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METHODOLOGY

Relationships Among Tasks, Time, and Student Practice in Elementary Physical Education

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Abstract

The purpose of this study was to examine how teachers structure class in elementary physical education and the impact their decisions have on the amount of appropriate practice students receive. Participants for this study were 10 third grade physical education teachers and their students. Each teacher taught two successive skill-related lessons of their choice that were at least 30 min in length. Nine randomly selected students were identified in each class. Videotaped instruction was coded for teacher and class variables and the amount of individual student practice. Overall, teachers in this study were efficient managers of their time and their students. As a result, students in this study received high levels of appropriate practice. In addition, a positive relationship was found between the number of tasks and the amount of appropriate practice students received, and time spent in games and lead-up games was related to inappropriate practice. The data also indicated that teacher use of initiation was positively related to the amounts of appropriate and total trials. When teachers had large groups practice, students had more inappropriate trials than when individual or reciprocal strategies were employed.

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How students spend their time during physical education (PE) is largely dependent upon a teacher's lesson organization and management. Class management, although a broad and complex topic, has been identified as a critical component of effective teaching. Although research offers several definitions, class management can essentially be defined as "the actions taken by the teacher to establish order, engage students and elicit their cooperation" (Emmer & Stough, 2001, p. 103).

Classroom management refers to teaching decisions and behaviors that contribute to an orderly and effective learning environment. Although specific management definitions vary in description, the general consensus among researchers is that classroom management is necessary for both effective instruction and learning to occur (Cothran & Kulinna, 2007; Cothran, Kulinna, & Garrahy, 2003; Garrahy, Cothran, & Kulinna, 2005). Research suggests that good managers provide more learning opportunities and, as a result, have students who learn more (Brophy & Good, 1986). Becoming an effective manager is essential in PE because time spent managing behavior or in nonpurposeful activities is time taken away from content. This certainly will impact what and how much students are learning in PE class. Teachers who are effective managers (a) use their time effectively, (b) implement a series of routines at the beginning of the year to prevent anticipated problems, (c) clearly communicate the rules of participation, and (d) demonstrate high levels of student performance (Brophy & Good, 1986; Evertson & Harris, 1992; Rink & Hall, 2008). Presumably, as a result of this structure, effective teachers are able to maximize learning opportunities, student engaged time, and achievement while eliminating behavior problems.

Time is a critical element that should be considered when choosing content and designing lessons in PE. Instructional theory suggests that how time is used frames all other decisions and influences what occurs in learning environments (Rink, 2003; Van der Mars, 2006). Time in PE influences instruction, practice, and student learning and achievement (Hastie, 1994; Lacy, LaMaster, & Tommaney, 1996; LaMaster & Lacy, 1993; Silverman, 1985a; Silverman, Tyson, & Morford, 1988). In addition, how this time is used has been shown to influence student practice, and appropriate student practice (i.e., practice that is neither too hard nor too easy for individual students) is strongly correlated with student motor skill learning (Ashy, Lee, & Landin, 1988; Buck, Harrison, & Bryce,

1990; Silverman, 1985b, 1990). As a result, appropriate practice can serve as a proxy for student achievement (Silverman, Devillier, & Ramirez, 1991).

The way in which a teacher organizes practice situations may be the most important variable influencing appropriate practice opportunities in PE (French et al., 1991; Hastie, Calderon, Palao, & Ortega, 2011; Rink, 2003; Rink, French, Werner, Lynn, & Mays, 1991; Silverman, Kulinna, & Crull, 1995). Task structures can be informally defined as the way in which teachers organize their classes by assigning tasks and how they have students practice. Although there has been research on task structures, both independently and in combination with other variables such as time and skill level in PE, much of the focus has been at the secondary level where more formal systems are often instituted and more easily observed (Tousignant & Siedentop, 1983). The results from research in secondary PE indicate that a relationship exists between the way teachers structure tasks in PE and how that influences student learning (Silverman et al., 1995), but there is little research in elementary schools to indicate whether similar relationships carry over to younger children in elementary school PE. The decisions teachers make that ultimately influence practice time and individual student practice in PE can provide other teachers with valuable knowledge and insight. For effective teaching to occur, teachers must first develop some level of competency in managing their students and their environments.

A better understanding of elementary PE task structure and organization is necessary if teachers are to become more efficient managers of their students and more effective teachers. Although educators and students are equal partners in the learning process, considerable insight may be gained through observing teachers' specific managerial and instructional behaviors, all of which have the potential to waste valuable practice time in PE. As a result, the purpose of this investigation was to examine teachers' instructional decisions in elementary PE and the impact their resultant behaviors have on the amount of appropriate practice students receive.

Method

Participants and Settings

Participants in this study were third grade PE teachers (n = 10) and their students. The teachers, three males and seven females, were recruited from school districts in the state of Connecticut. All

participants taught in suburban schools with curricula that focused on meaningful skill development such as soccer and football skills (e.g., kicking and throwing). All participants in this study were supplied with adequate equipment and resources for their PE programs. In other words, all participants had enough equipment available to them for each student to work individually on their skills if and when necessary. The PE teaching experience of these participants ranged from 2 to 30 years. Institutional Review Board approval was obtained along with appropriate school district procedures to inform principals, teachers, and students of their responsibilities. In addition, all schools and participants provided written consent for their participation.

Instruction

Each teacher taught two indoor lessons in which motor and/or movement skill was the focus of instruction. The content of the instructional activity was left to the discretion of the teacher, resulting in a variety of activities (e.g., football, scooters, soccer, parachute). To observe practice, nine students were randomly selected from each class for coding. The same students were coded in both classes.

Each class was videotaped for later data collection. Videotaping took place at the beginning of the academic school year (September–October), and two lessons per teacher were videotaped. Each class was approximately 30 min in length. Instruction was videotaped with a two-camera split-screen setup so that the entire area of the gymnasium was recorded for subsequent coding. Teachers wore portable microphones, and the audio signal was recorded simultaneously with the video signal. Additionally, to record elapsed time, an electronic stopwatch that superimposed its image on the videotape was used. Taping began when the students and/or the teacher first entered the gym and stopped after they disappeared through the gym doors at the end of class. During instruction, the students wore numbered and colored pinafores for identification purposes during the coding process. Students wore the same colored and numbered pinafore during both class sessions.

Instrumentation

Using a coding instrument designed by Silverman, Subramaniam, and Woods (1998) as a guide, we developed duration and event recording instruments for both teacher and student behaviors. Three levels of data were collected: (a) teacher behaviors related

to management and instruction, (b) task structure and presentation, and (c) student practice. The coding instrument for teacher behavior encompassed several possible behaviors in which teachers engage during daily elementary PE class. The instrument was developed to reflect five distinct categories of teaching: (a) noninstructional behaviors, (b) instructional behaviors, (c) discipline-related behaviors, (d) noninteractive behaviors, and (e) organizational operations. Each category was designed to elicit specific information about what teachers are doing during elementary PE class (see Table 1 for categories and subcategories). The coding instrument for task and student practice was designed to observe and collect data on task presentation (e.g., start and stop times, total presentation time), task organization (e.g., individual, reciprocal, paired group, small group, large group, lead-up game, scrimmage game), and total task time. In addition, the number of appropriate (successful) and inappropriate (unsuccessful) trials were coded for each of the nine randomly selected students in each class based on specific criteria the teacher gave. Practice trials were coded for each task so that subsequent analyses could tie those trials to specific tasks.

To ensure reliable and valid coding of data, two of the authors took the following steps before data collection: (a) viewing videotapes and discussing categories, (b) coding simultaneously followed by discussion, (c) independent coding of videotapes for comparison, and (d) separate coding with interobserver agreement checks. For each part of the instrument, definitions and examples were used to guide the coding process. Training for the coding process occurred prior to data collection and took approximately 150 hr to complete. During this time, a decision log was maintained so that coders were consistent. Interobserver agreement checks were done upon completion of each videotape and continued until interobserver agreement levels reached .90 or above for three consecutive classes and for all categories. Once obtained, data collection began.

Coding Procedures

Two of the authors, who were trained coders, viewed and coded randomly selected videotapes. One coder coded all 20 videotapes, and the other coder served as a reliability coder. Coders observed and recorded the type of behavior in which the teacher engaged and recorded the start and stop time of each behavior.

Table 1

Teacher Behavior Coding Categories

Instructional	**Noninstructional**

• *Explanation*
  • Initiation
  • New
  • Review
  • Reteach
 	
• *Demonstration*
  • New
  • Review
  • Reteach (DRT)
  • Other (DO)
 	
• *Combined Explanation and Demonstration*
  • New (CN)
  • Review (CR)
  • Reteach (CRT)
 	
• *Monitoring*
  • Monitor Active (MA)
  • Monitor Passive (MP)
  • Other (MO)
 	
• *Closure (C)*
	• *Greet Upon Entry (G)*
	• *Waiting in Office (WO)*
	• *Waiting in Gym (WG)*
	
	• *Discipline*
	  • Individual (DI)
	  • Small Group (DSG)
	  • Whole Group (DWG)
	
	• *Noninteractive*
	  • Equipment Setup (ES)
	  • Equipment Breakdown (EB)
	
	• *Organizational Operations*
	  • Active Wait (AW)
	  • Passive Wait (PW)
	  • Student Grouping Strategies (SG)
	  • Team Selection (TS)
	  • Equipment Distribution (ED)
	  • Transitions (T)
	
	• *Cleanup Routines*
	  • Students Clean up (SC)
	  • Teacher Cleans up (TC)

The coders also observed each task presentation and recorded when the presentation began. The coders focused on the instructions students received on the task and how they were to complete it. The coders then recorded the time when the presentation ended and the task began. Finally, the coders coded when the task ended. Coders were free to rewind the tape and reexamine any part of the task before recording the data.

Nine randomly selected students in each of the 10 classes were coded for the number of practice trials each student executed. All students were identified by the pinafores they wore during class. Practice trials were coded as appropriate trials (successful) or inappropriate trials (unsuccessful) based on the difficulty the student had in completing the trial and on the criteria the teacher gave. The coder then watched each task again, following one student at a

time, and repeated this procedure until all nine students were coded within each task. The coders were allowed to rewind and review the videotape as needed to collect the data.

Throughout data collection, eight out of 20 classes were observed for interobserver agreement to ensure soundness of the data collection process. Reliability checks were conducted at the initiation of data collection, throughout the study, and at the conclusion of the data collection for all parts of the coding instrument (i.e., teacher behavior, presentation time, task time, and practice trials). Intraclass correlation coefficients were calculated and results were compared and analyzed with ranges in reliability coefficients as follows: (a) teacher behavior = .978–.999, (b) presentation time = .960–.999, (c) task time = .987–.999, and (d) practice trials = .976–.999.

Data Analysis

Data for teacher behavior, task organization, practice time, and student practice trials were initially entered onto Excel spreadsheets by category and were summed across and within each class session for each class. Data were adjusted for time within each task.

Descriptive data analysis was conducted for both student and teacher behavior both within classes and within specific tasks. Pearson product-moment correlation coefficients were calculated between practice variables and task and teacher behavior variables. A multivariate analysis of variance (MANOVA) was used to examine the task organizations teachers used as the independent variable with appropriate and inappropriate trials per minute as the dependent variables. A significant MANOVA was followed by a stepwise discriminant function analysis, analysis of variance (ANOVA), and the Tukey follow-up test to determine for which levels of the independent variable and for which dependent variable differences existed (Stevens, 2009). Two ANOVAs were conducted to determine task organization differences for total trials per minute and percentage of appropriate trials. In the instance where the ANOVA was significant, the Tukey follow-up test was used to determine where the difference occurred.

Results

Descriptive Data

To identify what teachers are doing during PE classes, an intricate number of behaviors were observed, recorded, and categorized as follows: (a) noninstructional behaviors, (b) instructional behaviors, (c) discipline-related behaviors, (d) noninteractive behaviors, and (e) organizational operations. To prevent compromising the reliability of the data, two lessons from each teacher were videotaped and coded to capture a more realistic view of the individual teachers' approach. Overall, the descriptive statistics in this study related to these behaviors suggest that teachers are fairly efficient managers of both their time and their students in elementary PE classes.

Teachers spent the most time in active monitoring (M = 1318.0 s, SD = 448.2) behaviors, followed by new explanations (M = 529.2 s, SD = 221.2) and combined explanations and demonstrations (M = 467.6 s, SD = 341.4). Additionally, teachers spent nearly 4.5 min across the two classes (M = 269.7 s, SD = 90.4) in transition between activities and little time (M = 23.2 s, SD = 28.9) disciplining individual students. These data also revealed that teachers spent minimal time in passive monitoring behaviors across subjects with an overall mean of 112.80 s (SD = 181.04). In addition, teachers spent an average of 216.10 s (SD = 177.05) of class time in closure activities, reviewing the day's events and objectives. The range of time spent in this behavior ranged from 36 to 627 s. Descriptive statistics on teacher management and instructional behaviors are presented in Table 2.

After summing across class sessions and using the task as the unit of analysis, we found that the mean number of tasks across classes was 10.1 (SD = 5.30), varying from five to 18 tasks across the two class sessions. Within that number of tasks, the number of appropriate trials per minute ranged from 2.20 (SD = 1.56) to 10.76 (SD = 7.25). Total trials per minute were 2.66 (SD = 1.58) to 12.97 (SD = 6.92), respectively.

To identify whether the amount of time students spend in practice influences the amount and type of practice trials they receive, we coded both total task time and practice trials across subjects. Analysis of the task time data revealed that teachers spent a total of 1,387 to 2,050 s in practice situations. On average, 1,682 s (SD = 232.38), or nearly 28 min, of total class time was used for practice over a two-class period.

Table 2

Means for Time Spent in Specific Teaching Behaviors Across Teachers

Behavior	*M*	*SD*
Initiation	48.20	41.28
Explanation New	529.20	221.22
Explanation Review	102.30	157.10
Explanation Reteach	36.80	55.97
Explanation Other	89.10	73.69
Combination New	467.60	341.43
Combination Review	24.70	35.95
Combination Reteach	2.90	9.17
Monitor Active	1318.00	448.17
Monitor Passive	112.80	181.04
Monitor Other	27.80	55.39
Greeting	61.10	31.42
Waiting Gym	0.90	2.85
Discipline Individual	23.30	28.80
Discipline Small Group	0.40	1.26
Discipline Whole Group	7.20	18.38
Equipment Setup	30.20	39.34
Equipment Breakdown	1.10	3.48
Active Wait	15.70	17.41
Student Grouping	94.00	73.39
Team Selection	12.20	32.17
Equipment Distribution	85.00	84.19
Transition	269.70	90.40
Dismissal	128.10	58.91
Students Clean up	81.60	71.06
Closure	216.10	177.05
Equipment Closet	6.50	11.34

Note. $N = 10$ teachers. All times are recorded in seconds.

Among other results, the task organization data showed that reciprocal practice produced the greatest number of appropriate practice across subjects (M = 14.04/task, SD = 11.70). In addition, the mean time spent in small group practice was 190.15 s (SD = 62.79) with a relatively small number of appropriate trials (M = 5.51/task, SD =1.90) and with a fairly high number of inappropriate trials (M = 2.87, SD = 2.11) considering the small number of total trials (see Table 3).

Relationships Between Teaching and Time Variables and Student Practice

Analysis of the teacher behavior and student practice data resulted in only one significant finding. A positive relationship was found between the initiation (introduction) component of the lesson and the amount of appropriate practice, $r(8) = .80$, $p < .05$, and total practice trials, $r(8) = .74$, $p < .05$, students received.

Analysis of the task data resulted in a number of significant findings. After summing across class sessions, we determined relationships by using the task as the unit of analysis. Results indicated that strong relationships existed between the number of tasks and both the amount of appropriate practice, $r(8) = .83$, $p < .003$, and total trials, $r(8) = .80$, $p < .01$, in which students engaged during the lesson. In addition, a positive relationship, $r(8) = .69$, $p < .03$, existed between the number of tasks and the total number of trials. A positive relationship was found between the time spent in lead-up games and the number of inappropriate trials, $r(3) = .90$, $p < .04$, indicating the more time spent in lead-up games led to a greater amount of inappropriate trials. A strong positive relationship was also found between the time spent in group practice and the number of inappropriate trials, $r(6) = .95$, $p < .0003$, indicating that group practice was associated with greater amounts of inappropriate practice as well. When adjusted for time, a significant negative relationship was found between the number of appropriate trials per minute and the time spent in large group, $r(25) = -.46$, $p < .02$, and small group, $r(25) = -.70$, $p < .01$, activities.

Table 3

Means for Trials Variables and Task Organization

Task Organization	*N*[a]	Appropriate Trials	*SD*	Inappropriate Trials	*SD*	Total Trials	*SD*
Group (G)	8	7.31	5.00	1.62	1.21	8.92	4.76
Game (GA)	2	9.78	3.30	2.06	0.24	11.83	3.54
Individual (I)	26	7.08	5.13	1.98	2.06	9.06	5.50
Large Group (LG)	27	7.91	7.65	0.85	1.90	8.76	7.32
Lead-Up Game (LU)	5	6.49	4.34	3.33	3.06	9.82	7.08
Reciprocal (RE)	21	14.04	11.70	4.69	3.45	18.78	12.90
Scrimmage (S)	1	14.00	–	6.44	–	20.44[b]	–
Small Group (SG)	13	5.51	1.89	2.87	2.11	8.38	2.92

[a]The number of instances these types of practice occurred across subjects. [b]Only one teacher chose to use a scrimmage (S) practice situation during this study. Consequentially, an average score was not calculated, resulting in a higher than normal total trials score.

Differences in Practice Trial Variables for Task Organization

A significant difference, Wilks' Lamda = .693, $F(14, 188) = 2.70$, $p < 0.002$, for the number of appropriate and inappropriate trials was found among task organizations. The stepwise discriminant function analysis indicated that the mean inappropriate trials per minute was responsible for the difference among groups, Wilks' Lamda = .796, $F(7, 95) = 3.48$, $p < 0.003$. The ANOVA and Tukey test follow-up ($p < .05$) indicated that large groups resulted in more inappropriate trials per minute than did individual or reciprocal practice organizations. The separate ANOVA for differences in the mean number of total trials per minute was significant, $F(7, 95) = 2.40$, $p < .03$. The Tukey follow-up test indicated one significant difference between individual and small group organizations with individual tasks resulting in greater total trials. The ANOVA for differences among task structures for the mean percentage of appropriate trials was not significant.

Discussion

The purpose of this study was to analyze teachers' functional management decisions and their relationships with student practice. This investigation examined teaching from multiple perspectives. The results show a number of findings that suggest that, in general, teachers in this study have clear standards of behavior and functional routines that serve to maximize time and practice opportunities, which logically result in greater student achievement (Silverman, 2005). In addition, the teachers in this study spent little time disciplining students and, overall, had minimal amounts of transition time across classes. One possible explanation for such small amounts of time spent in these categories is the precise nature of the teachers' organizational planning. Teachers who are well prepared both logistically and environmentally appear to have minimal disciplinary issues during their classes, resulting in more overall practice and practice opportunities. In other words, teachers who spent time planning for equipment setup and breakdown, transitions, groupings, and instructional time had fewer incidents of behavioral issues in their classes, leaving more time for practice opportunities and learning to occur.

The task time data indicated that teachers spent a sizeable amount of time presenting content and the tasks to practice it. The data showed that teachers were spending as much as 23 min in task presentation over two class periods, suggesting that these teachers

may need to plan their instructional strategies more explicitly to allow for more overall practice time. These findings are similar to those found by others (Lacy et al., 1996; LaMaster & Lacy, 1993; McKenzie, Marshall, Sallis, & Conway, 2000) in PE that suggests students as a whole spend up to one third of all class time in nonfunctional behaviors such as waiting, listening, and transitioning. The time spent in task presentation may vary depending on the complexity of the task. With proper planning, however, teachers can design instructional sets in ways that will better balance the amount of wait time students are experiencing during instruction.

How teachers assign tasks and organize practice situations influences the amounts and types of practice students receive in elementary PE. Findings related to task structures revealed a trend whereby students in reciprocal practice yielded higher amounts of appropriate practice versus those participating in small groups, lead-up games, and game situations. This suggests, as at the secondary level (Silverman, 2011; Silverman et al., 1995), that activities designed to allow for more individualized practice and greater practice opportunities result in overall higher achievement levels. In addition, how teachers plan for and implement student practice opportunities is critical in achieving high amounts of appropriate practice in PE classes.

Teachers make numerous instructional decisions that influence how students spend their time during PE classes. Analysis of the data indicated that there were no significant relationships between teachers' instructional or organizational behaviors and overall student practice with the exception of the initiation (introduction) component of the lesson. This behavior was positively and significantly correlated with appropriate and total practice trials across subjects. This finding suggests that although task presentations, explanations, and demonstrations are still valuable and necessary components to a productive lesson, it seems the introduction to the lesson frames subsequent instruction and helps students prepare to achieve success. As a result, less time should be spent on lengthy instructional sets and more time spent in practice situations.

The way in which teachers organize practice is an important variable influencing appropriate practice opportunities in middle and high school PE (French et al., 1991; Hastie et al., 2011; Rink et al., 1991; Silverman et al., 1995). Overall, elementary PE teachers in this study whose students participated in lead-up games used large amounts of practice time and yielded minimal amounts of

overall practice trials. In fact, engaging students in both group and lead-up game practice situations covaried with the amounts of inappropriate practice students received. This suggests that lead-up games, in general, at the elementary level may not be the most appropriate choice for skill development because they do not allow for individualized practice and often minimal practice trials are executed. This further suggests that large group activities may not always adjust instruction for the modifications necessary to meet individual student needs and may influence how focused a student is when participating in the assigned task.

Additional findings in this study suggest teachers who offer a greater number of, and a larger variety of, tasks have more total practice trials and more overall appropriate practice in their lessons. The number of tasks among teachers ranged from five to 18 across two classes. Although task structure influenced the amount and types of practice students received, it seems that offering multiple tasks throughout the lesson may have encouraged more on-task behavior and ultimately, more student practice. These findings also suggest that teachers who are constantly and consistently adjusting tasks are keeping them more appropriate and that teachers who maintain longer tasks are less likely to promote practice opportunities. Research in classrooms has found similar results that suggest that effective managers provide more learning opportunities and as a result, have students who learn more (Brophy & Good, 1986). The results of this study found a significant relationship between the number of tasks and the total amount of appropriate practice students received. In addition, a significant relationship was found between the number of tasks and the total number of trials students received. These results seem to confirm other research in secondary PE (Rink et al., 1991; Silverman et al., 1998) that suggests multiple tasks or variety in task selection, particularly for lower skilled students, may be the key to achieving more appropriate practice in PE.

Overall, there were differences found for the type of task used and the number of inappropriate practice trials per minute students received. Large group activities resulted in more inappropriate trials per minute than did individual or reciprocal practice. As a result, students received more inappropriate trials per minute during these types of practice situations. Given previous research (Hastie et al., 2011; Rink, 2003; Rink et al., 1991; Silverman, 1993, 2005; Silverman et al., 1998) in secondary schools, it makes sense that when all students are doing the same task, those who are less skilled

will have more inappropriate trials. This, taken with the result that individual practice results in a greater number of total trials, further suggests that when elementary PE teachers have the opportunity to individualize, students will practice at a level more in line with their skill level.

Management and class structure in PE are challenging and complex issues. Understanding the importance of organizational planning, time management, and task design is critical for effective teaching and student learning to occur in PE classes. When teachers provide students with quality instruction, a variety of tasks, individualized practice, and task modifications, students achieve more. These factors, combined with teachers who are actively involved in the learning process, result in more valuable learning opportunities so students develop skill and may be more inclined to use that skill to be physically active.

The findings in this study may benefit undergraduate teacher preparation programs for a number of reasons. Initially, these findings may help teachers more clearly define what "management" in PE means, helping teacher candidates to understand the importance and necessity of instructional and organizational planning. These findings may also help to provide insight on steps that teachers can take to become effective managers (i.e., rules, routines, behavioral expectations, task structures, and time management). Future research focusing on students' attitude toward teachers' management strategies and routines and how they affect the amounts of time students spend practicing may also be of interest and beneficial to preservice teachers.

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