

Physical education teachers' use of Mosston and Ashworth's teaching styles: A
systematic literature review

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Abstract

The present systematic literature review explored the use of Mosston and Ashworth's (2008) teaching style from an international perspective. The review utilized a literature search, specifically publications in peer-reviewed journals listed in ERIC, Sport Discus, ISI Web of Science, and Google from 2000 to December 2016. The literature search yielded 15 potentially relevant publications. Thirteen articles met the inclusion criteria established for this review. The studies were first evaluated on the basis of quality criteria related to the methods and questionnaires. We found that participants were mainly recruited via convenience sampling. Reliability and validity of the questionnaires used were tested and observer training was undertaken in all studies. Pilot study was not undertaken in three studies. The results indicated that the reproduction teaching styles were used more often than the production teaching styles. The use of the command, the practice, and the inclusion styles dominate in the classrooms across 15 countries, whereas of the six production teaching styles only the guided discovery style and the convergent discovery style are sometimes used while the rest four are seldom used.

Keywords: Spectrum, teaching styles, physical education

Over the years a number of conceptual frameworks have been developed for use in gymnasium and classroom environments (e.g., Griffin, Mitchell, & Oslin, 1997; Hellison, 2011; Joyce, Weil, & Calhoun, 2014; Siedentop, Hastie, & Van Der Mars, 2011). These frameworks describe and organize the process involved in teaching. One of those conceptual frameworks that has remained for 50 years a guiding tool in teaching and research in physical education (PE) is the *Spectrum of Teaching Styles* (Goldberger, Ashworth, & Byra, 2012). Even today a number of scholars consider it as a viable instructional approach for delivering instruction at schools and 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 being shifted. The decisions are organized in three mutually exclusive sets: (a) the pre-impact set (planning and preparation decisions); (b) the impact set (decisions made during the teaching-learning transaction that define the action); (c) the post-impact set (feedback and assessment decisions).

The eleven styles can be clustered into either reproduction (styles A-E) or production (styles F-K) teaching styles. When styles A-E are used 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 to perform the selected task (Mosston & Ashworth, 2008).

The production cluster of styles F-K invites the discovery of new information by the student. In some styles within this cluster the production of ideas may even be new to the teacher. In styles F-K students are engaged in cognitive operations such as problem solving, inventing, comparing, contrasting, and synthesizing. The class climate favours patience and tolerance and individual cognitive and emotional differences. Feedback refers to the production of new ideas (Mosston & Ashworth, 2008).

The Spectrum still provides a concrete model both for the systematic generation of research questions and as an organized repository for research results (Chatoupis, 2009) and as such it can provide ample opportunities for conducting relevant research. Two narrative reviews (Byra, 2000; Chatoupis, 2009) and a content analysis (Chatoupis, 2010) on research that shows the influence of Spectrum teaching styles on variables associated with student learning have been published so far. The large number of relevant studies reveals that Spectrum research has grown and prospered over the past four decades.

Although the Spectrum as a theoretical model has enjoyed great popularity over the years, up to 2000 no research had been conducted on the use and implementation of the teaching styles by PE teachers around the world. Apart from some eminent researchers' arguing for Spectrum implementation in varying degrees internationally (e.g., Byra 2000; Franks, 1992; Gerney & Dort, 1992; Goldberger, 1992; Krug, 1999; Metzler, 1983), before the millennium there was no empirical evidence about which teaching styles and to what extent are used in school settings worldwide.

The last 16 years, however, a number of research studies have been conducted and published in peer-reviewed journals that proves that the 11 teaching styles have

been indeed implemented by PE teachers of varying age groups, experience and cultural backgrounds in K-12 contexts. Some of those studies attempted 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). They found that these factors had no influence on teachers' use of different teaching styles.

On the contrary, Jaakola 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) seems to influence teachers' practices (Zeng, 2016), while beliefs about the styles (Cothran et al., 2005) or teachers' motivation (Hein et al., 2012) are related to their use.

Despite a growing body of literature on this topic, no attempts have been made to provide a synthesis of data on teachers' use of reproduction and production teaching styles. Thus, the purpose of this paper is to systematically review the evidence from relevant research and reach conclusions as to which teaching styles and to what extent are implemented internationally. The article provides a synthesis of this evidence and identifies the limitations of relevant research and gaps in the literature to indicate where future research is needed.

The importance of conducting a systematic literature review on this topic cannot be underestimated. Firstly, as long as Spectrum theory has a prominent position in physical education literature and is widely included in teacher education programs (Byra, Sanchez, Wallhead, 2014), it makes good sense to know about the

implementation of each teaching style not only on a national but also on an international basis. In addition to that, investigating the use of the 11 teaching styles in classrooms across countries is important in reaching conclusions about the spread of Spectrum knowledge internationally.

Secondly, the systematic review will, also, provide teacher educators with the full scope of research on how and why PE teachers use the 11 teaching styles to integrate it into teacher education programs. Doing so will allow teacher educators to provide prospective or in-service teachers with a stronger professional development that supports learning opportunities from Command to Discovery (Ashworth, 2009). For example, the results from the present review can inform undergraduate or inservice teacher education programs about the need to promote effective use of common teaching styles or help teachers to add new teaching styles.

Thirdly, although emphasis in comparative and international education research (Adamson, 2012; Foster, Addy, & Samoff, 2012) as well as in comparative physical education and sports (Annerstedt, 2008; Dagkas & Benn, 2006; Hardman & Marshall, 2005; Puhse, & Gerber, 2005; Richter, 2007) has evolved considerably, there is little research being done on teachers' use of Mosston and Ashworth's Spectrum across countries. Therefore, the present literature review will add to the body of comparative research on teachers' use of the Spectrum. From a comparative perspective, knowing the differences and similarities in the use 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

The authors undertook a thorough literature search utilizing valid electronic databases (ERIC, Sport Discus, ISI Web of Science, Google Scholar). The search used specific keywords (Mosston's spectrum, teaching styles, teachers' use/implementation of teaching styles) in all different combinations to identify all relevant data-based Spectrum research.

The search focused only on studies investigating teachers' use/implementation of Spectrum's teaching styles. Also, only studies published in journals were considered 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, the reference lists of the identified papers were also checked for additional relevant studies. This search led to a total of 15 relevant published studies.

Inclusion Criteria

Articles were included in the review if they targeted at student teachers and inservice teachers teaching PE in K-12 context. Included were studies that employed questionnaires, systematic observation or both to collect data. Also, studies that used a preexisting questionnaire that was either adopted or adapted by the researchers were also included. In two studies researchers had student teachers (Syrmpas & Digelidis, 2014) or college students (Cothran, Kullina, & Ward, 2000) reflect on memories of K-12 to answer questions. Although the use of students' self report is not without problems, we decided to include these two studies in the review because student are 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 (e.g. Sirinkan & Gundogdu, 2011) and did not assess the reliability and the validity of the measuring instrument (e.g., Aktop & Karahan, 2012).

Selection Strategy

Initially, the titles of all identified studies were screened to determine their gross relevance to the review. Then, the authors read the abstracts to decide which studies met the inclusion criteria. In cases an inclusion decision could not be made by just reading the abstract, the full texts were scrutinized. Based on the above criteria, 13 of the 15 original research articles were included in the review (see Table 1).

Insert Table 1 about here

Results

Characteristics of the Included Studies

The included studies ($n = 13$) were published between 2000 and 2016 inclusive. They examined the use/implementation of teaching styles by teachers from three continents and 15 countries; namely, Oceania (Australia), North America (Canada and USA), Europe (UK, Portugal, France, Greece, Hungary, Estonia, Latvia, Lithuania, Spain, Finland), and Asia (Malaysia and Korea). Obviously, the majority of the studies have been conducted in Europe while no similar studies have been conducted in Africa. 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 it appears in Table 1, sample sizes ranged from two to a maximum of 1436 participants. The total number of participants was 3425. Four studies employed PE student teachers doing their teaching practice at schools whereas the remainder employed in-service teachers. 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) in which the systematic sampling method was employed.

Measuring instruments. The majority of studies ($n = 9$) included a short descriptive scenario written for each of the 11 teaching styles that was put in a survey instrument. A 5-point scale was used for participants ratings (from 1=never and 5=always) (see Cothran et al., 2000 for a full description). The above instrument was either adopted or adapted in these nine studies. In all nine studies the reliability and validity of the instrument was assessed. A pilot study was undertaken by six of these studies whereas in the remainder three there was uncertainty regarding its use (see Table 1). The remainder four studies employed systematic observation to collect data. Before data collection observer training was undertaken and observer reliability was estimated in all four studies.

Teachers' Use of Teaching Styles

The mean and standard deviations values as well as the percentages of teachers indicating use of each teaching style by country are shown in Tables A1 and A2. Descriptive results shown in Figure 1 indicate that in each country teachers used

Insert Figure 1 about here

the reproduction styles the most. Teachers from Australia ($M = 4.2$), Canada ($M = 4.1$), France ($M = 3.9$), and Portugal ($M = 3.9$) used most often the reproduction styles compared to teachers from the other countries. The reproduction styles were seldom used by teachers from Malaysia ($M = 2.2$), Greece ($M = 2.2$) and Hungary ($M = 2.4$) and sometimes used by teachers from Finland ($M = 2.7$) and USA ($M = 2.7$). The highest values for the use of the production teaching styles were given by teachers from Latvia ($M = 3.0$), Lithuania ($M = 3.0$) and Australia ($M = 2.9$) (sometimes used).

Teachers from Malaysia ($M = 1.2$) did not use production teaching styles at all (never used).

Figure 2 shows that the teaching style that is used the most internationally is the practice style ($M = 3.5$) (often used) followed by the command style ($M = 3.0$) (sometimes used) and the inclusion style ($M = 2.7$) (sometimes used). The least used teaching style is the self-check style ($M = 1.6$). The self-teaching style ($M = 1.6$), the learner initiated style ($M = 1.7$), the learner-designed individual program ($M = 2.0$) and the self-check style ($M = 2.2$) gave the lowest values (seldom used).

Insert Figure 2 about here

Discussion

Characteristics of the Included Studies

It is apparent from Table 1 that 13 studies so far have investigated the K-12 teachers' use of teaching styles in 15 countries from four continents (North America, Europe, Asia, Oceania). This means that the influence and benefit of the Spectrum theory contribute to the classroom learning process globally. This is in line with the scholarship's contention that the Spectrum of teaching styles is a concrete model for teaching PE at all school levels (Goldberger, 1992; Goldberger, Ashworth, Byra, 2012; Sicilia-Camacho & Brown, 2008).

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 worldwide use of the theory is encouraging and promising for its future and its viability as a teaching tool. According to Sara Ashworth, the founder of the *Spectrum Institute for Teaching and Learning*, many Spectrum colleagues from literally several parts of the world are engaged in their professional activities that include teaching (see <http://www.spectrumofteachingstyles.org/around.php?refreshed>). Unfortunately, at

the moment there are not enough studies to empirically support such a worldwide collegial use.

All studies but one (i.e., Cothran et al., 2005) utilized purposive or convenient sampling techniques making it almost impossible to generalize the results from the sample to the population (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). In addition, random samples are expensive and difficult to come by (Kerlinger, 1992).

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

Checking the reliability and the validity of a questionnaire represents good practice when conducting survey studies and protects the credibility of the findings (Kelley, Clark, Brown, & Sitzia, 2003). In the current review all studies checked both the reliability and the validity of the questionnaire, therefore securing trustworthy results. In addition, in those studies that data were collected by means of systematic observation, the observers underwent training and interobserver reliability was checked. The observers need to have sufficient training to ensure that collection of data is reliable (van der Mars, 1989).

Teachers Use of Teaching Styles

The key finding from the current review is that the pattern of teaching style employed by the teachers of the 15 countries was similar: The reproduction teaching styles were used more often than the production teaching styles (see Figure 1). In

particular, the use of the command, the practice and the inclusion styles dominate in the classrooms internationally, whereas of the six production teaching styles only two (guided discovery style, convergent discovery style) are sometimes used while the rest four are seldom used (see Figure 2).

Of all the teaching styles the self-teaching style is the least used (see Figure 2 and Table A2). In eight studies teachers reported that they made use of that style which raises doubts about the credibility of that report because as Mosston and Ashworth (2008) argue this style does not exist in 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 that they implemented most or all teaching styles (see Table A1 and A2), which is consistent with previous findings of cross cultural studies (Cothran et al., 2005; Hein et al., 2012). This results should be viewed with caution because teachers tend to overestimate their teaching behaviors (Good & Brophy, 2008).

A number of possible reasons can be proposed that may explain the pattern of teaching style use as depicted in Figures 1 and 2. First, it can be hypothesized that the PE teachers were concerned with developing students' motor skill proficiency and teaching competitive sport activities as development of motor skills and refinement of sport specific skills are considered to be a major PE curriculum aim worldwide (Dudley, Okely, Pearson, & Cotton, 2011; Hardman, 2008, UNESCO, 2013). Therefore, they heavily used two teaching styles that are designed to help students develop the correct technique (command style) and provide maximum amount of practice time (practice style) (Chatoupis, in press; Goldberger, 1984, Goldberger, 1992).

Second, because both the command and the practice styles maximize teachers' control over the classroom (Goldberger, 1984), using these styles is the safer option to avoid discipline problems. Perhaps this explains why in all 15 countries (especially in Malaysia, Hungary, Greece, UK, USA, and Finland) teachers did not make extensive use of teaching styles that allowed student prone to misbehavior to make many decisions (especially the production teaching styles).

Third, the inclusion style belongs to those 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 in place specific inclusive programmes that are making progress and are beginning to cater for a much more diverse group of children than ever before. Similarly, a number of countries have brought about change in inclusion and disability policy and practice, epitomised in policies related to entitlement to physical education, inclusion, integration, employment of support assistants, differentiated teaching methods, use of adapted equipment (UNESCO, 2013). This may explain why internationally the third most used teaching style is the inclusion style (see Figure 2).

Fourth, as students PE teachers might have experienced only reproduction teaching styles and especially the most representative forms of direct instruction; the command and the practice styles. In addition, during their initial teacher education they might not have experienced and practiced all 11 teaching styles which probably have prevented them from building confidence in using them. Although in countries like USA, Finland, and Greece the Spectrum is taught at Physical Education Teacher Education (PETE) programs, with a few exceptions especially in the USA this preparation does not seem to be rigorous (Jaakkola & Watt, 2011; Parker & Curtner-

Smith, 2012; Syrmpas, Digelidis, & Watt, 2016; White, 1998). In addition, 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, 2013).

Fifth, the national curriculum of most countries included in the review either encourage teachers to adopt a variety of pedagogical approaches (including the productive teaching styles) or reflects educational objectives, associated with the cognitive (e.g., critical thinking skills) and the social domains, that necessitate the use of such approaches for realizing these objectives (see Byra, 2006; Cothran et al., 2005; Curtner-Smith, Hasty, & Kerr, 2001; Jaakkola & Watt; Nathan & Ratnavadivel, 2012; Salvara & Birone, 2002; SueSee, 2012; Syrmpas, Digelidis, & Watt, 2016). A possible explanation is that the national curricular 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 Figure 1 and 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 influence the implementation of these styles (see Cothran et al. (2005; Jaakkola & Watt, 2011; Syrmpas, Digelidis, & Watt, 2016). Therefore, it can be hypothesized that the pattern of teaching style use as shown in Figures 1 and 2 is due to teachers beliefs or perceptions about the reproduction and production teaching styles or about their abilities to use them.

Seventh, the low mean values of teachers' use of reproduction styles and the even lower values for the production styles in USA as well as in some European countries (especially in Greece and Hungary) may be due to the large class sizes, time allocation reductions, inadequacies in facilities, and financial considerations that have been documented in these areas (see Hardman, 2007). For example, it has been

suggested that USA and UK teachers 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).

Eighth, teachers from Latvia, Estonia, Lithuania, and Australia reported that they used the production teaching styles more often than teachers from all the other countries. This result can be attributed to teachers' autonomous motivation (intrinsically motivated teachers use production teaching styles) (Hein et al., 2012) and to the curricular history of a country (Commonwealth countries, like Australia, share the movement education heritage which may lead to the use of the production styles) (Cothran et al., 2005).

Implications for Teacher Education Programs

It is commonly accepted within the PE teaching and research community that focussing solely on direct instruction teaching strategies could be potentially problematic when seeking (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 the present 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 an important agent of change in quality education in schools (Tsangaridou, 2009) as well as in teacher quality (MacPhail & Tannehill, 2012), the framework of teacher preparation and professional development programs should be informed by the present line of research.

This suggests that professionals who teach in PETE programs should encourage and challenge undergraduate students and inservice teachers alike to explore and use a wide 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 confidence and successfully.

Joyce, Weil, and Calhoun (2014) have proposed certain procedures that can be incorporated in a PETE 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). A good example of a carefully constructed series of courses that enables student teachers to develop comfort and confidence with the Spectrum of teaching styles is the PETE program at the University of Wyoming (see Byra, 2000)

Conclusions, Limitations, and Recommendations

The current literature review marks the first attempt to synthesize the results of previous studies related to how PE teachers use the Spectrum of teaching styles across 15 countries. The results suggested that the reproduction styles dominate around the world with the practice style, the command style and the inclusion style being used most often.

A few limitations to the reviewed studies as well as recommendations for future research should be mentioned. A small number of studies failed to undertake pilot testing whereas most studies employed poor sampling techniques. Future investigations on teachers' use of teaching styles should address these two methodological problems. Also, we searched only English language journals, and this may have resulted in missing relevant research.

The impact of the present systematic review is limited by the small number of countries included in the reviewed studies. Africa as well as countries with large populations like China or India are not represented at all in this line of research. Also, only three cross-cultural studies have been conducted so far, thus, limiting our understanding of various aspects of teaching and learning across countries. Future research should include other countries as well as focusing 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 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 speaking, 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 regarding the implementation of teaching styles.

The vast 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 further the reasons why teachers implement certain teaching styles more often than others or explain differences in the use of the spectrum among countries from a historical, sociological, and psychological perspective.

Table 1
Characteristics of included studies (n=13)

Study	Country	Participants	n	Level	Sampling method	Method of data collection	Pilot study	Validity of instrument	Observer training and reliability	Reliability of instrument	Unit of measurement
Cottrah et al. (2000)	USA	College students	438	K-12	Convenient	Questionnaire	Yes	Yes (construct)	na	Yes (Cronbach α)	Scores on a 5 point scale
Curthier-Smith et al. (2001a)	UK	PE Teachers	16	Secondary	Convenient	Systematic observation	na	Yes (construct)	Yes	na	Percentages of intervals
Curthier-Smith et al. (2001b)	UK	PE Teachers	18	Secondary	Convenient	Systematic observation	na	Yes (construct)	Yes	na	Percentages of intervals
Kulima et al. (2002)	USA	PE Teachers	212	Primary, secondary	Convenient	Questionnaire	Yes	Yes (construct)	na	Yes (Cronbach α)	Scores on a 5 point scale
Salvava & Birone (2002)	Greece, Hungary	PE Teachers	84	Primary	Convenient	Systematic observation	na	Yes (construct)	Yes	na	Percentages of intervals
Cottrah et al. (2005)	USA, Korea, Australia, France, England, Portugal, Canada	PE Teachers	1436	Primary, secondary, high school	Systematic sampling	Questionnaire	Yes	Yes (construct)	na	Yes (Cronbach α)	Percentages of teachers

Note: na = not applicable; nm = not mentioned

Table 1
 Characteristics of included studies (n=13) (cont.)

Study	Country	Participants	n	Level	Sampling method	Method of data collection	Pilot study	Validity of instrument	Observer training and observer reliability	Reliability of instrument	Unit of measurement
Jaakola & Watt (2011)	Finland	PE Teachers	294	Primary, secondary, vocational	Convenient	Questionnaire	Yes	Yes (construct)	na	Yes (Cronbach α)	Scores on a 5 point scale
Parker & Smith (2012)	USA	Student teachers	2	Secondary	Convenient	Systematic observation	na	Yes (construct)	Yes	na	Percentages of intervals
Nathan et al. (2012)	Malaysia	Student teachers	100	Secondary	Convenient	Questionnaire	Yes	Yes (construct)	na	Yes (Cronbach α)	Percentages of teachers
Hein et al. (2012)	Estonia, Hungary, Latvia, Lithuania, Spain	PE Teachers	176	Secondary and high school	Convenient	Questionnaire	nm	Yes	na	Yes (Cronbach α)	Scores on a 5 point scale
Sympas & Digelidis (2014)	Greece	Student teachers	288	Primary, secondary, high school	Convenient	Questionnaire	nm	Yes (construct)	na	Yes (Cronbach α)	Scores on a 5 point scale
Sympas et al. (2015)	Greece	PE Teachers	219	Primary, secondary, high school	Convenient	Questionnaire	nm	Yes (construct)	na	Yes	Scores on a 5 point scale
Zeng (2016)	USA	Student teachers	142	nm	Convenient	Questionnaire	Yes	Yes (construct)	na	Yes (test-retest)	Scores on a 5 point scale

Note. na = not applicable; nm = not mentioned

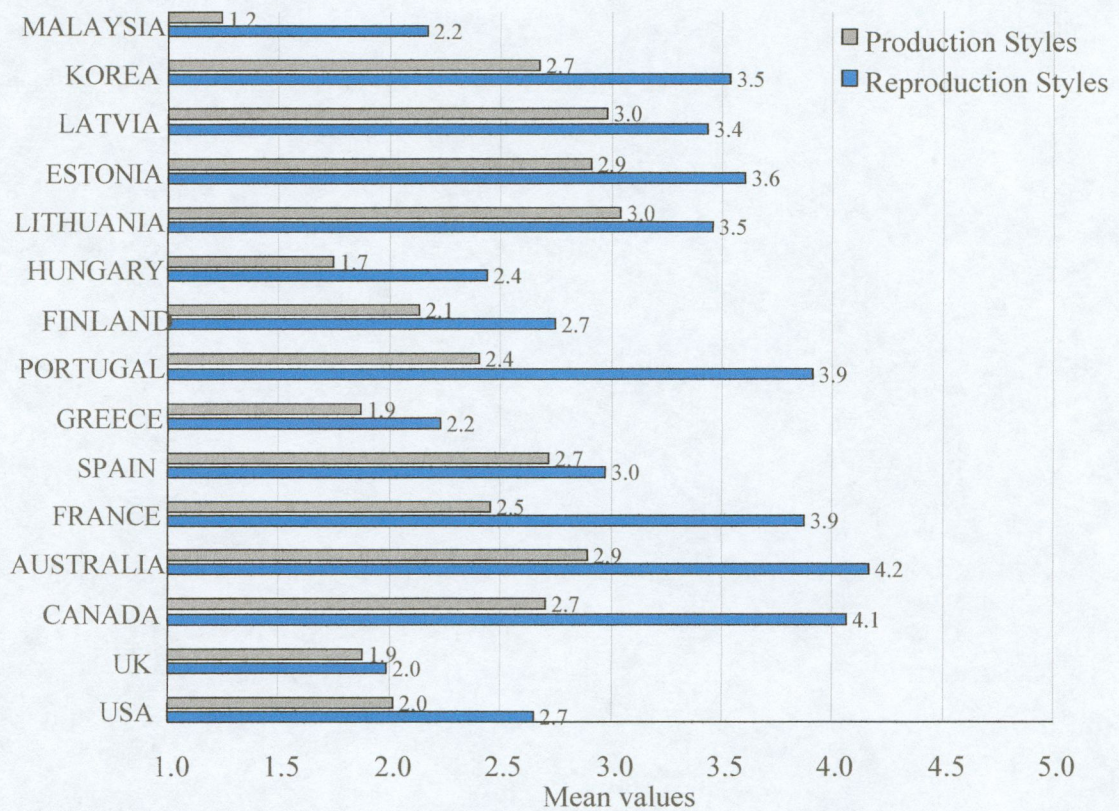


Figure 1. Overall mean values representing teachers' use of reproduction and production teaching style in each country. Reproduction cluster includes style A-E and production cluster includes style F-K. Minimum value on the 5-point Likert type scale = 1 and maximum value = 5. Mean scores from 1.00 to 1.49 indicates no use of teaching styles and mean scores of 1.50-2.49, 2.50-3.49, 3.50-4.49, 4.50-5.00 indicate seldom used, sometimes used, often used, and always used, respectively.

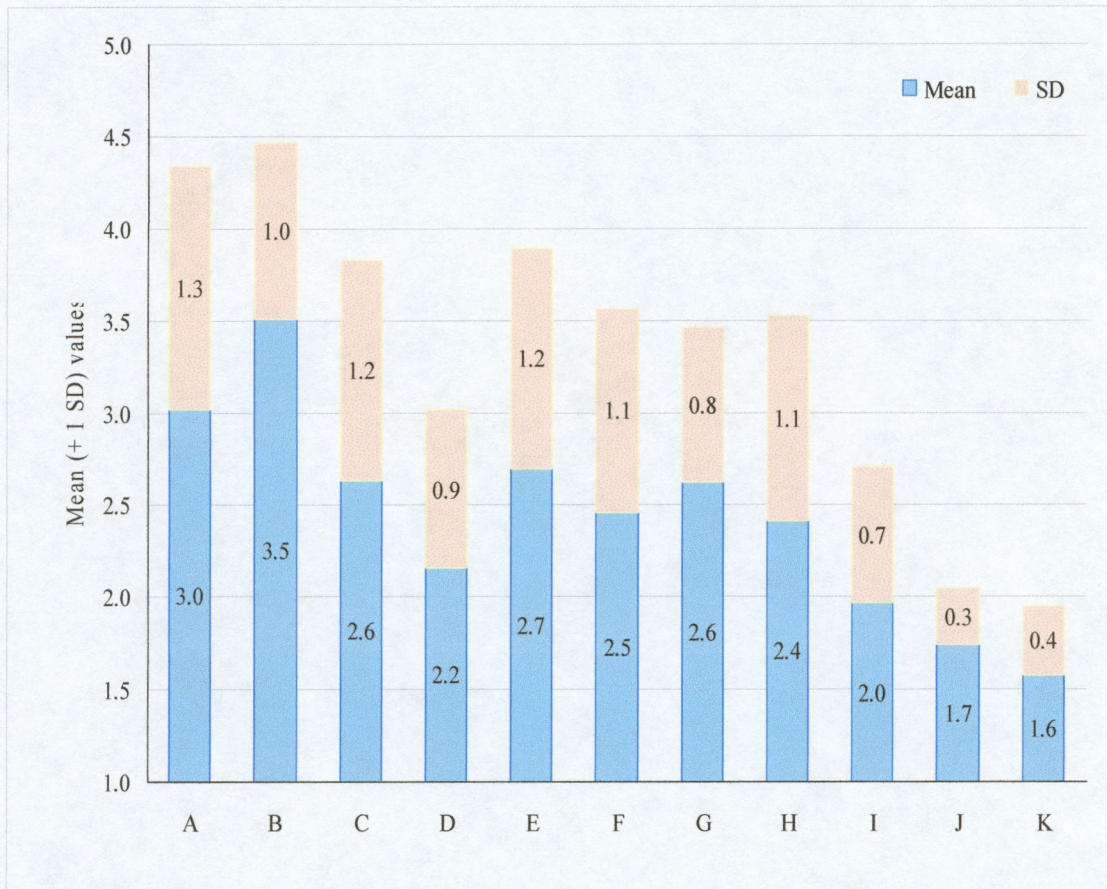


Figure 2. Overall mean and standard deviation values representing teachers' use of each teaching style irrespective of country. A = command style; B = practice style; C = reciprocal style; D = self-check style; E = inclusion style; F = guided discovery style; G = convergent discovery style; H = divergent discovery style; I = learner-designed individual program; J = learner initiated style; K = self teaching style. Minimum value on the 5-point Likert type scale = 1 and maximum value = 5. Mean scores from 1.00 to 1.49 indicates no use of teaching styles and mean scores of 1.50-2.49, 2.50-3.49, 3.50-4.49, 4.50-5.00 indicate seldom used, sometimes used, often used, and always used, respectively.