for all students to be able to achieve as a result of participating in quality physical education (PE) program.[1] Motor skill competency is 1 of the 3 Comprehensive School Physical Activity Program (CSPAP) facilitators underlying PA.[2] Supporting this theoretical postulation, empirical studies show that motor skill competency is an enabling factor that provides physical foundations necessary for enjoyable and successful physical activity (PA) engagement in youth.[3–7] Children with adequate motor skill competency spend significantly more time in moderate-to-vigorous PA than children with insufficient motor skill competency.[3–7] As a result, childhood manipulative skill proficiency is significantly associated with adolescents' participation in a variety of PAs and organized sports.[3,4]

However, children's motor skill competency is not developed naturally as a result of physical growth. Development of motor skill competency is based on the dynamic interaction among the task, the learner, and the environment.[8] Motor skill development must be learned and practiced within a sequentially structured learning environment based on children's sequence of motor development.[8–10] How well students are able to demonstrate motor skill competency depends largely on whether or not PE teachers provide students with quality PE program.[1]

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Quality physical education (QPE) serves as the heart of the CSPAP for promoting physically active behaviors.[11–13] QPE is a primary vehicle for equipping students with knowledge, skills, fitness, and positive attitudes to become skillful movers and competent performers necessary to participate in a variety of PAs.[11–14] QPE offers a wide array of PAs that are developmentally appropriate and meaningful for students. It uses appropriate instructional practices to provide students with maximum learning experiences and create productive learning environments for students.[11–14] Implementation of QPE in practices consists of 4 essential dimensions including task design, task presentation, class management, and instructional guidance.[14] How well the teacher enacts the 4 essential dimensions in a lesson collectively contributes to the quality of instructional practices.[15–18]

Task design, one essential dimension, refers to types and natures of learning tasks the teachers design and organize for their students to engage in.[17,18] To help students accomplish intended learning objectives, the teacher should provide students with learning tasks that are developmentally appropriate, and maximally and actively engaging.[1,18] Learning tasks that are developmentally appropriate are critical to ensure students to have successful learning experiences. Learning tasks that are maximally and actively engaging provide students with ample learning opportunities and participation.[15–18]

Task presentation, another essential dimension, refers to how the teacher delivers learning tasks to students.[17,18] Key teaching components of task presentation include that (a) the teacher precisely and accurately presents the learning task while using appropriate examples or metaphors to help students make a sense of the information; (b) the teacher demonstrates key features of a learning task while presenting learning cues related to the nature of the task; and (c) the teacher uses contextual scenarios to explain why the information should be learned to help students find new information relevant and meaningful.[15–18]

Class management, the 3rd essential dimension, implies how the teacher organizes the students, equipment, space, and learning resources for the task enactment.[17,18] Researchers contend that the quality of class management depends on how efficiently and effectively the teacher groups students, distributes physical learning materials/equipment, arranges physical layouts, locates students into working areas, and reinforces class norms and rules.[15–18]

Instructional guidance, the 4th essential dimension, is defined as how the teacher responds to students' ongoing task engagement.[17,18] Critical components of instructional guidance include that during the students' task engagement, the teacher closely observes and analyzes students' task performance, timely adjusts the complexities of the task, steers students' focus on task, and provides tailored instructional guidance.[15–18] The 4 essential dimensions provide a core framework for assessing the quality physical education teaching (QPET) in situated classrooms.[15–18]

According to the expectations for students in Grades 3–5 of the National Content Standard 1,[1] students should demonstrate mature forms of fundamental movements and basic specialized skills, be able to combine one skill with another, and apply the skills in dynamic situations. However, due to a lack of performance-based assessment tools in previous studies, motor skill competency was evaluated either using product-oriented criteria with a combined product score or merely process-oriented criteria with "yes" or "no" rating scale.[3,4,6] To fill these gaps in the assessment of motor skill competency, after 4 years of extensive testing with 4000 students at 90 schools across the nation, the National Association for Sport and Physical Education (NASPE) published *PE Metrics: Assessing the National Standard 1: Elementary*.[19] PE metrics includes a series of performance-based assessment rubrics that are specifically designed to assess levels of students' competency in motor skills and movement patterns using both process- and product-oriented criteria based on grade level expectations.

To date, no such study was found in the literature review that was conducted to examine the progress of 4th- and 5th-grade students' demonstration of motor skill competency assessed with the PE metrics assessment rubrics[19] in school settings. In addition, there has been a lack of empirical studies that investigate to what degree QPET contributes to students' demonstration of motor skill competency in manipulative skills (object-control skills). Therefore, the purpose of this study was to examine the extent to which the QPET contributed to improving 4th- and 5th-grade students' manipulative skill competency that was assessed with selected PE metrics assessment rubrics.[19] This investigation was guided by 2 research questions including: (a) To what degree did the 4 essential dimensions of QPET contribute to students' manipulative skill competency; and (b) How did the impact of essential dimensions of QPET in improving manipulative skill competency differ for boys and girls? The significance of this study lies in providing empirical evidence for how QPET impacts students' achieving desired learning outcomes in relation to the NASPE content standard 1.

2. Methods

2.1. Participants and research settings

Participants in this study were 9 elementary PE teachers and 4th- and 5th-grade students (n = 2709–3420) who were enrolled in 9 elementary schools in the United States. All 9 teachers (5 males and 4 females) were Caucasian. Their ages ranged from 33 to 55 years old and their teaching experience varied from 6 to 26 years. All 9 PE teachers participated in the 2-year study, indicating 100% retention rate. The students' retention rate was 91%. The student population was dominantly White, non-Hispanic (91.2%; 48% girls and 52% boys). The 4th- and 5th-grade students had one 60-min PE class each week for 36 weeks throughout an academic school year. The PE class size ranged from 18 to 28 students.

The University of Michigan Institutional Review Board for Human Subject Research and the school district granted the permission for conducting this study. All 9 PE teachers signed the consent form to indicate their willingness to participate in this study. The parents/guardians of the 4th- and 5th-grade students also signed the consent form to grant permission for