

MOTOR BEHAVIOR

Motor Skill Development of Students Enrolled in a Sport Education Volleyball Season Delivered by In-Service Physical Education Teachers

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Abstract

The purpose of the present study was to investigate students' motor skill development through a sport education volleyball season as implemented by in-service teachers with the support of ongoing professional development. Eight teachers (four middle school teachers and four junior high school teachers) and randomly selected students in the sixth grade (middle school; n = 66) and the seventh grade (junior high school; n = 64) at a Midwestern U.S. school corporation participated in this study. A 2-day sport education workshop was provided to the participating teachers, who then developed and taught volleyball lessons to their students using the sport-education model over 6 to 8 weeks with the ongoing support of a university research team. Student motor skill development was measured through a volleyball game of "Keep It Alive," with volleyball form, communication, movement to the ball, effective

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play, and total score the focal dependent variables. Volleyball skill was assessed at pre- and postseason. Pre- to postseason change was exhibited in volleyball form, communication, movement to ball, and total score. Change was not dependent on grade or school, though sport education implementation differences were evident across the schools. The results show that sport education can be successfully introduced to and implemented by in-service teachers with benefit to student motor skill development.

Stodden et al. (2006) note that motor skills are the “equivalent of the ABCs in the world of physical activity” (p. 291). Children who lack motor skill instruction and the opportunity to practice demonstrate delays in motor skill development (Seefeldt & Haubenstricker, 1982) and may not be able to advance to a high level of motor skill proficiency (Hamilton, Goodway, & Haubenstricker, 1999). Additionally, Li (2006) adds that “fundamental motor skills are necessary ingredients for success in sport skills...[and] can enhance the learning for sport-specific skills” (p. 300). In all, it appears as if children who do not develop fundamental motor skills will not have the prerequisite skills needed to be active later in life (Li, 2006). Thus, the development of motor skills has long been pronounced as one of the primary objectives of physical education. In fact, demonstrating “competency in motor skills and movement patterns needed to perform a variety of physical activities” is the first of the National Association for Sport and Physical Education’s (NASPE, 2004) standards for physical education. For the purpose of this paper, the authors consider motor skill development to include the performance of skills as well as acquisition of tactics and communication skills related to their performance.

Early versions of physical education in the late 19th and early 20th centuries emphasized hygiene and gymnastics and did not deal directly with the development of motor skills (Ennis, 2006). Then, in the late 1930s, La Porte’s (1937) physical education curriculum revolutionized the way in which physical education was taught by advocating units of content that focused on the development of motor skills over 3- to 6-week periods (Siedentop, 1998). Thus, what scholars now refer to as the multiactivity model was born (Hastie, 2003). In schools this has been manifested in short units of primarily team sport activities. The multiactivity model has become

an institution in physical education classes and is still used widely in contemporary classes. However, its tenets are not without criticism (Metzler, 2005).

Among the concerns related to multiactivity curricula is that the units are too short for the development of substantive learning outcomes, including the development of motor skills. As noted over 20 years ago, “the smorgasbord approach of requiring team sports, individual sports, dance, physical fitness activities, all within the space of one year lessens those students’ opportunities to master any one activity” (Taylor & Chiogioji, 1987, p. 22). In addition, the autocratic, teacher-centered way in which the multiactivity model is typically presented divorces students from the instructional process, which may negatively impact their motivation in physical education (Grant, 1992).

Sport Education and Motor Skill Development

In response to criticisms of the multiactivity approach, several curricular and instructional models have been proposed since the 1980s and are summarized elsewhere (Metzler, 2005; Tannehill & Lund, 2010). The use of model-based instruction is supported by NASPE (2008) in the *National Standards and Guidelines for Physical Education Teacher Education*. One of these approaches, called sport education, was conceived by Daryl Siedentop in the 1970s (Siedentop, Hastie, & van der Mars, 2004). Sport education provides students with protracted learning experiences in an effort to present a “culturally responsive and engaging curriculum for students within units of sport” (Hastie, 2003, p. 223). Siedentop (1994) notes that the primary objective of sport education is to “educate students to be players in the fullest sense, and to help them develop as competent, literate, and enthusiastic sportspeople” (p. 4).

Grounded in play theory and Siedentop’s writings (Siedentop, Mand, & Taggart, 1986), the basic structure of sport education is analogous to the model used to organize youth sport leagues (Metzler, 2005). Students are grouped into teams in which they remain for the duration of the extended sport “season” (typically 18–20 lessons), which culminates in a postseason tournament (Grant, 1992). Because students have extended exposure to the content in sport education, they may achieve higher levels of motor skill development than can be anticipated in the multiactivity approach. Aside from providing more time for engagement, sport education is designed to produce a more

authentic experience in relation to organized sport. Students take on team roles (e.g., coach, captain, statistician), assume duty roles (e.g., referee, ball retrievers, scorekeeper), and create public records of team and individual performance. Additionally, the locus of control in the physical education environment is progressively moved from the teacher in the beginning of the unit to the students. In this way, the sport education model takes on some of the characteristics of peer teaching and cooperative learning as children work together to plan practices and game strategies and take responsibility for the day-to-day operations of the league (Metzler, 2005).

Although sport education takes on several of the characteristics of organized, competitive sport, some key differences are important to note. In this teaching model, everyone is encouraged to engage and participate in both playing and nonplaying roles. The structure of sport education emphasizes inclusion as opposed to the selection of the best athletes and the exclusion of all others. Additionally, because the model is implemented primarily within the context of an educational setting, its overarching mission is centered on teaching children and enhancing their physical education experience (Siedentop et al., 2004).

Sport education has been well researched by physical education scholars, though some suggest that research on the development of motor skill competence through sport education is limited (Kinchin, 2006). A review of the relevant literature revealed four studies that examined the relationship between sport education and motor skill competence: two in which instruction was implemented by researchers and two with in-service practitioners leading instruction. Hastie, Sinelnikov, and Guarino (2009) assessed the motor skill development of 41 eighth grade students in a badminton sport education season taught by the investigators. Students improved in shot selection and execution as well as ability to select tactical solutions for game problems. Pritchard, Hawkins, Wiegand, and Metzler (2008) conducted one of the most methodologically rigorous investigations of sport education and motor skill development by randomly assigning 64 ninth grade students to either a 20-lesson volleyball sport education season or a 20-lesson traditional unit. Both units were taught by the researchers, and no significant difference in the motor skill development of the two groups was exhibited. However, the sport education group improved more in game play.

Hastie (1998) tracked the performance of one team of six sixth graders (four boys and two girls) through a 30-lesson season of “ultimate.” Three physical education teachers who were already familiar with sport education designed and implemented the unit, and the results suggest that the students made improvements in their motor skill competence. Ormond, DeMarco, Smith, and Fischer (1995) provided four continuing professional development (CPD) sessions that centered on sport education to one high school physical education teacher. Following the CPD sessions, the teacher implemented two 10-lesson basketball units—one using sport education and a second acting as a control. At the end of the unit, a panel of basketball experts viewed tapes from both of the classes and provided commentary. Based on the panel’s observations, the authors of the study concluded that the students in the sport education group performed better during games because they utilized more offensive and defensive tactics.

Overall, the findings of these four studies suggest that sport education holds promise for the development of motor skills in students. However, only two of the studies were implemented by in-service teachers, and only one of these (Ormond et al., 1995) contained a CPD component, which did not include ongoing support. Thus, the degree to which late career in-service teachers who favor a teacher-centered, direct instructional approach can successfully implement a unit of sport education while engaging in ongoing CPD remains unclear. The question of whether or not teachers can successfully implement sport education and impact student motor skill development is of importance because, as with many other professional fields, physical education is in a perpetual state of change. New curricular models and instructional strategies are continuously being introduced that alter what is considered best practice. If teachers are to continue to provide effective instruction throughout their careers, they must be viewed as continual works in progress as opposed to finished products upon the completion of preservice training (Knight, 2002). One way in which teachers can continue to learn is through CPD experiences aimed at keeping them abreast of current trends in the field (Armour, Makopoulou, & Chambers, 2009).

Continuing Professional Development

The true objective of any CPD program is to positively influence student learning by impacting the manner in which content is delivered by the teacher (Day, Sammons, Stobart, Kington, & Gu, 2007). In physical education, student success includes an improvement in motor skill performance. Research indicates that if this objective is to be met, teachers must engage in ongoing, directed, and meaningful CPD experiences. One-time professional development workshops without ongoing support from CPD providers are unlikely to be effective in changing teacher behaviors and influencing student learning (Armour & Yelling, 2004). CPD is also most effective when customized to the needs and interests of the teachers who will be responsible for implementing the reform as well as the context in which they teach (Klingner, 2004).

Because sport education has been recognized as a viable curricular model in physical education (Metzler, 2005), it is a logical focus of a CPD initiative. However, because sport education requires a change in the control of the lesson in a student-centered direction, educators who experience it for the first time may be resistant to the model (Kinchin, Penney, & Clarke, 2001) or implement it in a watered-down fashion (Curtner-Smith, Hastie, & Kinchin, 2008). This may be especially true of later career teachers who, as a group, tend to resist changes to traditional approaches to teaching (Day et al., 2007). Thus, research (Sinelnikov, 2009) has indicated the importance of supporting teachers throughout their first experience with sport education in conception, design, and implementation.

Although providing teachers with support throughout the CPD process is important, CPD initiatives should also provide teachers with an appropriate mixture of autonomy and accountability. Traditional CPD models were autocratic and pressured teachers to change in specified directions without providing them a voice in the process. Referred to as *top-down approaches* (Darling-Hammond & Richardson, 2009), these methods have been shown to have limited influence because teachers are not given the opportunity to develop a sense of ownership in the reform process (Fullan, 2007; Sparks, 1991).

In contrast to top-down models, *bottom-up approaches* to CPD embrace teachers' voices and visions for their own programs and promote teacher-centered learning to enact positive change in practices (Darling-Hammond, 2009; Sparks, 1991); however, while

Fullan (2007) acknowledges the impact of bottom-up reform on a local level, he cautions that such initiatives might not produce success on any scale. He recommends “reconciling and combining top down and bottom up forces for change,” which gives rise to a strategy he has referred to as “capacity building with a focus on results” (Fullan, 2007, p. 11). Such a strategy combines the best of both driving forces by helping teachers to develop ownership over reform and giving them guided direction in their efforts.

In line with research on CPD, teachers were provided with a long-term CPD experience, in which they received ongoing support and accountability, while also maintaining a degree of autonomy in directing their own learning experiences. Sport education was chosen as the focus of the CPD because it has shown the potential to positively influence student motor skill development. It also is recognized as a viable curricular model and has been successfully implemented through CPD initiatives (Sinelnikov, 2009). Furthermore, sport education has accumulated a large practitioner-focused literature base including books (Siedentop et al., 2004) as well as teaching materials and guides (Alexander & Taggart, 1995) that can be provided to teachers who are engaged in sport education-focused CPD. In sum, the purpose of the present study was to investigate students’ motor skill development through a sport education volleyball season as implemented by in-service teachers with the support of ongoing professional development.

Methods

Participants and Setting

This study was part of a larger investigation of the influence of a Physical Education Program (PEP) Grant (U.S. Department of Education, 2008) on the provision of physical education in an urban school corporation in the Midwest United States. The PEP Grant targeted one middle school (sixth grade) and one junior high school (seventh and eighth grade) within the corporation. The research was approved by the researchers’ university institutional review board and the school district. Eight physical education teachers (four middle school and four junior high school) participated in the investigation. Seven of the teachers were in the later stages of their careers, and each had 23 or more years of experience. The eighth teacher was the youngest and was entering her second year of teaching. Two were male and six were female, their ages ranged from 23 to 58 years,

and all were Caucasian. All teachers completed Bachelor degree programs and were currently licensed in physical education. Four teachers completed master degree programs. All of the teachers had taught at least two units of volleyball via the multiactivity approach prior to the conception of the study and, though one teacher reported that she learned about sport education during preservice training, none had ever implemented a sport education season.

Sport Education Workshop and Ongoing Support

All of the teachers were initially introduced to sport education through a 2-day intensive workshop delivered by a sport education expert. The teachers participated in the workshop as a group and were given an overview of the model, provided with books and supplemental reading materials, and given opportunities to practice implementing sport education. After the workshop and with ongoing support from faculty and graduate students from the investigators' university, the teachers were tasked with developing and implementing a sport education volleyball season.

The middle school teachers acted fairly autonomously, only relying on the faculty and graduate students for limited support. The junior high school teachers required significantly more support in the conception and application of their season, which included assistance with planning, organizing, and disseminating content. For example, at the middle school the teachers mapped out the sport education season on their own and designed their own instruction. However, the junior high school teachers asked the university partners to assist in the planning and implementation of their season. A graduate student assisted the junior high school teachers by meeting with them after school to discuss the design of their sport education season and taught model lessons (approximately 5% of all sport education lessons that were delivered) to help the teachers better understand how sport education should be implemented. This helped the junior high school teachers to transition into the use of the model, whereas the middle school teachers needed no such assistance.

At both schools, the research team discussed sport education lesson plans with the teachers and debriefed with them following the implementation of sport education lessons. This process was conducted to develop and maintain fidelity to the tenets of sport education instruction as explained by Siedentop et al. (2004) and outlined by Metzler (2005), the standards against which the teachers'

implementation of sport education was judged. By comparing the teachers' instruction to these criteria, the research team was able to provide the teachers with recommendations to improve their practice to better align with the model.

Season Description and Treatment Verification

To help the teachers develop a sense of ownership over their CPD experience, the two schools were invited to have a degree of autonomy over the way in which sport education was implemented at each site. While the teachers were provided with some voice, the stipulation was made that all of their decisions had to be in line with Siedentop et al.'s (2004) sport education text. This resulted in differences between the units at the middle and junior high schools. The sport education season in the middle school consisted of 21 lessons, whereas the season at the junior high school was 15 lessons in length. Additionally, the middle school students used a three-on-three volleyball game format, whereas a six-on-six format was used in the junior high school.

The middle school teachers also included several duty roles and team roles in their sport education season, whereas the junior high school teachers restricted their classes to a more limited number of roles, such as ball retriever and scorekeeper. Similarly, the middle school teachers used fair play points to keep students accountable for their behavior in class, whereas the junior high teachers elected not to use this system. During the season, the physical education classes at both schools met every other day (i.e., 5 days every 2 weeks) for 45 minutes per session.

To verify that the physical education teachers at both schools implemented the sport education volleyball seasons according to the guidelines outlined by Siedentop et al. (2004), two graduate students made daily visits to both sites to observe, take notes, and assist the teachers whenever necessary. These observations as well as the differences in the way the model was implemented at the two schools demonstrated that the middle school teachers adhered more closely to the guidelines for sport education than did the junior high school teachers. Accordingly, school was examined as an independent variable in the primary data analyses.

Motor Skill Data Collection

A total of 1,415 students in 22 classes participated in the volleyball season. Because the teachers wanted as much practice implementing

sport education as possible and did not want the students to have different experiences, all students in both schools participated in sport education. Consequently, there was no control group for this study. Motor skill data were collected from a stratified random sample (controlled for gender and grade level) of 170 students. Of these 170, a second stratified random sample (controlled for gender and grade level) of 130 students was selected for analysis. This final sample of 130 comprised 66 sixth graders from the middle school (35 boys, 31 girls) and 64 seventh grade students from the junior high school (32 boys, 32 girls) who were enrolled in the teachers' regularly scheduled classes.

Assessment Task

Prior to and immediately after completing the sport education volleyball season, students were video recorded playing a 5-minute game of "Keep It Alive." The objective of the game was to keep the volleyball in the air using only forearm passes and overhead sets. The researchers used the protocol for this skill assessment established by the South Carolina Physical Education Assessment Program (SCPEAP; 2007). SCPEAP established reliability and validity for the instrument. Prior to beginning each of the pre- and postassessments, participants were brought into the gym and asked to sit on the bleachers where they were read a description of the assessment task by a member of the research team. The researchers demonstrated the assessment task for the participants, along with the difference between a forearm pass and an overhead set.

The participants were then given a colored jersey with a number printed on the front and back and were randomly assigned to single-gender groups of five. In accordance with the procedures for the "Keep It Alive" skill assessment, a group of five children was arranged in a circle (poly spots were used to mark starting positions) and began play with a toss. Play then continued using overhead sets and forearm passes until the ball hit the ground or was hit illegally. Students were encouraged to communicate when taking hits, return to their starting positions after each hit, and not to pass to the individuals standing immediately next to them in the circle. After 2-and-a-half minutes of play, the game was stopped and the students were asked to rearrange their position within the circle. Play then continued for an additional 2-and-a-half minutes. In addition to videotaping the performance, the researchers acted as ball retrievers so that game play could continue with minimal interruption.

Measures of Motor Skills and Techniques

The SCPEAP (2007) *Middle School Physical Education Assessment Manual* describes the four categories of performance that were coded in the assessment: (a) form of the forearm pass (knees bent to straight; arms extended, hands together; forearm hit/shoulder shrug; and follow through with arms below shoulders) and overhead set (knees bent to straight, window overhead, elbows out, and extension/follow through), (b) whether a playable ball (effective play) resulted from the hit, (c) communication with group members (e.g., calling for the ball), and (d) movement to the ball. Each of the categories was scored according to whether the individual participant demonstrated successful performance *consistently* (Level 3; 75% of the time or more), *usually* (Level 2; 50%–74% of the time), *sometimes* (Level 1; 15%–49% of the time), or *rarely* (Level 0; less than 15% of the time). After the categories were scored individually, a combined score (total score) for the assessment was calculated by adding a student's scores across all four domains and then dividing by 4 (i.e., the number of assessment items). A more detailed description of the assessment task, along with the procedures used to evaluate student performance, can be found in the SCPEAP (2007) *Middle School Physical Education Assessment Manual*.

Observer Reliability

Two of the investigators were trained for 15–20 hours to use the four category, four level “Keep It Alive” coding system to analyze the videotapes of student performance. A progressive, six-step process adapted from van der Mars (1989) was used in the training of the observers: (1) a researcher experienced in working with the coding system communicated the category definitions to the observers, (2) coding conventions and hypothetical situations related to the coding system were discussed, (3) the observers were presented with the coding sheet and given time to build familiarity with it, (4) sample video recordings were observed and discussed as a group, (5) observers practiced coding from the videotapes independently, and (6) an interobserver reliability check was conducted using an experienced researcher as the criterion and an intraobserver reliability check was conducted by comparing scores on the same observations taken by each observer 1 week apart. Kazdin's (1982) point-by-point formula was used to determine the level of interobserver and intraobserver reliability by

dividing the number of agreements by the number agreements plus disagreements. Interobserver and intraobserver agreement reached the 80% threshold recommended by Cooper, Heron, and Heward (1987) on all four categories of performance prior to beginning the actual coding process. The two investigators then coded the motor skill performances of the targeted students, with each investigator responsible for coding one half of the sample.

Data Analysis

Following standard data screening and examination of descriptive statistics, the five dependent variables (form, effective play, communication, movement to the ball, and total score) were analyzed separately using 2 (school) \times 2 (time) repeated measures Analysis of Variance (RM-ANOVA). In light of the multiple analyses, a Bonferroni adjustment to the threshold alpha level ($p = 0.01$) was made to control for type I error.

Results

The means and standard deviations for all five dependent variables (form, effective play, communication, movement to the ball, total score) by time and school are included in Table 1. Students generally appeared most effective at moving to the ball and least effective at communication. The RM-ANOVAs yielded no significant time by school interaction effects, suggesting that differences in implementation of sport education across the schools did not yield distinct differences in volleyball skill performance and improvement. Time effects were observed for form, $F(1,128) = 15.37$, $p < .01$, partial $\eta^2 = 0.11$; communication, $F(1,128) = 23.22$, $p < .01$, partial $\eta^2 = 0.15$; movement to the ball, $F(1,128) = 11.34$, $p < .01$, partial $\eta^2 = 0.08$; and total score, $F(1,128) = 35.62$, $p < .01$, partial $\eta^2 = 0.22$. Effective play showed a trend toward significant change over time, $F(1,128) = 6.02$, $p < .02$, partial $\eta^2 = 0.05$. The students performed better after the unit than before the unit on these variables. A significant school effect was also observed for movement to the ball, $F(1,64) = 7.73$, $p < .01$, partial $\eta^2 = 0.06$. Students at the junior high performed better on moving to the ball than students at the middle school, whether it was pre- or postunit. No other variables showed significant school differences.

Table 1*Means and Standard Deviations for the Dependent Variables by School and Time*

Dependent Variables	Junior High School				Middle School			
	Pre		Post		Pre		Post	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Form	1.25	.96	1.77	.89	1.26	.93	1.41	.99
Effective Play	1.58	.83	1.78	.75	1.50	.73	1.65	.77
Communication	.89	1.09	1.56	1.07	1.18	1.08	1.44	1.14
Movement to ball	1.97	.96	2.33	.67	1.67	.97	1.88	1.0
Total Score	1.42	.68	1.86	.64	1.40	.70	1.60	0.67

Discussion

The purpose of the present study was to investigate students' motor skill development through a sport education volleyball season as implemented by in-service teachers with the support of ongoing professional development. Student volleyball form, communication, and movement to ball significantly improved throughout the season. In addition, there was a near significant trend in effective play. The total score of the four dependent variables that was calculated for examining the students' overall volleyball skill showed a significant difference between pre- and posttests.

Though no comparative control group was employed in the present work, the students' participation in the sport education unit, which included nonplaying team and duty roles, did not adversely impact student motor skill acquisition. This suggests that sport education as implemented by in-service teachers is a viable curricular model for developing students' motor skills.

The improvement in form is especially important given that the sport education model requires teachers to relinquish some of the control over their classes to allow student coaches and captains to lead instruction. The increase in communication might indicate that the student-centered nature of sport education is effective in prompting students to verbalize during game play. In addition, the students' improvement in movement to the ball might suggest that one can develop better anticipation capability and understanding of volleyball when he or she participates in sport education. The junior high school students in this study moved to the ball more effectively than those from the middle school during both the pre- and posttests. This trend could be explained by the junior high school teachers' decision to use full-sized courts in contrast to the smaller, modified courts used for the middle school games. The larger court size could have induced the junior high school students to move more during their games.

This study focused on how students' motor skill development might be impacted by in-service practitioners' use of sport education in an authentic environment. In interpreting the results of this investigation, recall that the teachers taught most of the lessons. In previous studies, the researchers or research assistants more often delivered the instruction (Hastie et al., 2009; Pritchard et al., 2008); however, the teachers in the present investigation received training in sport education through a 2-day workshop and were offered ongoing

support from university personnel. While the investigators were available to assist the teachers, they were not the ones delivering the instruction on a daily basis. Because the investigators focused on how the in-service teachers applied the sport education model to improve the students' motor skill levels, the present investigation represents an authentic application of sport education in the examination of motor skill development. In addition, seven of the eight teachers who participated in the present study had never been exposed to the sport education model prior to the workshop. Yet, the researchers found that the students at both of the schools improved their volleyball skills despite the teachers' lack of exposure to the model; therefore, this study is of practical significance for teachers who are interested in implementing sport education for the first time.

Because this study was designed and conducted through CPD, it is crucial to discuss the impact of the study-specific CPD and how CPD was found to work best when teachers were involved. Although the junior high school teachers relied more heavily on the support of the university, all of the teachers benefited from the ongoing support in maintaining fidelity to the sport education model over time. Sport education was a new instructional approach for the majority of the participating teachers; however, they successfully implemented this model and produced positive outcomes related to the students' motor skill development. This highlights the importance of supporting teachers in their initial implementation of sport education via CPD. In other words, ongoing support from the university research team, along with the workshop, effectively changed teacher behavior and student learning in the present study as it has in past studies (Armour & Yelling, 2004).

Although all of the participating teachers were offered similar support, they utilized it in different ways. The middle school teachers preferred to plan, develop, and implement the content on their own, while those at the junior high school requested additional support from the research team. In addition, the middle school teachers opted to adopt a longer season and smaller teams than their counterparts at the junior high school; these conditions support the importance of customizing CPD experiences in light of pedagogical and contextual factors (Klingner, 2004). Furthermore, while the middle school teachers positively responded to the support of the CPD, the teachers at the junior high school implemented a mitigated version of the model (Curtner-Smith et al., 2008), which highlights some of

the challenges related to implementing a complex curricular model such as sport education. Challenges might arise, in particular, with late career teachers who, as a group, are more resistant to change (Day et al., 2007); that is, late career teachers who are experienced in autocratic modes of instruction might have a difficult time making a complete transition to sport education.

The teachers' responses to the CPD served as a reminder of the importance of balancing top-down (Darling-Hammond & Richardson, 2009) and bottom-up approaches (Darling-Hammond, 2009; Sparks, 1991). The participating teachers in this study seemed to need both support and autonomy in implementing sport education: support to make sure they were implementing the model correctly, but autonomy to make curricular decisions based on their school context and personal preference. These findings can inform future CPD initiatives that seek to implement new instructional models and approaches.

While the present investigation presented a positive and significant trend in the students' development of motor skills through a sport education volleyball season, at least one major limitation exists that must be considered. Changes in student motor skill proficiency cannot, with certainty, be attributed to the sport education season because there was no control group to compare with the sport education groups. Student motor skill proficiency might have improved merely because of participation in a prolonged volleyball experience; therefore, in terms of motor skill development, this investigation should be seen as exploratory in nature in that it establishes a potential for successful implementation of a sport education model by in-service teachers that positively impacts students' motor skill development.

The present study makes a valuable contribution to related literature by adding to the relatively small group of studies targeting the relationship between sport education and motor skill development. Future researchers are encouraged to extend the present work by employing more comprehensive experimental designs to examine the sport education–motor skill development relationship and the effectiveness of in-service teachers' implementation of the model. In addition, future research could highlight the sustainability of in-service teachers' professional development by employing a longitudinal experimental design to study the long-term effectiveness of teacher professional development concerning new instructional models, such as sport education.

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