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PEDAGOGY

Differences Between Student Teachers' Implementation and Perceptions of Teaching Styles

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Abstract

Research studies on Spectrum of Teaching Styles (STS) theories have verified that mastering and implementing various teaching styles is the ideal way to match up the needs of diverse learners, the variety of content knowledge, and educational goals; however, little is known about how student teachers use and perceive various STS. The purpose of this study, therefore, was to explore student teachers' self-report of how they use and perceive teaching styles from a physical education teacher education (PETE) program. Participants were 142 student teachers (96 male, 46 female; 84 undergraduate, 58 graduate) from a Spectrum of Teaching Styles–based (STS) teaching strategies course. The tool used to investigate this was the STS Inventory$^{\text{-adapted version}}$ (STSI$^{\text{-AV}}$; Zeng, 2012). The participants expressed that they often use command, practice, reciprocal, and inclusion styles to teach PE lessons; among the nine styles in the STS, they believed that using command, practice, reciprocal, inclusion, guided discovery, convergent discovery, and divergent discovery styles in their teaching helps their students learn skills/activities better. The student teachers also expressed that implementing command, practice, reciprocal, inclusion, convergent discovery, and divergent discovery styles would motivate their students

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to learn better. No significant differences were found between male and female student teachers regarding how they use and perceive the STS. Student teachers from different education levels, however, implement and perceive the STS differently. This study provides quantitative data and fresh insights into how student teachers implement and perceive the STS.

Throughout the years, numerous advances have occurred in the ways of teaching physical skills and activities in schools; however, the most significant advance was Mosston's Spectrum of Teaching Styles (STS). The appeal of the STS framework is that it offers different teaching and learning options that help teachers reach their educational goals and the needs of learners. In other words, the STS can better match up both the needs of the learners and the objectives of the educator. Additionally, the STS framework offers instructors opportunities to modify their curricula to align with educational goals.

Since the STS was introduced to the field of teaching physical education (TPE), it has been recognized by educators in many countries around the world and widely applied to their physical education teacher education (PETE) programs (Byra, 1999, 2002; Cothran & Kulinna, 2008; Doherty, 2010; Mellor, 1992; Metzler, 2000; Mosston & Ashworth, 1994, 2008; Sicilia-Camacho & Brown, 2008). Conceptually, the STS has continually been refined since the first edition in 1966 (Ashworth, 2008; Boschee, 1972; Byra & Marks, 1993; Ernst & Byra, 1998; McCullick & Byra, 2002; Goldberger, Ashworth, & Byra, 2012).

Because there is no single perfect style of teaching that could be used within the field of TPE, verifying the effects of the STS has always been an interesting topic in the research of pedagogical inquiry (Byra & Jenkins, 2000; Gerney & Dort, 1992; McCullick & Byra, 2002; Mosston & Ashworth, 2008; Zeng et al., 2009). As a result, scholars in the field of TPE have applied the STS as a framework for delivering instruction and conducting research at various school levels (Byra & Jenkins, 2000; Gerney & Dort, 1992; Greenspan, 1992; Kirby, Byra, Wallhead, & Readdy, 2013; Mellor, 1992; Metzler, 2000; Zeng, Leung, Liu, & Bian, 2009). The findings of those pedagogical studies provide valuable information that enables teachers to prepare and implement their teaching purposefully in various curricula

and classes as well as to match up the characteristics of diverse learners (Byra & Jenkins, 2000; Greenspan, 1992; Metzler, 2000; Sicilia-Camacho & Brown, 2008; Zeng, 2015; Zeng et al., 2009).

Mosston's STS is based on the notion that "teaching behavior is a chain of decision making" (Spectrum of Teaching Styles, 2012, The Axiom section, para. 1) from teachers and learners; those specific decisions produced the STS, a spectrum of various landmark teaching–learning styles, of which each embraces different and specific learning objectives. The STS allows every teaching episode to provide the learner an opportunity to focus on attributes along each of the five implemental channels: cognitive, social, emotional, physical, and moral/ethical (Ashworth, 2008). Garn and Byra (2002) illustrated that implementing the STS is framed around the idea that learners can reproduce (mirror or replicate) and produce (discover or create) movements and knowledge. Moreover, the STS offers choices to teachers, to match up their students' learning styles and to meet the objectives of any teaching episode accurately (Mosston & Ashworth, 2008).

With regard to the above concern, Doherty (2010) stated that the STS can provide a sound basis for analysis of a teacher's teaching preference and the effectiveness of the style selected to meet a particular teaching objective. Specifically, the STS emphasizes the relationships between the styles rather than their differences; these relationships follow that effective instruction in PE considers the variety in teaching styles and the ability to use a style that best fits the situation or educational environment (Doherty, 2010). Furthermore, the STS permits freedom and celebrates the creativity of the individual teacher by encouraging deliberate decision-making canopy designs and combinations of styles in the STS; within this framework, teaching has become an art and a science (Doherty, 2010). In fact, all teaching methods attempt to support an educational intent that benefits students' learning. Specifically, one of the most unique characteristics in the STS is that it emphasizes the idea of a *non-versus approach,* meaning no teaching style is valued more than another teaching style. This approach honors and accepts all educational ideas.

Over the years, the STS has provided physical educators with alternative instructional styles, a widely accepted and understood lan-

guage for teaching, and potential resources for conducting research studies in the TPE settings (e.g., Beckett, 1991; Byra & Jenkins, 2000; Ernst & Byra, 1998; McCullick & Byra, 2002; Metzler, 1983, 2000; Salvara & Bironé, 2002; Zeng, 2015; Zeng et al., 2009). Goldberger (2008) defined the STS as a unified theory of teaching and illustrated that "any pedagogical theory attempts to explain a phenomenon based on a set of principles; in this case, the phenomenon is teaching, and the organizing principle is that teaching can be defined in terms of decision-making" (p. 10). More recently, Goldberger et al. (2012) illustrated, "We like to use the adjective 'elegant' because the Spectrum is, at the same time, deceptively simple, logical, and straightforward, and yet complex, elusive, and knotty" (p. 269). Goldberger et al. continued,

> For us, the Spectrum has provided an entrée into an anchorage within the fascinating world of teaching and learning. It provides this entrée by offering a common perspective, a number of undergirding concepts, and a functional language we can all use. (p. 269)

On the other hand, to sport pedagogy scholars, the instructional theoretical framework of the STS has played dual roles as an organized repository for exploring new knowledge about coaching and as a catalyst for generating new research questions in sport pedagogy (Goldberger et al., 2012). Although the STS cannot solve all the problems in teaching and coaching, I believe that it can help preservice professionals develop the skills and knowledge they need by providing a common perspective, language, and repository (Goldberger et al., 2012).

Since the 1980s, researchers and scholars in the field of TPE have used the STS theoretical framework, various teaching styles, widely accepted and understood terminologies, and possible resources to conduct research studies (e.g., Abdurrahman & Nilüfer, 2012; Beckett, 1991; Byra & Jenkins, 2000; Ernst & Byra, 1998; Griffey, 1981; Hurwitz, 1985; Kulinna & Cothran, 2003; McCullick & Byra, 2002; Metzler, 2000; Zeng, 2014). The following are a few examples: Abdurrahman and Nilüfer (2012) examined 66 in-service Turkish PE teachers' perceptions and preferences about the STS using a 36-item

questionnaire. Their results showed that (1) when asked, "Which teaching style do you think you have the best result?" 43.8% of male participants selected practice style and 29.4% of female participants selected command style, and 35.3% of female participants and 31.3% of male participants reported that they used command style in their classroom frequently; (2) when asked, "Which teaching styles do you prefer?" 64.7% of female participants and 34.4% of male participants reported that they preferred the first cluster (i.e., Styles A–E) with clear expository teaching strategies instead of teaching strategies that involve heavy cognitive thinking (i.e., Styles F–K).

Kulinna and Cothran (2003) investigated 212 American in-service PE teachers on how they used and perceived the 11 styles of the STS in their regular classes, and their findings included that the in-service teachers used many of the styles in their classes, but they preferred to use the styles from the reproductive cluster (Styles A, B, C, D, and E) and were not in favor of using the styles from the productive cluster (Styles F, G, H, I, J, and K); the divergent production style (Style H) was the only exception. Overall, Kulinna and Cothran found that the in-service teachers' uses and perceptions on the STS were varied or depended on factors such as "effectiveness," "fun," and "motivation" as well as on "their experience with the styles" (p. 607).

Cothran et al. (2005) in their survey project found that the use of teaching styles varied across countries. The main styles for teachers in all countries were teacher centered (i.e., Styles A–E). However, studies and information related to how the student teachers or preservice teachers in PETE programs perceive and implement the STS are still rarely covered. From this perspective, I would like to explore such concern; hence, the purposes of this study were to (a) investigate how the undergraduate and graduate student teachers perceive and implement Mosston's STS; (b) compare the differences in how the STS is perceived and implemented between undergraduates and graduates as well as male and female student teachers; (c) summarize and discover meaningful information on how the STS works among the two levels of student teachers; (d) provide suggestions or recommendations for PETE professionals so they can better understand how the STS works for each student teacher and can better prepare their student teachers to become more skillful teachers.

Method

Participants

The participants were 142 PETE major student teachers; 84 were undergraduates (aged 20–22) and 58 were graduates (aged 22–29), with 96 male and 46 female student teachers. These participants were enrolled in an STS-based teaching strategies course in an urban university located in northeastern United States. Student teachers ($N = 157$) in the PETE program (during two academic years, or four regular semesters) were invited to participate in a self-report survey using the Spectrum of Teaching Styles Inventory$^{\text{-adapted version}}$ (STSI$^{\text{-AV}}$; Zeng, 2012). As a result, 142 student teachers completed the survey (return rate of 90.5%). The time at which the survey was conducted was when they completed all the coursework and teaching training programs within their specific semester. Participants provided informed consent and were assured anonymity through the use of a given number.

Instrumentation

The instrument used in this study was the STSI$^{\text{-AV}}$ (Zeng, 2012; details can be found in the Appendix). The STSI$^{\text{-AV}}$ was used for a pilot study because there was no existing questionnaire to fulfill the purpose of investigating how student teachers perceive and use Mosston's STS. I adapted the STS descriptions inventory originally created by Ashworth (2008) into the STSI$^{\text{-AV}}$. Ashworth (2008) explained that Style J "is only for the individual who approaches the teacher to request this experience; it is not a whole class experience" ("Part 2," Learner-Initiated Style J, para. 2) and that Style K "is outside the realm of the classroom environment" ("Part 2," Self-Teaching Style K, para. 2); therefore, I only adopted to the STSI$^{\text{-AV}}$ Styles A–I, a total of nine teaching styles. In the STSI$^{\text{-AV}}$ (Zeng, 2012), each style has a name, classroom description, what one should expect to happen in the classroom, and who does what and when. The following three statements were added: (1) "I have used this style to teach physical education lessons," (2) "I think this style of teaching would help students learn skills/activities," and (3) "I think this style of teaching would motivate students to learn." Participants responded to the statements by choosing one of the following five op-

tions on a Likert scale: *never use/strongly disagree* (score = 1), *seldom use/somewhat disagree* (score = 2), s*ometimes use/okay* (score = 3), *often use/agree* (score = 4), or *always use/strongly agree* (score = 5). During the pilot study, a self-report survey using the STSI-AV (Zeng, 2012) was administered twice to the participants (a convenience sample of 65 preservice teachers (undergraduate = 34, graduate = 31; male = 38, female = 27) within 2 weeks after the coursework and training programs were completed. The scores from the first survey and the second survey were analyzed using correlation coefficients from the STS. As a result, the test–retest correlation coefficient between undergraduates and graduates was .88 and between males and females was .82. According to Zhu (2012), the correlation values can be interpreted as follows: .40 to .59 as moderately reliable, .61 to .79 as moderately high reliable, and .80 to 1.00 as pretty high reliable. The instrument is presented in the Appendix.

Coursework and Teaching Training Programs

The coursework and training programs implemented in this study included the following:

(a) Lectures. Nine weeks of lectures that covered the following chapters in *Teaching Physical Education* (Mosston & Ashworth, 2008): Chapter 2: An Overview, Chapter 3: The Anatomy of Any Teaching Style, Chapter 6: The Command Style, Chapter 7: The Practice Style, Chapter 8: The Reciprocal Style, Chapter 9: The Self-Check Style, Chapter 10: The Inclusion Style, Chapter 11: Issues Common to All Teaching Styles, Chapter 12: The Guided Discovery Style, Chapter 13: The Convergent Discovery Style, Chapter 14: The Divergent Discovery Style, and Chapter 15: The Learner-Designed Individual Program Style.

(b) Teaching episodes and lessons workshop. (1) During the workshop, the participants were provided with various teaching episodes and lesson plans using the teaching styles they learned from the lectures (Styles A–I); (2) the participants had time and opportunities to discuss what they learned from the examples and what they planned to implement for the incoming teaching.

(c) Teaching episodes assignments. The participants were requested to develop at least one teaching episode for each

style learned by using their favorite sport skill or physical activity, but they were required to submit three teaching episodes only, two using Styles A–E and one using Styles F–H.

(d) Any question they may have for the workshop and the assignments.

(e) A 6-week teaching training. Each participant was given a chance to teach an STS mini-lesson in an educational laboratory. The STS lesson required each participant to develop an STS lesson plan containing a minimum of four teaching styles within a 40-min timeframe.

(f) After the student teachers completed each lesson, a 5-min after-teaching conference was given by the instructor to provide feedback, comments, and/or suggestions to the student teachers (focus on how well the lesson was done, which areas can be improved, etc.).

Data Analyses

The goal for the data analyses was to look for effects of two independent variables (with nine styles and three statements for each) on two dependent variables—Education (undergraduate and graduate[1]) × Gender (male and female)—at the same time; therefore, a 2 (gender) × 2 (education) multivariate analysis of variance (MANOVA) and a follow-up one-way MANOVA were employed for data analyses. Descriptive statistics were used to reflect the general status of how the student teachers perceived and implemented the STS. The statistical program used for the data analyses SPSS (version 22). The STS descriptions and scenarios in TPE classes are presented in Table 1.

[1] 95% of the graduate student teachers did not have a chance to take the STS-based teaching strategies course during their undergraduate years.

Table 1
The Spectrum of Teaching Styles Descriptions and Scenarios

Style name & letter representing it		Descriptions and scenarios of the teaching styles
Command Style	A	The teacher selects the task that the students perform in unison and choreographed or precision performance image following the exact pacing and rhythm (cues) set by the teacher.
Practice Style	B	The teacher selects the subject matter tasks, the quantity, and the time limits so that students can practice individually and privately. The teacher circulates among all students and offers private feedback.
Reciprocal Style	C	The teacher selects the subject matter tasks and presents the expectations for students to work with a partner. One student (the doer) practices the task, while the other student (the observer) uses a teacher prepared criteria (checklist) to offer immediate feedback focusing on performance clarification to the doer. When the first set of tasks is finished, the students switch roles and continue to the second set of tasks. This experience offers practice in giving and receiving immediate feedback about the task and practice in developing comparing, contrasting, communicating, and social skills.
Self-Check Style	D	The teacher selects the subject matter tasks and designs the criteria sheet (performance checklist) for the students. Students individually practice the tasks and check their own performance using the checklist. The teacher privately communicates with students to listen to their self-assessment comments and either reinforces the learner's use of the criteria or redirects the learner's focus to specific performance details on the criteria.

Table 1 (cont.)

Style name & letter representing it		Descriptions and scenarios of the teaching styles
Inclusion Style	E	The teacher selects the subject matter skill and designs multiple levels of difficulty for each skill. Students select the level of difficulty that is appropriate to their performance. If inappropriate level decisions are made, the student may change the level choice. Students check their performance using the teacher prepared performance checklist (criteria sheet). The teacher circulates to acknowledge the choices the students have made (the teacher does not evaluate, assess, or suggest level changes) and to ask questions for clarification to affirm the accuracy of the students' assessment process. Generally performance standards suitable.
Guided Discovery Style	F	The teacher asks one student a series of specific questions*; each question has only one correct answer. The questions are logically sequenced so that each answer leads the student step by step to discover the answer—the idea, concept or solution—that is anticipated. (*Content appropriate for Guided Discovery includes principles, rules, concepts, and relationships. Non-examples of discovery content include isolated facts, skills, dates, names or events. These content examples cannot be discovered.)
Convergent Discovery Style	G	The teacher designs a situation or question that has one specific correct response—the situation or question is new and the response is not previously known to the students. The learners are given individual and private time to use their thinking and questioning skills, reasoning, and logic to discover the anticipated answering.

Table 1 (cont.)

Style name & letter representing it		Descriptions and scenarios of the teaching styles
Divergent Production Style	H	The teacher designs a single or series of problems, situations or questions that seek multiple solutions to the same problem. The task is new to the students; therefore, each student is invited to discover new possibilities, as they produce multiple (divergent) responses to the specific problem.
Learner Designed-Individual Program Style	I	The teacher designates a broad subject matter/topic. Within that topic each student is responsible for producing an individual learning program that includes setting goals and the process for accomplishing the goals. The learners design, implement, refine the program, and create performance criteria for their individual learning programs.

Note. From "Descriptions of Landmark Teaching Styles: A Spectrum Inventory," by S. Ashworth, 2008 (http://www.spectrumofteachingstyles.org/pdfs/literature/Ashworth2008_Descriptions_of_landmark.pdf).

Results

The descriptive statistics are presented in Table 2. The descriptive statistics reflect the status of how these student teachers use and perceive the STS; some of the unique features should be interpreted as follows: (a) on Statement 1 ("I have used this style to teach physical education lessons"), the participants (N = 142) reported that they had used command, practice, reciprocal, and inclusion styles to teach PE classes (order by score); on Statement 2, the participants reported that they believe using command, practice, reciprocal, and inclusion styles (order by score) helps students learn skills/activities; on Statement 3 ("I think this style of teaching would motivate students to learn"), the participants indicated that inclusion, practice, reciprocal, and command styles (order by score) would motivate students to learn. (b) For mean score by gender, on command style Statement 2 ("I think this style of teaching would help students learn skills/activities"), the males' highest score was 4.24 (means more

than *agree*) and the females' highest score was 4.50 (between *agree* to *strongly agree*). On Statement 1 ("I have used this style to teach physical education lessons"), males' lowest score (means *seldom* use this style) was in the convergent style. Females' lowest score (means *seldom* use this style), however, was in the learner-designed individual program style Statement 1. (c) For education level mean score, undergraduates' highest score was 4.35 (means more than *agree*) in command style Statement 2 ("I think this style of teaching would help students learn skills/activities"), but graduates' highest score was 4.58 (between *agree* to *strongly agree*) in practice style Statement 2. Moreover, on Statement 1 ("I have used this style to teach physical education"), undergraduates' lowest score was 1.83 (means *almost never* use this style) in the command style, but the graduates' lowest score was 2.31 (means *once in a while* use this style) in the convergent style.

Additionally, the student teachers reported that they *seldom use* or *once in a while* use the following teaching styles during their teaching assignment or activities: self-check (male = 2.45, female = 2.32; graduate = 2.47, undergraduate = 2.32), guide discovery (male = 2.47, female = 2.28; graduate = 2.08, undergraduate = 2.82), convergent discovery (male = 2.19, female = 2.17; graduate = 2.11, undergraduate = 2.31), divergent discovery (male = 2.48, female = 2.30; graduate = 2.20, undergraduate = 2.74), and learner-designed - individual program (male = 2.25, female = 1.82; graduate = 1.83, undergraduate = 2.51). Details are presented in Table 2.

Table 2

Descriptive Statistics on Student Teachers' Perceptions and Implementation of Mosston's Spectrum of Teaching Styles

		Gender		Level	
Style and stament	***N*** ***M* (*SD*)[a]**	**Males** ***M* (*SD*)[b]**	**Females** ***M* (*SD*)[c]**	**Under-graduate** ***M* (*SD*)[d]**	**Graduate** ***M* (*SD*)[e]**
Command					
Statement 1	3.88 (.96)	3.84 (1.05)	3.95 (.75)	4.02 (.99)	3.95 (.75)*
Statement 2	4.32 (.85)	4.24 (.90)	4.50 (.72)	4.35 (.87)	4.27 (.83)
Statement 3	3.95 (.96)	3.90 (.95)	4.04 (.98)	4.10 (.87)	3.72 (1.03)*

Table 2 (cont.)

Style and statement	*N* *M* (*SD*)[a]	Gender		Level	
		Males *M* (*SD*)[b]	Females *M* (*SD*)[c]	Under-graduate *M* (*SD*)[d]	Graduate *M* (*SD*)[e]
Practice					
Statement 1	3.83 (.89)	3.87 (.92)	3.74 (.83)	4.05 (.80)	3.52 (.92)*
Statement 2	4.20 (.80)	4.17 (.81)	4.26 (.80)	4.13 (.87)	4.58 (.68)
Statement 3	4.08 (1.00)	4.23 (.72)	4.08 (1.01)	4.19 (.84)	4.17 (.79)
Reciprocal					
Statement 1	3.36 (1.00)	3.42 (1.03)	3.24 (.94)	3.62 (.93)	3.00 (1.01)*
Statement 2	3.92 (.93)	3.88 (.89)	4.00 (1.01)	3.82 (.94)	4.07 (.89)
Statement 3	3.97 (.90)	3.96 (.85)	4.00 (1.01)	.91 (.96)	4.07 (.81)
Self-Check					
Statement 1	2.41 (.92)	2.45 (.92)	2.32 (.92)	2.47 (.72)	2.32 (.92)
Statement 2	3.34 (.89)	3.29 (.94)	3.45 (.78)	3.27 (.85)	3.44 (.94)
Statement 3	3.55 (1.00)	3.46 (.96)	3.71 (1.06)	3.51 (.95)	3.60 (1.07)
Inclusion					
Statement 1	3.36 (1.06)	3.85 (.98)	3.47 (1.09)	3.34 (.93)	3.39 (1.22)
Statement 2	3.90 (.98)	3.85 (.98)	4.00 (.98)	3.69 (.93)	4.20 (.81)*
Statement 3	4.18 (.82)	4.13 (.82)	4.28 (.81)	3.98 (.82)	4.46 (.73)*
Guide-Disc.					
Statement 1	2.38 (.89)	2.47 (.97)	2.28 (.72)	2.08 (.64)	2.82 (1.03)*
Statement 2	3.59 (.94)	3.50 (.93)	3.78 (.96)	3.42 (.94)	3.82 (.90)*
Statement 3	3.25 (1.05)	3.40 (1.04)	2.93 (1.30)	2.84 (1.12)	3.84 (.91)*
Convergent					
Statement 1	2.17 (.82)	2.19 (.61)	2.17 (.82)	2.11 (.64)	2.31 (.73)
Statement 2	3.49 (.95)	3.45 (.95)	3.56 (.95)	3.25 (.90)	3.84 (.91)*
Statement 3	3.47 (.93)	3.17 (1.02)	4.11 (1.15)	3.19 (1.45)	3.89 (.85)*
Divergent					
Statement 1	2.42 (.87)	2.48 (.80)	2.30 (1.00)	2.20 (.76)	2.74 (.94)*
Statement 2	3.48 (.88)	3.40 (.85)	3.65 (.94)	3.23 (.84)	3.84 (.83)*
Statement 3	3.56 (.92)	3.42 (.89)	3.84 (.94)	3.32 (.89)	3.91 (.86)*

Table 2 (cont.)

Style and statement	*N* *M* (*SD*)[a]	Gender		Level	
		Males *M* (*SD*)[b]	Females *M* (*SD*)[c]	Under-graduate *M* (*SD*)[d]	Graduate *M* (*SD*)[e]
Learner D-IP					
Statement 1	2.11 (.85)	2.25 (.83)	1.82 (.85)	1.83 (.78)	2.51 (.80)*
Statement 2	3.33 (.96)	3.21 (.97)	3.58 (.91)	3.02 (.99)	3.77 (.72)*
Statement 3	3.41 (.94)	3.30 (.99)	3.63 (.79)	3.12 (.95)	3.84 (.83)*

Note. Guide-Disc. = guided discovery style; Learner D-IP = learner-designed - individual program style. Statement 1: "I have used this style to teach physical education lessons"; Statement 2: "I think this style of teaching would help students learn skills/activities"; Statement 3: "I think this style of teaching would motivate students to learn."

[a]$N = 142$. [b]$n = 96$. [c]$n = 46$. [d]$n = 84$. [e]$n = 58$.

*$p < .05$.

The results of the 2 (gender) × 2 (education levels) MANOVA determined if there were differences between the male and female as well as undergraduate and graduate student teachers in their perceptions and implementation of the STS. The results showed no significant difference in gender, $p > .05$, $\Lambda = .145$, $F = 1.343$; however, significant differences were found for education level, $p < .05$, $\Lambda = .000$, $F = 7.732$. According to the research design, a follow-up test—a one-way MANOVA—for comparing the differences between the two education levels (undergraduate and graduate) on their perceptions and implementation of Mosston's STS was executed. The findings are presented in Table 3.

Table 3

A Follow-Up Test: One-Way MANOVA for Comparing the Differences Between the Two Levels (Undergraduate = 84, Graduate = 58) on Their Perceptions and Implementation of Mosston's Spectrum of Teaching Styles

Dependent variable	*df*	*MS*	*F*	*p*[a]
Command				
Statement 1	1	4.237	4.680	.032
Statement 2	1	.227	.308	.580
Statement 3	1	5.033	5.609	.019
Practice				
Statement 1	1	9.651	13.209	.000
Statement 2	1	1.104	1.718	.192
Statement 3	1	.011	.016	.898
Reciprocal				
Statement 1	1	13.148	14.180	.000
Statement 2	1	2.102	2.452	.120
Statement 3	1	.796	.976	.325
Self-Check				
Statement 1	1	.758	.886	.348
Statement 2	1	1.044	1.317	.253
Statement 3	1	.288	.286	.594
Inclusion				
Statement 1	1	.090	.080	.778
Statement 2	1	9.150	10.050	.002
Statement 3	1	7.820	12.524	.001
Guide-Disc.				
Statement 1	1	18.134	26.632	.000
Statement 2	1	5.463	6.328	.013
Statement 3	1	34.282	31.453	.000
Convergent				
Statement 1	1	1.417	3.077	.082
Statement 2	1	12.140	14.733	.000
Statement 3	1	17.105	4.304	.040

Table 3 (cont.)

Dependent variable	*df*	*MS*	*F*	*p*[a]
Divergent				
Statement 1	1	9.968	14.141	.000
Statement 2	1	12.630	17.890	.000
Statement 3	1	12.039	15.479	.000
Learner D-IP				
Statement 1	1	16.048	25.487	.000
Statement 2	1	19.405	24.248	.000
Statement 3	1	17.224	22.106	.000

Note. Guide-Disc. = guided discovery style; Learner D-IP = learner-designed - individual program style. $N = 142$.

[a]17 out of 27 comparisons significantly different at $p < .05$ level; also see Table 2.

Among the comparisons in the two education levels, 17 out of 27 were found significantly different at $p < .05$ level. Specifically, the following comparisons were significantly different between the two levels of student teachers. Undergraduates used command style more often than did the graduates (4.02 vs. 3.95), and undergraduates had a stronger belief that the command style would help students learn skills/activities than did graduates (4.10 vs. 3.72); undergraduates used practice style more often than did graduates (4.05 vs. 3.52), and undergraduates used reciprocal style more often than did graduates (3.62 vs. 3.00). Compared to the undergraduates, graduates had a stronger belief that inclusion style would help students learn skills/activities and would motivate students to learn (4.20 vs. 3.69 and 4.46 vs. 3.98, respectively). Furthermore, with regard to the use and perception of the four production styles (Styles F–I), a consistent finding was that the graduates used the four styles significantly more often and strongly believed that those styles would help students learn skills/activities and would motivate others more than did the undergraduates (with only one exception, which is that there was no significant differences between the two levels on the use of the convergent style).

Discussion

I investigated the status of student teachers' use and perceptions of the STS in a PETE program at an urban university. The following two main hypotheses guided this study: (1) no significant differences of the use and perceptions of the STS between male and female student teachers and (2) no significant differences of the use and perceptions of the STS between undergraduate and graduate student teachers.

The self-report details for how the participants implement and perceive the STS are presented in Table 2 and in the Results section. Findings were consistent with or similar to those of previous studies by Abdurrahman and Nilüfer (2012), Jaakkola and Watt (2011), Kulinna and Cothran (2003), and Cothran et al. (2005). Abdurrahman and Nilüfer found that 64.7% of female PE teachers and 34.4% of male PE teachers preferred the first cluster with clear expository teaching styles (Styles A–E) instead of teaching styles that required intense thinking (Styles F–K). Jaakkola and Watt in their survey of teaching styles that PE teachers use and of benefits to their students found that the PE teachers used command and practice styles the most, but self-teaching, self-check, and convergent discovery styles were almost never used; their students felt that they benefited from the teacher-centered styles (Styles A–E) rather than the student-centered styles (Styles F–K).

Similar findings were revealed by Kulinna and Cothran (2003) as well. They found that the styles from the reproduction cluster (Styles A–E) were used by the PE teachers in their teaching frequently; the styles from the production cluster (Styles F–K) were rarely used, with Style H (divergent discovery style) as an exception. Cothran et al. (2005) also reported that the use of different styles varied in different countries; however, the main styles for teachers to implement in their daily teaching were teacher centered (Styles A–E).

Again, the present findings were consistent with or similar to those in previous studies. For the two main hypotheses, the first was true; that is, there was no significant difference regarding the use and perceptions of the STS between male and female student teachers. The reasons behind that may be strongly correlated to all student teachers receiving the same course requirements, teaching

training programs, and lectures. (Refer to Coursework and Teaching Training Programs in the Method section.) The second hypothesis, significant differences with regard to the use and perceptions of the STS between the undergraduates and graduates student teachers, was found not true.

The findings from this study should not be a surprise, because the participants came from different education levels (graduate and undergraduate); other than that, the following could be the reasons behind those differences: (a) The first reason is age; there was 2–9 years of age difference between the undergraduates (20–22 years old) and the graduates (22–29 years old); with these differences, they differ not only in education level but also in life experiences. (b) The second is experience. The graduate student teachers had 1–6 years of working experience; the working experience may have caused them to perceive, react to, and execute things differently. (c) The third reason is a comprehensive factor that combines gender, age, and education level. This comprehensive factor relates to a teacher's cognition, attitude toward, and motivation levels on his or her teaching works. In short, this is an unclear reason; more studies are needed for this concern.

Because there was no previous study using the STS as framework and student teachers as participants in the research literature, comparisons of the differences and similarities on how student teachers use and perceive the STS in their teaching are not available. Over the years, however, researchers and scholars have investigated how in-service PE teachers perceive and implement the STS in their regular teaching. Cothran et al. (2005) conducted a typical investigation. Their findings are meaningful and, for future research in the same area, has instructive meaning: (a) The PE teachers generally believed in the benefits of the STS and became more confident in implementing a variety of teaching styles in their classes; (b) a common theme to note is that the reproduction styles (Styles A–E) were more commonly used and viewed more positively than were the production styles (Styles F–K) by the in-service PE teachers.

Nevertheless, one might wonder, what factors could account for in-service PE teachers who believe this trend? One possible explanation is related to the subject matter of physical skills/activities that are well defined by the teaching styles from the reproduction

cluster (Styles A–E). In the field of TPE, Styles A–E are also called direct instruction models. The second possibility is that PE teachers respond to their students' preferences; Cothran, Kulinna, and Ward (2000) found that many students in the United States preferred reproduction teaching styles. Another possibility is that PE teachers lacked experience with understanding and implementing the styles from the production cluster (Styles F–K); that is, the participants in the survey conducted by Cothran et al. (2000) did not receive any instruction and examples in using the production styles when they were student teachers in their PETE programs (Byra, 1999). This lack of experience and instruction (with certain examples and opportunities to implement) affected their confidence in using styles in the STS.

The following limitations were considered when interpreting the results of this study: the unequal number of participants (undergraduate and graduate or male and female student teachers); education levels and life experience differences among the participants; and participants were not randomly selected, they were chosen because they were enrolled in the course. Further study in this topic needs to avoid these limitations and select participants who possess similar conditions.

In conclusion, the student teachers in this study expressed they often used command, practice, reciprocal, and inclusion styles to teach physical education lessons; among the nine teaching styles, they believed that using the command, practice, reciprocal, inclusion, guided discovery, convergent discovery, and divergent discovery styles in their teaching helps their students learn skills/activities better. The participants also expressed that implementing the command, practice, reciprocal, inclusion, convergent discovery, and divergent discovery styles would motivate their students to learn better. No significant difference were found between male and female student teachers regarding their use and perceptions of the STS to teach PE classes; student teachers from different education levels, however, implement and perceive the STS differently.

What Does This Article Add?

Researchers have suggested that future research is needed to explore the effects of how teachers learn about different styles, whether through teacher education or professional development programs

(Byra, 1999; Cothran et al., 2000) and to clarify why teachers did not implement the styles in the production cluster (Styles F–K) even though they had positive perceptions on some of the styles in the cluster. Their findings suggest that teacher preparation and professional development programs should provide opportunities for teachers to learn and practice multiple teaching styles in various class settings (Cothran et al., 2005). The findings of this study extend the previous studies related to how PE teachers perceive and implement the STS. It also marks the first attempt to explore how student teachers perceive and implement the STS in a PETE program. Although the design has its shortcomings, the results of this initial attempt provide insights into the status of how student teachers perceive and implement the STS and why student teachers at different education levels perceive and implement the STS differently. Hopefully, this initial study serves as a prompt for further investigation by more scholars in a collaborative way to discover which factors truly affect how student teachers in PETE programs perceive and implement the STS. Additionally, future studies also need to confirm that there are no significant differences between male and female teachers in their use and perceptions of the STS. What key factors will affect student teachers' use and perceptions of the STS? Doing so will allow professionals in PETE programs to improve their instruction and training using the STS to foster future PE teachers who become more skillful educators; that is, in Ashworth's (2009) words, our future depends on our ability to lead and develop our students and to provide them with a stronger professional foundation that supports learning opportunities from Command to Discovery.

Recommendations

Professionals in PETE programs should equip and prepare themselves with various pedagogy theories and skills that will enable them to provide complete and solid pedagogical information and knowledge to their teacher candidates. They should not only provide a series of lectures and teaching training programs, but also make sure that the course requirements are specific, detailed, and align with the professional standards (e.g., in the United States, the standards of the National Council for Accreditation of Teacher Education). With those characteristics in the course requirements, teacher candidates will obtain more opportunities to learn and practice multiple teach-

ing styles and methods in various class settings that will change "a common phenomenon physical education teachers worldwide were in favor of implementing: reproduction teaching styles" described by Cothran et al. (2005).

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Appendix[1]

Spectrum of Teaching Styles Inventory-adapted version

Demographic

DIRECTIONS: Please mark the response pertaining to you:

1. What is your gender? ☐ Male ☐ Female
2. Are you in the ☐ Undergraduate program or the ☐ Graduate program?

Self-Report Use and Beliefs About the Spectrum of Teaching Styles (STS)

DIRECTIONS: This survey is about the ways you perceive and your experiences in the STS in physical education class settings. There are no right or wrong answers; we just want to know your opinions about the following statements. Circle your answer that fits most in your experiences or situations.

You can choose from: *never/strongly disagree, seldom/somewhat disagree, sometimes/okay, often/somewhat agree,* and *always/ strongly agree.*

Sources

1. Ashworth, S. (2008). *Descriptions of landmark teaching styles: A spectrum inventory.* Retrieved from Spectrum of Teaching Styles website: http://www.spectrumofteachingstyles.org/pdfs/literature/Ashworth2008_Descriptions_of_landmark.pdf
2. *The Spectrum of Teaching Style Descriptions Inventory – A Survey Questionnaire.* From Zeng, H. Z. (2012). *PETE students' perceptions about Mosston's Spectrum of Teaching Styles – A Polite Study.* Paper presented at 2012 American Association for Health, Physical Education, Recreation, and Dance

[1]Original inventory from *Descriptions of Landmark Teaching Styles: A Spectrum Inventory,* by S. Ashworth, 2008 (http://www.spectrumofteachingstyles.org/pdfs/literature/Ashworth2008_Descriptions_of_landmark.pdf). Inventory adapted in *PETE Students' Perceptions About Mosston's Spectrum of Teaching Styles: A Polite Study,* by Z. H. Zeng, 2012, paper presented at 2012 American Association for Health, Physical Education, Recreation, and Dance (AAHPERD) National Convention and Exposition, Boston, MA.

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The following descriptions offer images of the classroom that represent different landmark teaching–learning expectations, and each expectation inherently promotes a set of decisions and different sets of learning objectives in content and human behavior. Thus, each description represents a different teaching–learning style (O-T-L-O).

Command Style/Style A

In this style, the teacher selects the task that the students perform in a unison, choreographed or precision performance image following the exact pacing and rhythm (cues) set by the teacher.

1. I have used this style to teach physical education

Never	*Seldom*	*Sometimes*	*Often*	*Always*

2. I think this style of teaching would help students learn skills/activities.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

Practice Style/Style B

In this style, the teacher selects the subject matter tasks, the quantity, and the time limits so students can practice individually and privately. The teacher circulates among all students and offers private feedback.

1. I have used this style to teach physical education

Never	*Seldom*	*Sometimes*	*Often*	*Always*

2. I think this style of teaching would help students learn skills/activities.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

Reciprocal Style/Style C

In this style, the teacher selects the subject matter tasks and presents the expectations for students to work with a partner. One student (the doer) practices the task, while the other student (the observer) uses a teacher prepared criteria (checklist) to offer immediate feedback focusing on performance clarification to the doer. When the first set of tasks are finished, the students switch roles and continue to the second set of tasks.

This experience offers practice in giving and receiving immediate feedback about the task and practice in developing comparing, contrasting, communicating, and social skills.

1. I have used this style to teach physical education

Never	*Seldom*	*Sometimes*	*Often*	*Always*

2. I think this style of teaching would help students learn skills/ activities.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

Self-Check Style/Style D

In this style, the teacher selects the subject matter tasks and designs the criteria sheet (performance checklist) for the students. Students individually practice the tasks and check their own performance using the checklist. The teacher privately communicates with students to listen to their self-assessment comments and either reinforces the learner's use of the criteria or redirects the learner's focus to specific performance details on the criteria.

1. I have used this style to teach physical education

Never	*Seldom*	*Sometimes*	*Often*	*Always*

2. I think this style of teaching would help students learn skills/ activities.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

Inclusion Style/Style E

In this style, the teacher selects the subject matter skill and designs multiple levels of difficulty for each skill. Students select the level of difficulty that is appropriate to their performance. If inappropriate level decisions are made, the student may change the level choice. Students check their performance using the teacher prepared performance checklist (criteria sheet). The teacher circulates to acknowledge the choices the students have made (the teacher does not evaluate, assess, or suggest level changes) and to ask questions for clarification to affirm the accuracy of the students' assessment process. Generally, performance standards.

1. I have used this style to teach physical education

Never	*Seldom*	*Sometimes*	*Often*	*Always*

2. I think this style of teaching would help students learn skills/ activities.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

The next four teaching–learning styles promote different discovery cognitive operations while engaged in the task. The content in these styles is new and not known in advance of the experience to the learner.

Guided Discovery Style/Style F

In this style, the teacher asks one student a series of specific questions*; each question has only one correct answer. The questions are logically sequenced so that each answer leads the student step by step to discover the answer—the idea, concept, or solution—that is anticipated.

(Content appropriate for Guided Discovery includes principles, rules, concepts, and relationships. Non-examples of discovery content include isolated facts, skills, dates, names, or events. These content examples cannot be discovered.)

**Note: There are cognitive liabilities when this style is used in a large group. The discovery process is interrupted per student in a group setting; therefore, the content acquisition cannot be guaranteed for each student.*

1. I have used this style to teach physical education

Never *Seldom* *Sometimes* *Often* *Always*

2. I think this style of teaching would help students learn skills/activities.

Strongly disagree *Somewhat disagree* *Okay* *Somewhat agree* *Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree *Somewhat disagree* *Okay* *Somewhat agree* *Strongly agree*

Convergent Discovery Style/Style G

In this style, the teacher designs a situation or question that has one specific correct response—the situation or question is new and the response is not previously known to the students. The learners are given individual and private time to use their thinking and questioning skills, reasoning, and logic to discover the anticipated answering.

1. I have used this style to teach physical education

Never *Seldom* *Sometimes* *Often* *Always*

2. I think this style of teaching would help students learn skills/activities.

Strongly disagree *Somewhat disagree* *Okay* *Somewhat agree* *Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree *Somewhat disagree* *Okay* *Somewhat agree* *Strongly agree*

Divergent Production Style/Style H

In this style, the teacher designs a single problem or series of problems, situations, or questions that seek multiple solutions to the same problem. The task is new to the students; therefore, each student is invited to discover new possibilities, as they produce multiple (divergent) responses to the specific problem.

1. I have used this style to teach physical education

Never *Seldom* *Sometimes* *Often* *Always*

2. I think this style of teaching would help students learn skills/activities.

Strongly disagree *Somewhat disagree* *Okay* *Somewhat agree* *Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

Learner Designed - Individual Program Style/Style I

In this style, the teacher designates a broad subject matter/topic. Within that topic each student is responsible for producing an individual learning program that includes setting goals and the process for accomplishing the goals. The learners design, implement, refine the program, and create performance criteria for their individual learning programs.

1. I have used this style to teach physical education

Never	*Seldom*	*Sometimes*	*Often*	*Always*

2. I think this style of teaching would help students learn skills/ activities.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

3. I think this style of teaching would motivate students to learn.

Strongly disagree	*Somewhat disagree*	*Okay*	*Somewhat agree*	*Strongly agree*

Because Style J and Style K are outside the realm of the classroom environment, so, this survey was not including them.

Note. The score scales are *never use/strongly disagree* (1), s*eldom use/somewhat disagree* (2), *sometimes use/okay* (3), *often use/somewhat agree* (4), *always use/strongly agree* (5).

THANK YOU FOR YOUR PARTICIPATION!
The P. I. Howard Z. Zeng (D. P. E.)