The Physical Educator Vol. 75 • pp. 880–900 • 2018
https://doi.org/10.18666/TPE-2018-V75-I5-8292

PEDAGOGY

Physical Education Teachers' Use of Mosston and Ashworth's Teaching Styles: A Literature Review

Constantine C. Chatoupis

Abstract

This systematic review explored the use of Mosston and Ashworth's teaching styles from an international perspective. I searched all relevant peer-reviewed journals listed in ERIC, SPORTDiscus, and ISI Web of Science. This search yielded 15 potentially relevant studies published from 2000 to December 2016. Thirteen of these studies met the inclusion criteria established for this review and involved 3,465 participants from 15 countries. The results indicated that the reproduction teaching styles were used more often than the production teaching styles. The use of the command, practice, and inclusion styles dominated in the classrooms across 15 countries. Of the six production teaching styles, only the guided discovery and the convergent discovery styles were sometimes used, while the remaining four were seldom used. The results are discussed in light of Spectrum theory and with respect to the physical education teacher preparation programs of those countries.

Constantine C. Chatoupis is a research and teaching assistant, Department of Physical Education and Sport Science, University of Athens, Greece. Please send author correspondence to cchatoupis@phed.uoa.gr

The Spectrum of Teaching Styles is a conceptual framework that describes and organizes the process involved in teaching (Goldberger, Ashworth, & Byra, 2012). The Spectrum has been a guiding tool in teaching and research in physical education (PE) for 50 years. Even today some scholars consider it as a viable instructional approach for delivering instruction at schools and for eliciting student learning (Graham, Holt/Hale, & Parker, 2010; Harrison, Blakemore, & Buck, 2007; Rink, 2010).

According to Mosston and Ashworth (2008), the Spectrum consists of a continuum of 11 landmark styles, each of which emerges as decisions shift between teacher and learner. The transition from one landmark style to another represents certain decisions organized into three mutually exclusive sets: (a) the preimpact set (planning and preparation decisions), (b) the impact set (decisions made during the teaching–learning transaction that defines the action), and (c) the postimpact set (feedback and assessment decisions).

The 11 styles are clustered as either reproduction styles (command style, practice style, reciprocal style, self-check style, and inclusion style) or production styles (guided discovery style, convergent discovery style, divergent discovery style, learner-designed individual program, learner-initiated style, and self-teaching style). In reproduction styles, the purpose of the instruction is the replication of specific known skills and knowledge. The teacher specifies the subject matter of the lessons, indicates the learning conditions by identifying the teaching style, and defines the criteria for correct task completion. The class climate is one of performing the model, repeating the task, and reducing errors. Feedback is specific, often corrective, and there is an acceptable way of performing the selected task (Mosston & Ashworth, 2008).

In production styles, the teacher invites the students to discover new information that may be new to the teacher. The production styles require students' engagement in cognitive operations, such as problem solving, inventing, comparing, contrasting, and synthesizing. The class climate favors patience and tolerance and individual cognitive and emotional differences. In these styles, feedback refers to the production of new ideas (Mosston & Ashworth, 2008).

The Spectrum still provides a concrete model for the systematic generation of research questions and as an organized repository for

research results (Chatoupis, 2009). Two narrative reviews (Byra, 2000b; Chatoupis, 2009) and a content analysis (Chatoupis, 2010) on research that explores the influence of Spectrum teaching styles on student-learning variables have been published so far. The large number of relevant studies reveals that Spectrum research has grown and prospered over the past four decades.

The Spectrum as a model for teaching styles has enjoyed great popularity over the years. However, up to 2000, no research had been conducted on the use and implementation of the teaching styles by PE teachers around the world. During that period, some renowned researchers speculated that the Spectrum is utilized in the classroom internationally (e.g., Byra, 2000a; Franks, 1992; Gerney & Dort, 1992; Goldberger, 1992; Krug, 1999; Metzler, 1983).

Over the last 16 years (i.e., 2000–2016), however, a number of research studies have been conducted and published in peer-reviewed journals, which supports that the 11 teaching styles have indeed been implemented by PE teachers of varying age groups, experience, and cultural backgrounds in K–12 contexts across the globe (see Table 1). Some of those studies failed to attribute the use of teaching styles to environmental factors (rural, urban), political factors (e.g., curricular imperatives), teachers' preparation, and years of teaching experience (Curtner-Smith, Hasty, & Kerr, 2001; Curtner-Smith, Todorovich, McCaughtry, & Lacon, 2001; Parker & Curtner-Smith, 2012; Salvara & Birone, 2002; Syrmpas, Digelidis, & Watt, 2016). On the contrary, Jaakkola and Watt (2011) found that not only teaching experience but also teachers' age and perceived ability to use teaching styles influence the implementation of the teaching styles. Also, educational level (undergraduate–graduate) seemed to influence teachers' practices (Zeng, 2016), while teachers' beliefs about the styles (Cothran et al., 2005) or teachers' motivation (Hein et al., 2012) were related to their use.

Despite a growing body of literature on this topic, no one has attempted to provide a review of research on teachers' use of reproduction and production teaching styles from an international perspective. Thus, this systematic review aimed to synthesize the evidence from relevant research studies and draw conclusions about which teaching styles are being used and to what extent they are implemented internationally.

The importance of conducting a systematic literature review on this topic is evident. First, Spectrum theory has a prominent position in PE literature and is widely included in teacher education programs (Byra, Sanchez, & Wallhead, 2014). It is essential for researchers to know about the implementation of each teaching style internationally, because this information will help them to reach conclusions about the spread and use of Spectrum knowledge internationally.

Second, this review aims to provide teacher educators with the full scope of recent research (since 2000) on how and why PE teachers use the 11 teaching styles, so that teacher educators can integrate it into teacher education programs. Doing so allows teacher educators to provide prospective or in-service teachers with stronger professional development that supports learning opportunities from Command to Discovery (Ashworth, 2009). For example, the results of this review can inform undergraduate or in-service teacher education programs about promoting efficient use of common teaching styles or can help teachers to add new teaching styles.

Third, knowing the differences and similarities in the implementation of the various teaching styles across countries provides a deeper understanding of teaching and learning and allows countries to learn from others about the implementation of the Spectrum.

Method

Identifying Research

I undertook a thorough literature search using valid electronic databases (ERIC, SPORTDiscus, and ISI Web of Science). I searched specific keywords (*Mosston's Spectrum*, *teaching styles,* and *teachers' use/implementation of teaching styles*) and their combinations to identify all relevant data-based Spectrum research.

The literature search focused only on studies investigating teachers' use/implementation of Spectrum teaching styles or students' reflections on their teachers' use of styles. Also, I considered only studies published in journals, because the publication of research in a journal includes a peer-review process, and that suggests a more unbiased, professional investigation and presentation. Therefore, dissertations and research papers published in books and conference proceedings were excluded. After the completion of the search,

I checked the reference lists of the identified papers for additional relevant studies. This search led to 15 relevant published studies.

Inclusion Criteria

Published studies were included in the review if they (a) targeted PE student teachers and in-service teachers teaching PE in a K–12 context and (b) employed a preexisting questionnaire that was either adopted or adapted, systematic observation, or both to collect data. In two studies, researchers had PE student teachers (Syrmpas & Digelidis, 2014) or college students (Cothran, Kulinna, & Ward, 2000) reflect on memories of K–12 to answer questions. Although the use of students' self-report is not without problems, these two studies were included in the review because students were in a position to report their thoughts with sufficient accuracy (Lee, 1997). Studies were excluded only if they were written in a language other than English (Sirinkan & Gundogdu, 2011) or if they did not assess the reliability and validity of the measuring instrument (Aktop & Karahan, 2012).

Selection Strategy

Initially, I read the titles of all identified studies to determine their gross relevance to the review. Then I read the abstracts to decide which studies met the inclusion criteria. In some cases, I could not make an inclusion decision by reading the abstract, so I then read the full paper. Based on the above criteria, 13 of the 15 original research articles were included in the review (see Table 1).

Data Analysis

I initially intended to create total mean scores for each teaching style from the 13 reviewed studies to compare the 15 countries regarding the implementation of the teaching styles. However, this proved to be problematic because of the varied methodologies and data collection techniques employed in the reviewed studies. Some of the studies included observation of actual behavior (Parker & Curtner-Smith, 2012; Salvara & Birone, 2002), but they used different forms that cannot be equated. Also, in studies that used a questionnaire to collect data, the scales were different. For example, Zeng (2016) used a nine-style inventory, whereas the other studies used an 11-style inventory.

Table 1
Characteristics of Included Studies (N = 13)

Study	Country	Participants	*n*	Level	Sampling method	Pilot study	Method	Observer[a]	Instrument		
									Validity	Reliability	Scale
Cothran et al. (2000)	USA	College students	438	K–12	Conventional	Yes	Questionnaire	NA	Yes (construct)	Yes (Cronbach's α)	5-point
Curtner-Smith, Hasty, & Kerr (2000)	UK	PE teachers	16	Secondary	Conventional	NA	Systematic Observation	Yes	Yes (construct)	NA	% intervals
Curtner-Smith, Todorovich, McCaughtry, & Lacon (2000)	UK	PE teachers	18	Secondary	Conventional	NA	Systematic Observation	Yes	Yes (construct)	NA	% intervals
Kulinna & Cothran (2002)	USA	PE teachers	212	Primary, secondary	Conventional	Yes	Questionnaire	NA	Yes (construct)	Yes (Cronbach's α)	5-point
Salvara & Birone (2002)	Greece, Hungary	PE teachers	84	Primary	Conventional	NA	Systematic Observation	Yes	Yes (construct)	NA	% intervals
Cothran et al. (2005)	USA, Korea, Australia, France, England, Portugal, Canada, UK	PE teachers	1,436	Primary, secondary, high school	Systematic	Yes	Questionnaire	NA	Yes (construct)	Yes (Cronbach's α)	% teachers

Table 1 (cont.)

Study	Country	Participants	*n*	Level	Sampling method	Pilot study	Method	Observer[a]	Instrument		
									Validity	Reliability	Scale
Jaakkola & Watt (2011)	Finland	PE teachers	294	Primary, secondary, vocational	Conventional	Yes	Questionnaire	NA	Yes (construct)	Yes (Cronbach's α)	5-point
Parker & Curtner-Smith (2012)	USA	Student teachers	2	Secondary	Conventional	NA	Systematic Observation	Yes	Yes (construct)	NA	% intervals
Nathan & Ratnavadivel (2012)	Malaysia	Student teachers	100	Secondary	Conventional	Yes	Questionnaire	NA	Yes (construct)	Yes (Cronbach's α)	% teachers
Hein et al. (2012)	Estonia, Hungary, Latvia, Lithuania, Spain	PE teachers	176	Secondary and high school	Conventional	NM	Questionnaire	NA	Yes	Yes (Cronbach's α)	5-point
Syrmpas & Digelidis (2014)	Greece	Student teachers	288	Primary, secondary, high school	Conventional	NM	Questionnaire	NA	Yes (construct)	Yes (Cronbach's α)	5-point
Syrmpas et al. (2016)	Greece	PE teachers	219	Primary, secondary, high school	Conventional	NM	Questionnaire	NA	Yes (construct)	Yes	5-point
Zeng (2016)	USA	Student teachers	142	NM	Conventional	Yes	Questionnaire	NA	Yes (construct)	Yes (test–retest)	5-point

Note. NA = not applicable; NM = not mentioned. 5-point scale: 1 = *never*, 2 = *seldom*, 3 = *sometimes*, 4 = *often*, 5 = *always*. Percentage of intervals: % of times each style was used within intervals of 20 s/lesson duration as an average of all lessons taught in each trial (40–45 min).

[a]Observer training was undertaken and interobserver reliability was estimated.

Therefore, I categorized each study based on the following dimensions to provide summary information: (a) teaching style used and (b) order of use of teaching styles. Statistical analysis provided frequencies, and SPSS was used for all calculations. The dimension of country was not included, because in some cases (see Table 1) the same countries were examined more than once (Greece in three studies, the United Kingdom in three studies, and the United States in five studies), which resulted in conflicting frequency values for these countries.

Results

Characteristics of the Included Studies

The included studies ($N = 13$) were published between 2000 and 2016 and examined the use/implementation of teaching styles by teachers from three continents and 15 countries, namely, Australia/Oceania (Australia), North America (Canada and United States), Europe (United Kingdom, Portugal, France, Greece, Hungary, Estonia, Latvia, Lithuania, Spain, Finland), and Asia (Malaysia and Korea). The majority of these studies were conducted in Europe, while similar studies conducted in Africa and South America were lacking. Three of the 13 studies represented a cross-cultural investigation of the use of teaching styles (Cothran et al., 2005; Hein et al., 2012; Salvara & Birone, 2002), whereas the remainder focused on only one country.

As Table 1 shows, sample sizes ranged from two to a maximum of 1,436 participants. The total number of participants was 3,425. Four studies employed PE student teachers doing their teaching practice at schools. In one study, the level at which the participants taught is not mentioned (Zeng, 2016). Participants were recruited via convenience sampling in all studies except in Cothran et al. (2005), which employed systematic sampling.

Measuring instruments. The majority of the studies ($n = 9$) included with each of the 11 teaching styles a descriptive scenario that was put in a survey instrument. Participants rated their use of the teaching styles on a 5-point Likert-type scale of 1 = *never*, 2 = *seldom*, 3 = *sometimes*, 4 = *often*, 5 = *always* (see Cothran et al., 2000, for a full description). Each study either adopted or adapted a survey instrument and then tested it for validity and reliability. Six

studies undertook a pilot study. However, for the remaining three, I was uncertain if they used a pilot study (see Table 1). The remaining four studies employed systematic observation to collect data using interval recording and they estimated observer reliability.

Teachers' Use of Teaching Styles

The descriptive results shown in Table 2 indicate that with the exception of the self-check style, the reproduction styles are used more often than the production styles. Also, Table 2 shows that the teaching style that is used the most internationally is the practice style (17),[1] followed by the command style (12) and the inclusion style (11). The least used teaching style is the self-teaching style (6). The self-teaching style (6), the learner-initiated style (6), the learner-designed individual program (6), and the self-check style (4) are the least used teaching styles.

Discussion

Characteristics of the Included Studies

It is apparent from the review that between 2000 and 2016, 13 studies from 15 countries across four continents (North America, Europe, Asia, and Australia/Oceania) investigated the use of teaching styles in K–12 teachers. This finding implies that the Spectrum of Teaching Styles is used in the classroom learning process in quite a few countries around the globe. This is in line with the scholarship's contention that the Spectrum is a solid model for teaching PE at all school levels (Goldberger, 1992; Goldberger et al., 2012).

The premise that the Spectrum is a universal theory is reinforced by the fact that several countries have adopted this framework in the classroom. This universal use of the theory is encouraging and promising for its future and its viability as a teaching tool. According to Sara Ashworth, the founder and director of the Spectrum Institute for Teaching and Learning, many Spectrum colleagues from several parts of the world teach the Spectrum (Spectrum of Teaching Styles, 2012). Unfortunately, at the moment, few studies offer empirical support of such worldwide collegial use.

[1]The numbers in parentheses represent the total number of times a particular style appears as first, second, third, and so on on all reviewed studies (see also Table 2).

Table 2

Frequency of Teachers' Use of the Reproduction and Production Teaching Styles Across 15 Countries

	f										
Rank	**Command**	**Practice**	**Reciprocal**	**Self-check**	**Inclusion**	**Guided-discovery**	**Convergent-discovery**	**Divergent-discovery**	**Learner-designed**	**Learner-initiated**	**Self-teaching**
1	9	**17**	1	0	0	0	0	0	0	0	0
2	**12**	9	1	0	2	0	0	0	0	0	0
3	2	0	7	1	**11**	4	0	4	0	0	0
4	1	0	8	3	3	4	0	5	2	0	0
5	1	1	5	1	2	2	9	7	1	0	1
6	0	0	2	5	0	6	3	3	5	0	1
7	0	0	0	5	2	4	4	6	2	0	0
8	0	0	0	4	1	0	1	0	3	2	1
9	0	0	0	1	0	0	0	0	**6**	1	2
10	0	0	0	1	0	0	0	0	2	**6**	2
11	0	0	0	1	0	0	0	0	0	2	**6**

Note. The numbers in the far left column (1–11) denote the order of use of the teaching styles: e.g., 1 = the most often used, 2 = the second most often used, etc. Numbers in bold show the first three most and least frequently used teaching styles internationally.

All studies but one (Cothran et al., 2005) used purposive or convenience sampling techniques, which makes generalization of the results from the sample to the population almost impossible (Gall, Borg, & Gall, 1996). Research that is real world or field oriented does not allow for random sampling of individuals (Robson, 1996; Thomas & Nelson, 2001). Also, random samples are expensive and difficult to acquire (Kerlinger, 1992).

Three studies did not specify undertaking a pilot study. Pilot testing plays a critical role in improving data collection routines, trying scored techniques, revising locally developed measures, and checking the appropriateness of standard measures (Gall et al., 1996). This practice may apply to not only new but also adapted and adopted questionnaires (Kouvelioti & Vagenas, 2015), as was the case in these three studies.

Checking the reliability and validity of a questionnaire represents good practice for conducting survey studies and protects the credibility of the findings (Kelley, Clark, Brown, & Sitzia, 2003). In this review, all studies checked the reliability and validity of the questionnaire, therefore securing trustworthy results. Also, in studies that collected data by systematic observation, the observers underwent training and interobserver reliability was checked. Researchers can ensure that data collection is reliable by having observers take sufficient training (van der Mars, 1989).

Teachers' Use of Teaching Styles

The key finding from this review is that the pattern of teaching style employed by the teachers across the 15 countries was similar, with reproduction teaching styles used more often than production teaching styles (see Table 2). In particular, the use of the command, practice, and inclusion styles dominated in the classrooms internationally, whereas only two (guided discovery and convergent discovery) of the six production teaching styles were sometimes used, with the remaining four seldom used (see Table 2).

Of all the teaching styles, the self-teaching style was the least used. In seven studies, teachers reported that they made use of that style, which raises doubts about their understanding of this style (Cothran et al., 2005; Cothran et al., 2000; Jaakkola & Watt, 2011; Kulinna & Cothran, 2002; Salvara & Birone, 2002; Syrmpas & Digelidis, 2014;

Syrmpas et al., 2016) . Mosston and Ashworth (2008) argue that this style does not exist in the classroom. Self-teaching may not function well in situations that bring people, social mores, and traditions together. Similarly, in studies that used questionnaires as a method of data collection, teachers reported implementing most or all teaching styles, which is consistent with previous findings of cross-cultural studies (Cothran et al., 2005; Hein et al., 2012). This result should be viewed with caution because teachers tend to overestimate their teaching behaviors (Good & Brophy, 2008).

Several potential reasons may explain the pattern of teaching style use. Development of motor skills and refinement of sport-specific skills are aims of PE curricula worldwide (Dudley, Okely, Pearson, & Cotton, 2011; Hardman, 2008; United Nations Educational, Scientific, and Cultural Organization [UNESCO], 2014). PE teachers were perhaps concerned with developing students' motor skill proficiency and teaching competitive sport activities. Therefore, they heavily used two teaching styles that are designed to help students develop the correct technique (command style) and provide the maximum amount of practice time (practice style; Chatoupis & Vagenas, 2017; Goldberger, 1984, 1992).

Second, because the command and practice styles maximize teachers' control over the classroom (Goldberger, 1984), use of these styles is the safer option so that the teacher can avoid discipline problems. Perhaps this explains why (especially in Malaysia, Hungary, Greece, the United Kingdom, the United States, and Finland) teachers in all 15 countries did not make extensive use of teaching styles that allowed students, who are prone to misbehavior, to make many decisions (especially the production teaching styles; see the corresponding reviewed studies for the mean scores reported).

Third, the inclusion style belongs to pedagogical practices that facilitate equal opportunities for all children (Byra, 2006). According to Hardman (2008), legal mandates and agendas in many countries have attempted to enforce inclusion; countries such as England, Sweden, Canada, Australia, Finland, and Israel have put in place specific inclusive programs that are making progress and are beginning to cater to a more diverse group of children. Similarly, some countries have brought about change in inclusion and disability policy and practice, epitomized in policies related to entitlement to PE,

inclusion, integration, employment of support assistants, differentiated teaching methods, and use of adapted equipment (UNESCO, 2014). This may explain why internationally the third most used teaching style is the inclusion style.

Fourth, when they were students, the PE teachers of the sample might have experienced only reproduction teaching styles, especially the most representative forms of direct instruction, the command and the practice styles. Also, during their initial teacher education, they might not have experienced and practiced all 11 teaching styles, which could have prevented them from building confidence in using them. In countries such as the United States, Finland, and Greece, the Spectrum is taught at some physical education teacher education programs. However, with a few exceptions (especially in the United States), this preparation does not seem to be rigorous (Jaakkola & Watt, 2011; Parker & Curtner-Smith, 2012; Syrmpas et al., 2016; White, 1998). Also, in many countries, the adequacy of teacher preparation for PE is arguable, and initial training presents a problem even in developed countries (Hardman, 2007; UNESCO, 2014).

Fifth, the national curriculum of most countries included in this review encourages teachers to adopt a variety of pedagogical approaches (including the production teaching styles). Also, it reflects educational objectives associated with the cognitive (e.g., critical thinking skills) and social domains that necessitate the use of such approaches (Byra, 2006; Cothran et al., 2005; Curtner-Smith, Hasty, & Kerr, 2001; Jaakkola & Watt, 2011; Nathan & Ratnavadivel, 2012; Salvara & Birone, 2002; SueSee, 2012; Syrmpas et al., 2016). It is possible that national curricula may not have a considerable influence on PE teachers' teaching practices, as the production teaching styles were not used as much as the reproduction styles (see Table 2, as well as Curtner-Smith, Hasty, & Kerr, 2001).

Sixth, what teachers believe about the strengths of teaching styles and their self-ability to use them influences the implementation of these styles (Cothran et al., 2005; Jaakkola & Watt, 2011; Syrmpas et al., 2016). Therefore, it can be hypothesized that the pattern of teaching style use, as shown in Table 2, is caused by teachers' beliefs or perceptions about the reproduction and production teaching styles or about their ability to use them.

Seventh, a noteworthy result was the low mean values of teachers' use of reproduction styles and the even lower values for the production styles in the United States and some European countries (especially Greece and Hungary; Cothran et al., 2005; Hein et al., 2012; Salvara & Birone, 2002; Syrmpas & Digelidis, 2014). This may be due to the large class sizes, time allocation, inadequacies in facilities, and financial considerations that have been documented in these countries (Hardman, 2007). As it has been suggested, teachers from the United States and United Kingdom do not use production styles, because of class time and class size (Pierce, 2010) or because of teachers' work (over) load (Macfadyen & Campbell, 2005) and lack of time to experiment with alternative teaching styles (Curtner-Smith & Hasty, 1997).

Implications for Teacher Education Programs

It is commonly accepted within the PE teaching and research community that focusing solely on direct instruction teaching strategies (e.g., the reproduction styles) could be problematic when teachers seek (a) to develop wider learning skills and independent learning (Dudley et al., 2011), (b) to teach activities that dictate the employment of a specific approach to instruction (Rink, 2010), and (c) to cope with the diversity of the student population (Goldberger, 2011; Mosston & Ashworth, 2008).

However, as this review revealed, the use of the production styles was much lower than the use of the reproduction styles across the 15 countries. Therefore, because teacher education can be a decisive agent of change in quality education in schools (Tsangaridou, 2009) and teacher quality (MacPhail & Tannehill, 2012), the professionals who teach in physical education teacher education programs should encourage and challenge undergraduate students and in-service teachers alike to explore and use a broad range of teaching styles. In particular, these programs should help PE teachers to develop more comfort and confidence with the production teaching styles, as well as with the less used reproduction teaching styles, and to learn to use them in the school context with trust and success.

Joyce et al. (2014) proposed certain procedures that can be incorporated in a physical education teacher education program for the successful implementation of a newly acquired teaching strategy

(i.e., a combination of lecture, discussion, observation of demonstrations, practice, and feedback in protected conditions, as well as in real school settings). The physical education teacher education program at the University of Wyoming (Byra, 2000a) is a good example of a carefully constructed series of courses that enable student teachers to develop comfort and confidence with the Spectrum of Teaching Styles.

Conclusions, Limitations, and Recommendations

This literature review marks the first attempt at synthesizing the results of studies related to how PE teachers across 15 countries use the Spectrum of Teaching Styles. The results suggest that reproduction styles dominate in school settings around the world; in particular, practice, command, and inclusion styles are used most often.

A few limitations of the reviewed studies and recommendations for future research should be mentioned. A small number of studies failed to undertake pilot testing, while most of the studies employed poor sampling techniques (i.e., convenience sampling). Future investigations on teachers' use of teaching styles should address these two methodological problems. Also, only English-language journals were searched, and this may have resulted in relevant research being missed.

The effect of this systematic review is limited by the small number of countries included in the reviewed studies. Africa, as well as countries with large populations such as China and India, is not represented in this line of research. Also, only three cross-cultural studies have been conducted so far, thus limiting understanding of various aspects of teaching and learning across countries. Future research should include other countries and should focus on differences or similarities in the use of the Spectrum between or among different cultures.

In the majority of the reviewed studies, teachers were asked to report which styles they used during their teaching. This method of data collection can be misleading and rather limited because, as research has shown, PE teachers do not use the teaching styles that they believe they use (SueSee & Edwards, 2011). Generally, there are differences between what people use and what they say they do (Lawson & Stroot, 1993). Future studies should employ direct

observation of teachers' instruction to provide a more reliable picture of the implementation of teaching styles.

The majority of the studies did not consider factors that may influence teachers' practice such as the subject matter taught, students' level of experience with the teaching styles, and quality of initial teacher education. Future studies should employ qualitative methods to elaborate why teachers implement certain teaching styles more often than other styles or to explain differences in the use of the Spectrum among countries from a historical, sociological, and psychological perspective.

References

Aktop, A., & Karahan, N. (2012). Physical education teacher's views of effective teaching methods in phsyical education. *Procedia – Social and Behavioral Sciences, 46*, 1910–1913. https://doi.org/10.1016/j.sbspro.2012.05.401

Ashworth, S. (2009, July). *Creating active futures*. Paper presented the 26th ACHPER International Conference, Brisbane, Queensland, Australia.

Byra, M. (2000a). A coherent PETE program: Spectrum style. *Journal of Physical Education, Recreation, and Dance, 71*(9), 40–43, 56. https://doi.org/10.1080/07303084.2000.10605721

Byra, M. (2000b). A review of Spectrum research: The contributions of two eras. *Quest, 52*, 229–245. https://doi.org/10.1080/00336297.2000.10491712

Byra, M. (2006). Teaching styles and inclusive pedagogies. In D. Kirk, M. O'Sullivan, & D. Macdonald (Eds.), *Handbook of research in physical education* (5th ed., pp. 449–466). London, England: Sage. https://doi.org/10.4135/9781848608009.n25

Byra, M., Sanchez, B., & Wallhead, T. (2014). Behaviors of students and teachers in the command, practice, and inclusion styles of teaching: Instruction, feedback, and activity level. *European Physical Education Review, 20*(1), 3–19. https://doi.org/10.1177/1356336X13495999

Chatoupis, C. (2009). Contributions of the Spectrum of Teaching Styles to research on teaching. *Studies in Physical Culture and Tourism, 16*, 193–205.

Chatoupis, C. (2010). An analysis of Spectrum research on teaching. *Physical Educator, 74*, 188–197.

Chatoupis, C., & Vagenas, G. (2017). Effects of two practice style formats on fifth grade students' motor skill performance and task engagement. *Physical Educator, 74*, 220–238. https://doi.org/10.18666/TPE-2017-V74-I2-7249

Cothran, D. J., Kulinna, P. H., Banville, D., Choi, E., Amade-Escot, C., MacPhail, A., . . . Kirk, D. (2005). A cross-cultural investigation of the use of teaching styles. *Research Quarterly for Exercise and Sport, 76*, 193–201. https://doi.org/10.1080/02701367.2005.10599280

Cothran, D., Kulinna, P. H., & Ward, E. (2000). Students' experiences with and perceptions of teaching styles. *Journal of Research and Development in Education, 33*(5), 93–103.

Curtner-Smith, M. D., Hasty, D. L., & Kerr, I. G. (1998). *Influence of national curriculum physical education on teachers' use of productive and reproductive teaching styles*. Retrieved from http://www.spectrumofteachingstyles.org/pdfs/literature/Curtner-Smith1998_Influence_Of_National.pdf

Curtner-Smith, M., Hasty, D., & Kerr, I. (2001). Teachers' use of reproductive and productive teaching styles prior to and following the introduction of National Curriculum Physical Education. *Educational Research, 43*, 333–340.

Curtner-Smith, M., Todorovich, J., McCaughtry, N., & Lacon, S. (2001). Urban teachers' use of productive and reproductive teaching styles within the confines of the National Curriculum for Physical Education. *European Physical Education Review, 7*, 177–190. https://doi.org/10.1177/1356336X010072005

Dudley, D., Okely, A., Pearson, P., & Cotton, W. A. (2011). A systematic review of the effectiveness of physical education and school sport interventions targeting physical activity, movement skills, and enjoyment of physical activity. *European Physical Education Review, 17*, 353–378. https://doi.org/10.1177/1356336X11416734

Franks, D. (Ed.). (1992). The Spectrum of Teaching Styles: A silver anniversary in physical education. *Journal of Physical Education, Recreation, and Dance, 63*(1), 25–56. https://doi.org/10.1080/07303084.1992.10604082

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* (6th ed.). White Plains, NY: Longman.

Gerney, P., & Dort, A. (1992). The Spectrum applied: Letters from the trenches. *Journal of Physical Education, Recreation, and Dance, 63*(1), 36–39. https://doi.org/10.1080/07303084.1992.10604085

Goldberger, M. (1984). Effective learning through a Spectrum of Teaching Styles. *Journal of Physical Education, Recreation, and Dance, 55*(8), 17–21. https://doi.org/10.1080/07303084.1984.10630618

Goldberger, M. (1992). The Spectrum of Teaching Styles: A perspective for research on teaching physical education. *Journal of Physical Education, Recreation, and Dance, 63*(1), 42–46. https://doi.org/10.1080/07303084.1992.10604087

Goldberger, M. (2011). *The Spectrum of Teaching Styles – Revisited 2011*. Retrieved from https://www.jmu.edu/kinesiology/pdf/Spectrum article (2).pdf

Goldberger, M., Ashworth, A., & Byra, M. (2012). Spectrum of Teaching Styles retrospective 2012. *Quest, 64*, 268–282. https://doi.org/10.1080/00336297.2012.706883

Good, T. L., & Brophy, J. E. (2008). *Looking in classrooms* (10th ed.). New York, NY: Pearson.

Graham, G., Holt/Hale, S. A., & Parker, M. (2010). *Children moving: A reflective approach to teaching physical education* (8th ed.). Boston, MA: McGraw-Hill.

Hardman, K. (2007). *An update on the status of physical education in schools worldwide: Technical report from the World Health Organization*. Retrieved from https://www.icsspe.org/sites/default/files/Kenneth Hardman update on physical education in schools worldwide.pdf

Hardman, K. (2008). Physical education in schools: A global perspective. *Kinesiology, 40*(1), 5–28.

Harrison, J. M., Blakemore, C. L., & Buck, M. M. (2007). *Instructional strategies for secondary physical education* (6th ed.). Boston, MA: McGraw-Hill.

Hein, V., Ries, F., Pires, F., Caune, A., Emeljanovas, A., Ekler, J. H., & Valantiniene, I. (2012). The relationship between teaching styles and motivation to teach among physical education teachers. *Journal of Sport Science and Medicine, 11*, 123–130.

Jaakkola, T., & Watt, A. (2011). Finnish physical education teachers' self-reported use and perceptions of Mosston and Ashworth's teaching styles. *Journal of Teaching in Physical Education, 30*, 248–262. https://doi.org/10.1123/jtpe.30.3.248

Joyce, B., Weil, M., & Calhoun, E. (2014). *Models of teaching* (9th ed.). Boston, MA: Allyn and Bacon.

Kelley, K., Clark, B., Brown, V., & Sitzia, J. (2003). Good practice in the conduct and reporting of survey research. *International Journal for Quality in Health Care, 15*, 261–266. https://doi.org/10.1093/intqhc/mzg031

Kerlinger, F. N. (1992). *Foundations of behavioural research*. New York, NY: Holt, Rinehart, and Winston.

Kouvelioti, R., & Vagenas, G. (2015). Methodological and statistical quality in research evaluating nutritional attitudes in sports. *International Journal of Sport Nutrition and Exercise Metabolism, 25*, 624–635. https://doi.org/10.1123/ijsnem.2014-0010

Krug, D. (1999). *Mosston's Spectrum of Teaching Styles: A new vision.* Paper presented at the meeting of the AIESEP World Sport Science Congress, Education for Life, Jyväskylä, Finland.

Kulinna, P. H., & Cothran, D. J. (2002). Physical education teachers' self-reported use and perceptions of various teaching styles. *Learning and Instruction*, *13*, 597–609. https://doi.org/10.1016/S0959-4752(02)00044-0

Lawson, H. A., & Stroot, S. (1993). Footprints and signposts: Perspectives of socialization research. *Journal of Teaching in Physical Education, 12*, 437–446. https://doi.org/10.1123/jtpe.12.4.437

Lee, A. M. (1997). Contributions of research on student thinking in physical education. *Journal of Teaching in Physical Education, 16*, 262–278. https://doi.org/10.1123/jtpe.16.3.262

MacPhail, A., & Tannehill, D. (2012). Helping pre-service and beginning teachers examine and reframe assumptions about themselves as teachers and change agents: "Who is going to listen to you anyway?" *Quest, 64*, 299–312. https://doi.org/10.1080/00336297.2012.706885

Macfadyen, T., & Campbell, C. (2005, September). *An investigation into the teaching styles of secondary school physical education teachers*. Paper presented at the British Educational Research Association Annual Conference, University of Glamorgan.

Metzler, M. (1983). On styles. *Quest, 35*, 145–154. https://doi.org/10.1080/00336297.1983.10483791

Mosston, M., & Ashworth, S. (2008). *Teaching physical education* (1st online ed.). Retrieved from http://www.spectrumofteachingstyles.org/ebook

Nathan, S., & Ratnavadivel, N. (2012). Exploring Mosston's Spectrum of Teaching Styles usage and perception among student teachers of Sultan Idris Education University. *Journal of Research, Policy, and Practice of Teachers and Teacher Education, 2*(1), 33–44.

Parker, M., & Curtner-Smith, M. (2012). Preservice teachers' use of production and reproduction teaching styles within multi-activity and sport education units. *European Physical Education Review, 18*(1), 127–143. https://doi.org/10.1177/1356336X11430655

Pierce, G. (2010). *A pilot study examining high school physical education teachers' understanding and use of Mosston's style(s) of teaching* (Unpublished master's thesis). California Polytechnic State University, San Luis Obispo, CA.

Rink, J. E. (2010). *Teaching physical education for learning* (6th ed.). Boston, MA: McGraw-Hill.

Robson, C. (1996). *Real world research*. Oxford, United Kingdom: Blackwell.

Salvara, M. I., & Birone, N. (2002). Teachers' use of teaching styles: A comparative study between Greece and Hungary. *International Journal of Applied Sports Sciences, 14*(2), 46–69.

Sirinkan, A., & Gundogdu, K. (2011). The perceptions of teachers in relation to physical education curriculum and instructional plans. *Elementary Education Online, 10*(1), 144–159.

Spectrum of Teaching Styles. (2012). Around the world. Retrieved from http://www.spectrumofteachingstyles.org/around.php?refreshed

SueSee, B. (2012). *Incongruence between self-reported and observed senior physical education teaching styles: An analysis using Mosston's and Ashworth's teaching styles* (Doctoral thesis, The Queensland University of Technology, Australia). Retrieved from https://eprints.qut.edu.au/60945/1/Brendan_SueSee_Thesis.pdf

SueSee, B., & Edwards, K. (2011, April). *Self-identified and observed teaching styles of senior physical education teachers in Queensland schools*. Paper presented at the 27th ACHPER International Conference, Moving, Learning, and Achieving, Prince Alfred College, Adelaide, Australia.

Syrmpas, I., & Digelidis, N. (2014). Physical education student teachers' experiences with and perceptions of teaching styles. *Journal of Physical Education and Sport, 14*(1), 52–59.

Syrmpas, I., Digelidis, N., & Watt, A. (2016). An examination of Greek physical educators' implementation and perceptions of Spectrum teaching styles. *European Physical Education Review, 22*, 201–214. https://doi.org/10.1177/1356336X15598789

Thomas, J. R., & Nelson, J. K. (2001). *Research methods in physical activity* (4th ed.). Champaign, IL: Human Kinetics.

Tsangaridou, N. (2009). Preparation of teachers for teaching physical education in schools: Research on teachers' reflection, beliefs, and knowledge. In L. Housner, M. Metzler, P. Schempp, & T. Templin (Eds.), *Historic tradition and future directions of research and teacher education in physical education* (pp. 373–382). Morgantown, WV: Fit Publishing.

United Nations Educational, Scientific, and Cultural Organization. (2014). *World-wide survey of school physical education*. Retrieved from http://unesdoc.unesco.org/images/0022/002293/229335e.pdf

van der Mars, H. (1989). Observer reliability: Issues and procedures. In P. W. Darst, D. B. Sakrajsek, & V. H. Mancini (Eds.), *Analyzing physical education and sport instruction* (pp. 53–80). Champaign, IL: Human Kinetics.

White, P. T. (1998). Perceptions of physical education majors and faculty members regarding the extent of use of and exposure to Mosston's and Ashworth's Spectrum of Teaching Styles. *Dissertations Abstracts International, 59*(5), 1508A.

Zeng, H. Z. (2016). Differences between student teachers' implementation and perceptions of teaching styles. *Physical Educator, 73*, 285–314. https://doi.org/10.18666/TPE-2016-V73-I2-6218