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MOTOR SKILLS

Effects of Two Practice Style Formats on Fifth Grade Students' Motor Skill Performance and Task Engagement

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Abstract

We investigated the effectiveness of two teaching formats that fall under the canopy of Mosston and Ashworth's (2008) practice style, on fifth grade students' motor skill performance and task engagement. Both formats are also known as station teaching or learning centers. In the teacher-rotated format (TR), the teacher decides the amount of time apportioned during practice at each station, whereas in the learner-rotated format (LR), each learner decides on task order and the amount of time spent at each station. Ten-year-old children (N = 60) were randomly assigned to the TR group (n = 20), the LR group (n = 25), and a control group (n = 15). A soccer dribbling test was employed to evaluate the soccer dribbling skill prior to and after the instructional intervention. The same soccer dribbling tasks were taught to the learners in both treatment groups in eight 30-min sessions. ANCOVA on the posttest scores showed a significant difference between the experimental groups and the control group ($p < .001$) and between the two experimental groups, favoring the LR group ($p < .001$). A 3 × 2 (Group × Test) repeated measures ANOVA showed a significant improvement of the soccer dribbling skill for both teaching formats ($p < .001$) but not for the control group. An ANOVA on the overall practice trial data yielded significant differences between the two formats, favoring the LR group ($p < .001$). Both formats were

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found to be effective, but the results indicate that given the opportunity to reapportion their practice time, learners in the LR format took advantage of this opportunity and improved their performance further.

The Spectrum of Teaching Styles (Mosston & Ashworth, 2008) is a pedagogical theory that provides a concrete model both for the systematic generation of research questions and as an organized repository for research results. Since 1970, numerous Spectrum studies have been conducted, and some of them have provided support for specific aspects of Spectrum theory (Byra, 2000; Chatoupis, 2009).

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) pre-impact (planning and preparation decisions), (b) impact (decisions made during the teaching–learning transaction that define the action), and (c) post-impact (feedback and assesment decisions).

A teaching style that has drawn the attention of many researchers is the practice style of teaching (Chatoupis, 2010). The practice style is the first in the Spectrum that involves the student in the decision-making process (Mosston & Ashworth, 2008). Nine decisions of the impact set are shifted to the learner. These decisions are posture (how to posture for the task), location (where to locate in the environment), order of tasks, starting time per task, pace and rhythm (how quickly to perform the task), stopping time per task, interval (the time between two tasks or parts of tasks), attire and appearance, and initiating questions for clarifications (when to ask questions about the task). During practice, the teacher observes students' performance and offers individual and private feedback to each learner. Also, the teacher is available to answer questions by the learners (Mosston & Ashworth, 2008). The teacher makes the pre- and post-impact decisions.

According to the literature, design variations of the landmark practice style are the most commonly used methods of instruction in PE settings (Kulinna & Cothran, 2003; Jaakola & Watt, 2011). In this study, we examined two design variations of the landmark practice style that have been used in a previous research (Goldberger & Gerney, 1990): the LR (Learner Rotated) and the TR (Teacher

Rotated) formats. Both formats are also known as *task teaching* (Siedentop & Tannehill, 2002) or *station teaching* (Mosston & Ashworth, 2008). In Spectrum terms, the LR and the TR formats fall under the canopy of the nearest landmark style, which is the practice style (Goldberger & Gerney, 1990).

The major difference between the two formats is the number of impact decisions being shifted to the learners. In the TR format, only three decisions are shifted to the learners: pace and rhythm, attire and appearance, and posture. In the LR format, all impact decisions are shifted to the learners except for location. Also, the difference between the two formats lies on how much time is apportioned during practice. In the TR format, learners have about the same amount of practice time on each task because the teacher decides on the starting and stopping time per task and consequently on the interval. In the LR format, learners make time decisions.

In a series of Spectrum studies, the practice style proved to enhance school children's motor performance in athletic activities including forearm pass (Griffey, 1983); rifle shooting (Boyce, 1992); hockey (accuracy task; Goldberger, 1983; Goldberger & Gerney, 1986; Goldberger, Gerney, & Chamberlain, 1982), soccer ball juggling (Beckett, 1991); volleyball spike (Harrison, Fellingham, Buck, & Pellett, 1995); striking with a racket (Jenkins & Byra, 1997); and volleyball passing, serving, and setting (Zeng, Leung, Liu, & Bian, 2009).

Perhaps most relevant to the present study, Goldberger and Gerney (1990) examined the effects of two organizational formats that are presented within the instructional framework of the practice style of teaching. Under the TR format, the participants, fifth grade boys and girls, rotated from station to station, in a specific order, every few minutes on the command of the teacher. Under the LR format, the fifth graders decided the order in which to rotate (from station to station), the amount of time to spend at each station, and when to rotate (from station to station). Goldberger and Gerney found both formats to be effective in fostering students' learning. In addition, they found the LR format to be more effective for the low-ability students than the high-ability students.

In summary, when students are given the opportunity to share in the decision-making process, their progress toward achievement

in the psychomotor domain becomes great (Lydon & Cheffers, 1984; Mosston & Ashworth, 2008).

To date, the amount of practice time that learners achieve in the practice style of teaching has not been investigated thoroughly. Because learners in the LR format are given the opportunity to work individually, to make time decisions, and to receive frequent teacher assistance, several researchers hypothesized that the practice style would provide the conditions for increased practice time (Gerney & Dort, 1992; Goldberger, 1984, 1992; Goldberger & Gerney, 1990; Goldberger et al., 1982). Contrary to this hypothesis, Goldberger and Gerney (1990) found that learners in the TR format engaged in more practice trials than did their LR counterparts. More recently, Byra, Sanchez, and Wallhead (2014) found that the amount of time that students spent in fitness activities was similar among the command, practice, and inclusion styles.

Although there is a surge of literature in which teacher and student behavior within the landmark practice style has been explored, little is currently known about the effects of two formats that function under the canopy of the landmark practice style on psychomotor learning outcomes as well as on the amount of practice time students spend. This is the second Spectrum study to examine the effects of narrowing down the configuration of decisions to a small cluster on certain variables. Given this scarcity of empirical evidence, it seems important that this area of investigation receive further attention from researchers. Therefore, the purpose of the study was to investigate the effectiveness of the TR and LR formats on the soccer dribbling skill performance and on practice trials.

Based on the previously discussed research, we addressed three hypotheses: (a) Both formats are effective in facilitating improved motor performance over time. (b) The LR format is more effective in developing learners' motor performance than is the TR format. (c) Because learners in the LR format make time decisions, they are involved in more practice trials than are learners in the TR format.

Findings from the present research are critical to educators because they can help them to broaden their understanding of the benefits and limitations of shifting impact decisions to children while they learn motor skills. In addition, this information may provide insight on effective ways of structuring the learning environment to increase practice time in PE.

Method

Participants

Sixty children from three fifth grade classes of a rural public school in a southern region of Greece participated in the study (M_{age} = 10.11 years, SD = 0.15). The participants were Greek Caucasian with similar socioeconomic background (middle class). Children were chosen based on the following criteria: (a) They had experience with receiving instruction within the practice style because their PE teacher taught them with that style in the previous school years, (b) they did not exhibit behaviors that could hinder the teaching–learning process, and (c) they had similar experience in the soccer dribbling skill in that none of them were junior athletes in local soccer clubs and none participated in extracurricular soccer activities. The children were randomly assigned to the TR group (n = 20), the LR group (n = 25), and the control group (n = 15).

Inequality in the group sizes in this simple unrestricted randomization (Schulz & Grimes, 2002b) was due to keeping gender analogies constant and partially to the post facto exclusion of a few participants having difficulties in doing the test. Children did not know to which group they were assigned. Therefore, the experiment was single blinded (Schulz & Grimes, 2002a).

The learners were taught by the same male instructor, who had 5 years of teaching experience in elementary PE settings. As a postgraduate student and later as an in-service teacher, the instructor was trained in the appropriate use of the Spectrum of Teaching Styles. In addition, in his most recent years of teaching, the instructor taught elementary school children using many of Mosston and Ashworth's (2008) teaching styles, including the practice style of teaching. The participants in this study did not previously know the instructor in the sense that he was not the PE teacher of the school. Having one instructor provide all instruction helped to control for unplanned variability in the instructor factor (Goldberger & Gerney, 1990). The parents of the children signed consent forms for their child's participation in the study.

Setting

The study lasted 4 weeks. Physical activity instruction was provided two times a week, 30 min/session, thus giving eight sessions for each group. Instruction took place in a gymnasium that the learners used during their regular PE lessons. The gymnasium could comfortably hold up to 25 children at one time. The children received an orientation to the instruction prior to the first session. This included an introduction to the expectations of the teaching style and familiarization with the instructor, the gymnasium, and the equipment.

All sessions taught to the treatment groups were audio–video recorded using a video camera recorder (handycam) attached on a tripod. The handycam offered a sensitive built-in microphone, a large viewing screen, powerful zoom ability, and instant playback. Sessions taught to the control group were audio–video recorded once a week. The video camera was positioned to capture the movements of all learners and the instructor. It was located in a discreet place to reduce the participants' reactivity to it. The instructor was wearing a wireless microphone so that his voice could be recorded. The video-recorded lessons were viewed by two coders to ensure teaching style implementation and by the researcher and an independent rater to estimate learners' task engagement.

Session Content

The content of each session was based on the skill theme development approaches, as described by Graham, Holt/Hale, and Parker (2010). In particular, the tasks included traveling in pathways with the ball and dribbling around stationary obstacles. For example, each learner has a ball and dribbles the ball around the outside of the cones in his or her own personal space, or learners dribble their soccer ball following a certain path with curves drawn on the ground. The design and the selection of the tasks were based on information provided in Mosston and Ashworth's (2008) and Graham et al.'s (2010) textbooks.

Interventions

Treatment groups. For the purposes of this study, the gymnasium was divided into six stations and one soccer dribbling task was assigned to each station. During the first session of both for-

mat groups, the instructor began by stating the reasons for using the practice style and explaining the role of the instructor and the learner. He also asked and answered questions for role clarification. Then he described and demonstrated the soccer dribbling tasks to be executed and explained the criteria sheet. The criteria sheet included written and/or pictorial instructions on how to complete the tasks, information on the quantity of the tasks, and space for learners to check off each task when completed. To ensure participation and serious effort, the instructor told the learners they would be tested on the soccer dribbling skill at the end of the 4-week practice. Before practice began, he solicited and answered questions for task clarification.

Under the TR format, the instructor divided the class into six groups and assigned each group to one of the six stations. Then he gave them the following instruction: "Every group can spend only 5 minutes in each station; upon my signal they should move to the next station. The six rotations will take about 30 minutes. The location, order, starting time, stopping time, and interval decisions are made by me." Upon the command "Begin now!", the learners started practicing the tasks.

Under the LR format, the instructor told the learners they could choose the order of the tasks and move individually to the stations of their choice. To prevent stations from being overcrowded, no more than five learners were allowed to be at each station. He also asked them to complete all tasks and to be accountable for making all eight impact decisions. Before practice time, the instructor made the following statement:

> You will have about 30 minutes to work. Decide how you are going to use your time efficiently. It would make sense to spend the minimal amount of time on those tasks you can already do or you can learn to do easily. Do them quickly and check them off on your task card. This will provide you with additional time to spend on those tasks that need the most work. Really focus on those tasks in which you need the most work, and remember, you will be tested on these skills at the end of the unit. (Goldberger & Gerney, 1990, p. 88)

Upon the command "You may begin when you are ready," the learners started practicing the tasks.

Under both formats, the instructor moved around the classroom, monitored task and role performance of learners, and offered individual and private feedback to learners. In particular, the instructor identified the learners who were making errors in either the performance of the soccer dribbling task or the decision-making process (i.e., adherence to the decisions of the impact set). Then he offered corrective feedback to the individual learner and stayed with him or her to verify the corrected behavior before he moved on to the next learner. At the end of each session, the instructor offered general feedback to learners for role performance and collected task sheets.

Control group. Learners assigned to the control group were involved in PE activities because the researcher did not want to deprive them of participating in some form of physical activity. A study can be more valuable to the extent that the control and experimental groups are similar except that the control group receives no treatment or an alternative treatment to that given to the experimental group (Gall, Borg, & Gall, 1996). Therefore, the learners in the control group formed small teams of three or four participants and took part in mini football games. During game time, the instructor circulated and provided private feedback only for organizational/managerial and discipline purposes.

Instrumentation

The soccer dribbling skill test (Keith, 1980) was administered before and after the intervention to assess learners' soccer dribbling skill. Pre- and posttesting took place in the gymnasium. The pretest session occurred 1 day before the study started and the posttest session 1 day after the completion of the study. Each testing session lasted about 50 min.

Six cones were set up 2 yd apart over a distance of 10 yd. Each learner was instructed to begin with the ball at her or his feet at the first cone and dribble in and out of the cones in a zigzag fashion around the end cone and back to the starting point. Time was measured (to the nearest tenth of a second) from the moment the learner made contact with ball (player-initiated test) until both learner and ball crossed the finish line. Each learner performed two timed trials, with the lowest (fastest) timed trial being recorded. In case a learner

misses a cone, he or she has to return and properly circle it. Time represents the participants' skill outcome score.

Learners' Task Engagement

Following Goldberger and Gerney's (1990) measurement method of task engagement, we counted the number of practice trials taken by each learner during sessions. The practice trials for each learner were tallied each day and were summed up to obtain the total trials for each learner. Learners' task engagement was analyzed to determine which of the two format groups used practice time more efficiently. Using Scott's coefficient (van der Mars, 1989), we estimated an intraclass reliability coefficient of 0.90.

Teaching Style Verification

Fidelity between the instructor's behavior and the style-specific behaviors was ascertained through systematic observation using the style analysis checklist for the practice style (Sherman, 1982). The checklist requires a coder to determine whether the teacher or the learner exhibited the behavior in each statement. The practice style checklist contains 28 style-specific teacher/student statements that are organized in five categories: (a) role identification (e.g., describes the "shift" in nine decisions), subject matter identification (e.g., announces the tasks), (c) performance of the task, (d) evaluation feedback (e.g., evaluates learners, offers individual and private feedback to learners about task and roles), and (e) end-of-lesson ceremony (e.g., offers feedback to learners for role performance). A modification of this checklist was used to verify that the instructor's behavior was congruent with the LR and TR formats.

The teacher should exhibit 26 of the possible behaviors for pure LR format implementation and 25 for pure TR format implementation. The learner should exhibit the remaining behaviors. Behaviors that are not exhibited or exhibited by the incorrect party (teacher or student) are not circled (Ernst & Byra, 1998). Sherman (1982) established scores of 21 (80%) and above to verify style implementation. In the current study, scores of 24 (74%) were obtained from the two trained coders. Fidelity between the instructor's behaviors and the style-specific behaviors was therefore ascertained.

Coder Reliability

The two coders were trained by the author to use the practice style checklists. Training lasted approximately 3 hr. Initially, the coders learned to analyze practice style teaching episodes by coding eight practice style episodes under the supervision of the researcher. Following, the coders analyzed eight more practice style episodes independently. Each style analysis checklist was then compared to the researcher's results. Practice continued until interobserver and intraobserver agreement, estimated with Scott's coefficient, exceeded 0.75. An 84% intraobserver and an 89% interobserver agreement level were obtained.

Data Analysis

Mean, standard deviation, and confidence interval scores were calculated for each dependent variable (soccer dribbling skill scores and practice trials) and for each group. To investigate the first hypothesis, we employed a 3 × 2 (Group × Test) repeated measures analysis of variance (ANOVA). The soccer dribbling posttest scores were analyzed using an analysis of covariance (ANCOVA), with the soccer dribbling pretest scores serving as the covariate. To investigate differences between the two formats as to the number of practice trials, we used an analysis of variance (ANOVA) on the overall practice data.

Eta-squared was also computed to assess effect size in an effort to determine the degree to which the intervention affected soccer dribbling skill performance and the number of practice trials. The 0.05 level of significance was employed for all analyses.

Results

Skill Performance

Apart from normality and homoscedasticity, for an ANCOVA to be valid, independence between treatment and covariate, model linearity, and equal regression slopes are assumed (Keppel & Wickens, 2004; Rausch, Maxwell, & Kelley, 2003).

Normality in the unadjusted and the adjusted scores was confirmed by visual inspection of the normal Q-Q and box-plots, and by testing its significance using the Kolmogorov–Smirnov test (pretest scores, $p = 0.193$; posttest scores, $p = 0.200$; adjusted scores,

p = 0.200). The data were homoscedastic (pretest Levene = 0.562, p = 0.573; posttest Levene = 0.500, p = 0.609). The covariate was independent of the treatment, $F(2, 57) = 0.341$, $p = 0.713$. The fitted model complied with the assumption of linearity as confirmed by a lack of fit test, $F(1, 55) = 0.226$, $p = 0.960$, with the correlation between the covariate and the posttest scores being highly significant ($r = 0.70$, $p < 0.001$). Finally, the regression slopes were about equal, as the Group × Pretest interaction was not significant, $F(2, 54) = 0.798$, $p = 0.456$.

An ANCOVA on the posttest soccer dribbling scores revealed a significant effect of the treatments, $F(2, 56) = 29.536$, $p = .0001$, $\eta^2 = 0.51$, 95% CI [23.10, 23.75], after adjusting for the highly significant covariation of the pretest soccer dribbling scores, $F(1, 56) = 93.69$, $p < 0.001$. A Bryant-Paulson generalization of Tukey's HSD procedure, as a post hoc test, revealed that both treatment groups significantly outperformed the control group ($p < .001$) and the LR group significantly outperformed the TR group ($p < .001$). The pretest and posttest mean and standard deviation scores for the soccer dribbling skill and the confidence intervals are presented in Tables 1 and 2, respectively.

Table 1
Soccer Dribbling Skill Scores and Practice Trials by Group and Test

		Soccer dribbling skill				
Group	*n*	Pretest *M* (*SD*)	Posttest *M* (*SD*)	Adj. posttest[a] *M* (*SD*)	*p*	Practice trials *M* (*SD*)
TR	20	24.93 (1.63)	23.55 (1.89)	23.39 (1.218)	.001	13.56 (1.16)
LR	25	24.54 (1.79)	21.73 (2.11)	21.93 (1.220)	.001	21.55 (1.39)
Control	15	24.86 (1.60)	25.07 (1.82)	24.97 (1.218)	.12	–

[a]Adjusted soccer dribbling scores.

Table 2
Confidence Intervals by Group and Test

	Soccer dribbling skill			
Group	Pretest 95% CI	Posttest 95% CI	Adj. posttest 95% CI	Practice trials 95% CI
TR	[22.67, 24.44]	[24.17, 25.70]	[22.84, 23,93]	[12.98, 14.15]
LR	[20.86, 22.61]	[23.80, 25.28]	[21.44, 22.42]	[21.02, 22.07]
Control	[24.07, 26.08]	[23.98, 25.75]	[24.34, 25.60]	–

A 3 × 2 (Group × Test) repeated measures ANOVA showed a significant interaction between groups and test, $F(2, 57) = 29.323$, $p = 0.001$, $\eta^2 = 0.51$. Post hoc analysis for the soccer dribbling scores revealed a significant improvement from pretest to posttest for the TR and LR groups ($p < .001$), but not for the control group.

Learners' Task Engagement

An ANOVA on the overall practice data revealed a significant effect for groups, $F(1, 43) = 423.641$, $p = 0.001$, $\eta^2 = 0.91$, 95% CI [17.16, 17.95]. Learners who were taught under the conditions of the LR format engaged in more practice trials than did those taught within the TR format (see Tables 1 and 2).

Discussion

Skill Performance

Learners in the LR group and the TR group showed significant improvement from pre- to posttest, whereas learners in the control group did not. This result corroborates previous research findings (e.g., Goldberger & Gerney, 1986, 1990; Goldberger et al., 1982; Harrison et al., 1995; Jenkins & Byra, 1997; Zeng et al., 2009) attesting to the effectiveness of the practice style. The first hypothesis of the study was supported.

It makes sense to suggest that the improvement over time of both groups may be due to the way the instructor structured the learning environment: Learners had to move through a series of stations that were set up for different tasks. It has been argued that the use of learning centers or stations can motivate students to learn (Graham, 2008; Mosston & Ashworth, 2008).

As in previous research (Goldberger & Gerney, 1990), in this study learners' improvement over time under the LR format was greater than that of their counterparts in the TR format. This result indicates that learners can be given some decision-making responsibility and maintain a level of achievement greater than the achievement of learners exposed to a learning environment in which the teacher makes most of the decisions (as in the TR format).

The second hypothesis of the study was also supported: The adjusted LR and TR posttest means were significantly different from each other, with the LR group being superior to the TR group (see Tables 1 and 2). Unlike learners in the LR group, learners in the TR group were allowed to make only three decisions (pace and rhythm, posture, and attire and appearance). Given Mosston and Ashworth's (2008) premise that the greater the amount of student input into decsions, the greater their progress of the learner toward achievement of psychomotor objectives, it makes sense to postulate that the difference in soccer dribbling skill performance between the two formats may be due to the greater amount of decision-making power learners were afforded in the LR group. In a similar study, no difference was found between the two formats, and only for low-ability learners did the LR group prove to be most effective (Goldberger & Gerney, 1990).

Another plausible reason for this difference was that learners in the LR group were involved in significantly more practice trials than students in the TR group (see Table 1). This gave them the opportunity to practice more which, in turn, may have been responsible for their increased performance in soccer dribbling. However, the reader should be cautious not to infer any causal relationship between practice time and increased performance in the LR group, because based on the statistical analysis no such inference can be made.

Learners' Task Engagement

It was also hypothesized that learners in the LR group would practice more than learners in the TR group. This hypothesis as well as many pedagogues' argument that the practice style can provide the conditions for increased practice time (Gerney & Dort, 1992; Goldberger, 1984, 1992; Goldberger & Gerney, 1990; Goldberger et al., 1982) was supported (see Tables 1 and 2).

Unlike learners in the TR group, their counterparts in the LR group were given the opportunity to make time decisions (i.e., starting time per task, pace and rhythm, stopping time per task, interval). Because learners in the LR group could manipulate their allocated time per task, they seized this opportunity to complete more trials. That was not the case in previous research, because learners had not understood the concept of reallocating practice time and the incentives had not been powerful enough to influnce their behavior (Goldberger & Gerney, 1990) or they had little experience in decsion making (Byra et al., 2014).

It can be contended that in this study the researcher took steps to make sure that learners would take advantage of their opportunity to practice and make more productive use of allocated time. In particular, (a) the researcher talked to the learners about the concept of reallocating practice time; (b) the learners were reminded that they would be tested on the soccer dribbling test at the end of the sessions and to be involved in serious efforts and participation; and (c) learners were able to hold themselves accountable for making certain decisions, because they were already familiar with the practice style of teaching.

In a research where, among other things, middle-school-aged children were taught with a student-paced practice method (as in the LR format), it was found that this method was associated with more practice (Silverman, Woods, & Subramaniam, 1998). Mosston and Ashworth (2008) have suggested this, and the present research has provided some empirical evidence for that suggestion.

Implications and Recommendations

In this study, both formats proved to be effective in promoting learners' motor performance. Considering that both formats represent organization options of station teaching and decision-sharing models of teaching, PE teachers who value outcomes related to the psychomotor domain and to increased learner responsibility can employ either format.

In station teaching, learners do not have to wait in long lines to practice and adequate amounts of space and equipment are provided. Such conditions can motivate learners to learn (Graham, 2008; Mosston & Ashworth, 2008). Likewise, learners' decision making (e.g., the various formats of the practice style) can lead to increased

performance in the psychomotor domain (Mosston & Ashworth, 2008). Apart from gains in motor performance, the LR format can also aid learners to assume more self-responsibility (Byra et al., 2014, Goldberger & Gerney, 1990).

If educators are to provide learners with more practice time and encourage further achievement, they need to employ the LR format in which learners are allowed to make time decisions. By manipulating their allocated time per task, learners can achieve more engaged time. Appropriate practice trials or engaged time has been found to be a strong correlate to student achievement in the psychomotor domain (e.g., motor skill acquisition; Lee & Poto, 1988; Metzler, 1989; Rink, 2006; Silverman, 1990).

However, teachers have to be alert with learners' lack of personal social responsibility associated with making decisions. Siedentop and Tannehill (2002) stressed that for educators to use task teaching well, learners need to have good self-control skills. In addition, shift in decision-making responsibility may lead to less active time, especially when learners are not accustomed to making decisions (Byra et al., 2014).

Although our findings merit the attention of practitioners, the study is not without limitations. The small sample size and that the sample may not be representative of the population cast doubts about the generalizability of the findings. A further limitation is the inability of some students to take the soccer dribbling test (they missed or hit most cones). These students had to be excluded from the study, which reduced the sample size further.

More replication studies as well as further research conducted with different age groups, sports skills, and other teaching styles are needed. If studying the effects of a small group of decisions can reveal the implications of configuring decisions on learning, then employing formats that fall under the canopy of other landmark styles makes sense. In addition, there is a lack of knowledge as to how much engaged time the Spectrum teaching styles allow learners to spend. Therefore, it would be interesting to investigate the amount of practice time that learners spend in teaching styles other than the practice style and if this is related to achievement.

References

Beckett, K. (1991). The effects of two teaching styles on college students' achievement of selected physical education outcomes. *Journal of Teaching in Physical Education, 10,* 153–169. https://doi.org/10.1123/jtpe.10.2.153

Boyce, B. A. (1992). The effects of three styles of teaching on university students' motor performance. *Journal of Teaching in Physical Education, 11,* 389–401. https://doi.org/10.1123/jtpe.11.4.389

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

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. *The Physical Educator, 74,* 188–197.

Ernst, M., & Byra, M. (1998). What does the reciprocal style of teaching hold for junior high school learners? *The Physical Educator, 55,* 24–37.

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. (1983). Direct styles of teaching and psychomotor performance. In T. J. Templin & J. K. Olson (Eds.), *Teaching in physical education* (pp. 211–223). Champaign IL: Human Kinetics.

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., & Gerney, P. (1986). The effects of direct teaching styles on motor skill acquisition of fifth grade children. *Research Quarterly for Exercise and Sport, 57,* 215–219. https://doi.org/10.1080/02701367.1986.10605399

Goldberger, M., & Gerney, P. (1990). Effects of learner use of practice time on skill acquisition of fifth grade children. *Journal of Teaching in Physical Education, 10*(1), 84–95. https://doi.org/10.1123/jtpe.10.1.84

Goldberger, M., Gerney, P., & Chamberlain, J. (1982). The effects of three styles of teaching on the psychomotor performance of fifth grade children. *Research Quarterly for Exercise and Sport, 53,* 116–124. https://doi.org/10.1080/02701367.1982.10605237

Graham, G. (2008). *Teaching children physical education: Becoming a master teacher* (3rd ed.). Champaign IL: Human Kinetics.

Graham, G., Holt/Hale, S. A., & Parker, M. (2010). *Children moving: A reflective approach to teaching physical education.* New York, NY: McGraw-Hill.

Griffey, D. C. (1983). Aptitude × Treatment interactions associated with student decision-making. *Journal of Teaching in Physical Education, 3*(2), 15–32. https://doi.org/10.1123/jtpe.2.2.15

Harrison, J. M., Fellingham, G. W., Buck, M. M., & Pellett, T. L. (1995). Effects of practice and command styles on rate of change in volleyball performance and self-efficacy of high-, medium-, and low-skilled learners. *Journal of Teaching in Physical Education, 14,* 328–339. https://doi.org/10.1123/jtpe.14.3.328

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

Jenkins, J., & Byra, M. (1997). An exploration of theoretical constructs associated with the Spectrum of Teaching Styles. In F. Carreiro da Costa (Ed.), *Research on teaching and research on teacher education: What do we know about the past and what kind of future do we expect?* (pp. 103–108). Lisbon, Portugal: AIESEP.

Keith, D. (1980). *Soccer handbook*. Vancouver, Canada: Hancock House.

Keppel, G., & Wickens, T. (2004). *Design and analysis: A researcher's handbook* (4th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Kulinna, P. H., & Cothran, D. J. (2003). Physical education teachers' self-reported use of and perceptions of various teaching styles. *Learning and Instruction, 13,* 597–609. https://doi.org/10.1016/S0959-4752(02)00044-0

Lee, A. M., & Poto, C. (1988). Instructional time research in physical education: Contributions and current issues. *Quest, 40,* 63–73. https://doi.org/10.1080/00336297.1988.10483888

Lydon, M. C., & Cheffers, J. T. F. (1984). Decision-making in elementary school-age children: Effects upon motor learning and self-concept development. *Research Quarterly for Exercise and Sport, 55,* 135–140. https://doi.org/10.1080/02701367.1984.10608389

Metlzer, M. (1989). A review of research on time in sport pedagogy. *Journal of Teaching in Physical Education, 8,* 87–103. https://doi.org/10.1123/jtpe.8.2.87

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

Rausch, J. R., Maxwell, S. E., & Kelley, K. (2003). Analytic methods for questions pertaining to a randomized pretest, posttest, follow-up design. *Journal of Clinical Child and Adolescent Psychology, 32,* 467–486. https://doi.org/10.1207/S15374424JCCP3203_15

Rink, J. (2006). *Teaching physical education for learning* (5th ed.). Boston, MA: McGraw-Hill.

Schulz, K. F., & Grimes, D. A. (2002a). Unequal group sizes in randomized trials: Guarding against guessing. *The Lancet*, *359*, 966–970. https://doi.org/10.1016/S0140-6736(02)08029-7

Schulz, K. F., & Grimes, D.A. (2002b). Blinding in randomized trials: Hiding who got what. *The Lancet, 359,* 696–700. https://doi.org/10.1016/S0140-6736(02)07816-9

Sherman, M. A. (1982). *Style analysis checklists for Mosston's Spectrum of Teaching Styles.* Unpublished manuscript, University of Pittsburgh, PA.

Siedentop, D., & Tannehill, D. (2002). *Developing teaching skills in physical education* (4th ed.). Palo Alto, CA: Mayfield.

Silverman, S. (1990). Linear and curvilinear relationships between student practice and achievement in physical education. *Teaching & Teacher Education, 6,* 305–314. https://doi.org/10.1016/0742-051X(90)90023-X

Silverman, S., Woods, A. M., & Subramaniam, P. R. (1998). Task structures, feedback to individual students, and student skill level in physical education. *Research Quarterly for Exercise and Sport, 69,* 420–424.

van der Mars, H. (1989). Systematic observation: An introduction. In P. W. Darst, D. B. Zakrajsek, & V. H. Mancini (Eds.), *Analyzing physical education and sport instruction* (pp. 3–17). Champaign, IL: Human Kinetics.

Zeng, H. Z., Leung, R. W., Liu, W., & Bian, W. (2009). Learning outcomes taught by three teaching styles in college fundamental volleyball classes. *Clinical Kinesiology, 63*(1), 1–6.