

PEDAGOGY

Effect of the Sport Education Tactical Model on Coeducational and Single Gender Game Performance

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Abstract

Physical education teachers are faced with a decision when teaching physical activities in schools. What type of instructional model should be used, and should classes be coeducational or single gender? The current study had two purposes. The first purpose investigated the effectiveness of the sport education tactical model (SETM) during game play in middle school physical education. The second purpose investigated game performance of male and female students in coeducational and single gender physical education classes. The SETM combined the characteristics of the sport education model and the tactical games model (Pritchard & McCollum, 2009). Two sixth grade periods and two seventh grade periods were selected to be either coeducational or single gender during a basketball season. Pre- and posttests consisted of 15-min, three-versus-three basketball games that were videotaped. Participants participated in an 18-day basketball unit using the SETM. Game performance

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was measured using the game performance assessment instrument (Oslin, Mitchell, & Griffin, 1998). Results revealed a significant difference in game performance for time (i.e., pretest to posttest scores) using the SETM. Results also revealed that females in a single gender class had significantly more game involvement than females in a coeducational class. Researchers concluded that game performance for males and females in a coeducational physical education class was the same for males and females in a single gender class using the SETM.

The National Association for Sport and Physical Education (NASPE, 2003) stated a high-quality physical education (PE) program includes the following components: (a) opportunity to learn, (b) meaningful content, and (c) appropriate instruction. To produce a quality PE program, teachers must choose content, determine the length of the unit, determine the appropriate mode for instruction, and decide whether the learning environment should be coeducational or single gender. Teachers must decide on the instructional model to use in their PE classes. Instructional models are used to plan and design instructional materials, as well as to guide instruction in the classroom (Joyce, Weil, & Calhoun, 2004). When deciding on an appropriate instructional model, teachers have many to choose from based on the objectives of the PE unit. Metzler (2011) identified eight instructional models teachers can choose to implement their curriculum. Two of these eight instructional models used in secondary PE are the tactical games model (TGM; Mitchell, Oslin, & Griffin, 2006) and the sport education model (SEM; Siedentop, Hastie, & van der Mars, 2011). Research investigating these two instructional models has revealed benefits in using the TGM and SEM.

The TGM research found teachers preferred the model and students were motivated when participating in the TGM (Berkowitz, 1996; Burrows, 1986; Griffin, Oslin, & Mitchell, 1995; Mitchell, Griffin, & Oslin, 1994). Turner (1996) researched the TGM, comparing it to a skills-technique approach in seventh grade field hockey unit. The TGM participants improved significantly in skill development, declarative knowledge, and game performance compared to the skills-technique approach (Turner, 1996). French, Werner, Taylor, Hussey, and Jones (1996) revealed a significant improvement in skills and game play for ninth grade participants in a 6-week study for the sport of badminton. Turner and Martinek

(1999) found a significant improvement in game play execution of field hockey skills and procedural knowledge for the skill-technique group and the TGM group. Other researchers reported a positive transfer of learning from one sport category to another (Martin, 2004; Mitchell & Oslin, 1999).

When investigating the SEM, researchers found that environment reinforced specific interpersonal behavior (Hastie, 1998a), increased positive interactions, and decreased negative interactions of students (Hastie & Sharpe, 1999) and that lower skilled students had more opportunities to learn (Hastie, 1998b, 1998c). Minimal off-task behaviors by students were reported (Hastie, 1996), along with opportunities for developing moderate to vigorous physical activity (Hastie & Trost, 2002). Hastie, Sluder, Buchanan, and Wadsworth (2009) found an improvement in cardiovascular fitness in fifth grade students during an obstacle course fitness season. There are reports of improvement in game performance for high school students (Ormond, Christie, Barbieri, & Schell, 2002; Pritchard, Hawkins, Wiegand, & Metzler, 2008) and middle school students (Hastie, 1998c; Hastie, Sinelnikov, & Guarino, 2009). Hastie, Sinelnikov, and Guarino (2009) found significant improvements in badminton game performance and tactical awareness for eighth grade Russian students. The students improved in badminton shot selection and badminton shot execution following an 18-lesson badminton season. Pritchard et al. (2008) found similar results of significant improvement in game performance for high school students in a 20-lesson volleyball season. Students in the SEM improved in decisions made and skill execution performed and adjusted to the volleyball compared to a traditional model of instruction (Pritchard et al., 2008).

With the increasing support of the two models, Mitchell, Oslin, and Griffin (2006) suggested using the components of the SEM within the TGM to “provide an effective framework through which a tactical games model can be implemented” (p. 487). Hastie and Curtner-Smith (2006) researched a combination of the SEM and TGM during a season of batting and fielding games with 29 sixth grade students in Australia. The researchers found students thoroughly enjoyed the unit and increased their tactical ability, and the researchers believed the combination of the two models made the PE unit stronger (Hastie & Curtner-Smith, 2006). Based on the results of Hastie and Curtner-Smith, along with previous research conducted on SEM and TGM, Pritchard and McCollum (2009)

suggested combining the SEM and TGM models to form the sport education tactical model (SETM). Pritchard and McCollum (2009) stated the goals of the SETM are for students to become competent, literate, and enthusiastic sportsperson toward the activity being taught including the characteristics of SEM (i.e., seasons, affiliation, culminating event, record keeping, formal competition, and festivity) and the characteristics of TGM (i.e., game form, tactical awareness, and skill execution). Teaching students to be able to play a sport or participate competently in an activity should be a goal of any PE program. PE teachers need to provide an environment that allows both genders to learn to play the game being taught. Rink, French, and Tjeerdsma (1996) stated that if students are competent in sport and games, they are thought to be more likely to engage in physical activity throughout their lives. Students can become bored with traditional PE, especially those who cannot play the sport or game effectively (Himberg, Hutchinson, & Roussell, 2003; Siedentop & Tannehill, 2000). To encourage game performance, teachers must choose an instructional model that instructs students to play a sport and provide an environment that gives students ample opportunities to learn.

To provide an environment of effective student learning, teachers must decide whether the PE class should be coeducational or single gender. Research dealing with coeducational and single gender PE reported females have negative experiences due to a lack of enjoyment, lack of opportunity, poor self-image, and lack of athletic competence (Olafson, 2002; Osborne, Bauer, & Sutliff, 2002; Taylor et al., 1999). Lirgg (1993) found females perceive their physical abilities as lower than male students, and Trinh, Rhodes, and Ryan (2008) indicated that females believe physical activity is embarrassing. Although females believe physical activity is embarrassing, research has shown that middle school females are more active in coeducational than single gender PE (McKenzie, Prochaska, Sallis, & LaMaster, 2004) and can be just as active as males in coeducational PE (Hannon & Ratliffe, 2005). Hannon and Ratliffe (2005) investigated physical activity levels in coeducational and single gender PE classes at a high school setting. Results of the study revealed no significant differences in activity levels between females in coeducational and single gender PE classes.

When Title IX was passed in 1972, the guidelines for PE changed; all classes must be the same for females and males, and all classes must be coeducational with some exceptions. The exceptions

included sex education and contact sports, which were optional, not mandatory (Kirk, 2003). Before Title IX, it was common for teachers to give males preferential treatment with regard to facilities and equipment; females used secondhand equipment and teachers scheduled facility use around male's schedules (Durrant, 1992). According to Griffin (1984), some teachers felt males were forced to hold back because of females, which may hinder long-term growth and development. Griffin (1985) indicated that teachers complained males play too rough for females and that females are reluctant to participate in a game. Osborne et al. (2002) interviewed 12 seventh and eighth grade students (six males, six females) who participated in both coeducational and single gender PE classes. The females stated a feeling of having no cooperation by the males, and the males felt the females did not provide enough effort. The students believed single gender classes would be more beneficial (Osborne et al., 2002). The results of Osborne et al. are supported by Derry and Phillips (2004) and Hannon and Ratliffe (2007). Derry and Phillips found seventh, eighth, and ninth grade females in single gender PE had significantly higher skill learning time and more initiated reactions with their teachers than females in coeducational classes. Hannon and Ratliffe (2007) studied the opportunities to participate for high school males and females in coeducational and single gender PE classes. They found females had significantly more touches per lesson during flag football, ultimate Frisbee, and soccer in single gender PE compared to females in coeducational PE. Although Hannon and Ratliffe (2007) stated females had more opportunities to respond, they did not provide a specific instructional model or instructional strategies used in the PE classes. The 90-min classes had 30 min of game play with 10 min of data collection during game play.

A study by Hastie (1998b) found females enjoyed PE when involved in the SEM. Hastie (1998b) reported that females had the same opportunities to respond as the boys during the preseason of a floor hockey unit in a coeducational PE environment. Males dominated during the competition phase of the unit, but females had significantly more responses and higher success levels than earlier in the floor hockey season. Although the males dominated later in the floor hockey unit, the females stated they had fun during the unit. Hastie (1998b) stated, "Fun came from improvement and being part of a team and feeling important as part of that team" (p. 168). Hastie, Sinvelnikov, and Guarino (2009) found similar results with middle

school boys having higher decision making for game performance scores and higher scores on a wall volley test compared to girls in badminton. The boys made better decisions on where to hit the shuttle than girls, but the skill execution of game performance was not significant. The higher decision making of boys is why they had higher game performance scores than girls, but Hastie, Sluder, et al. (2009) measured neither the adjust category of the badminton game performance assessment instrument (GPAI; Oslin et al., 1998) nor the game involvement.

To have a quality PE program, teachers must decide how to change female beliefs so that all students enjoy PE and learn to engage in physical activity. One way is to ensure students are competent in playing the game being taught in PE. If children are competent in game and sport, then they are more likely to be active throughout their life (Rink, French, & Tjeerdsma, 1996). Courturier, Chepko, and Coughling (2007) stated that educators need to be sensitive and consider the different needs of females and males when planning and implementing curriculum if they want to promote physical activity for a lifetime. By choosing an appropriate instructional model, PE teachers may influence both genders in PE whether the environment is coeducational or single gender. One specific instructional model that may impact adolescent students is the SETM, which leads to the two purposes of the current study. The first purpose was to investigate the effectiveness of the sport education tactical model (SETM) on game performance in middle school PE. The second purpose was to investigate game performance of male and female students in coeducational and single gender PE environments.

Method

Participants and Setting

The investigation was administered in a middle school located in the southeastern United States and consisted of two sixth and two seventh grade level PE periods that included two classes in each period. The periods were randomly assigned to coeducational or single gender PE with one sixth grade period (i.e., two classes) and one seventh grade period (i.e., two classes) being coeducational. The other sixth grade period (i.e., two classes) and seventh grade period (i.e., two classes) were single gender with males being taught on half of the gym and the females being taught on the other half of the gym. During the sixth grade coeducational period, one class of 19

students (10 males, nine females) was taught by one teacher on half of the gymnasium with three basketball goals and the second class of 18 students (nine males, nine females) was taught by another teacher on the other half of the gymnasium with three basketball goals. During the sixth grade single gender period, one class of 20 male students was taught by the male teacher and the other class of 20 female students was taught by the female teacher. In the seventh grade coeducational period, one class of 22 students (14 males, eight females) was taught by the male teacher and the other class of 21 students (13 males, eight females) was taught by the female teacher. In the seventh grade single gender period, one class of 24 male students was taught by the male teacher and the second class of 20 females was taught by the female teacher. There was no barrier in between the gym, so participants could see the other class during instruction. The students who did not provide informed consent remained part of the basketball season due to this being their PE class, but were not tested for game performance. Participants who provided consent forms and completed the study by being present for pre- and posttesting consisted of 22 males and 17 females in a coeducational PE class setting. Single gender PE classes had 26 males and 25 females. The basketball season consisted of 18 lessons lasting 50 min each using the SETM instructional model (see Table 1). The University Institutional Review Board for the Protection of Human Subjects approved the investigation before data collection began. Participants provided informed consent prior to data collection.

Table 1

Sport Education Tactical Model Basketball Season

Lesson	Instructional Focus
1	Team Affiliations/Scoring System/Daily Roles
2	Attacking the Basket (Dribbling)
3	Using space in the attack (Dribbling With Defense)
4	Maintaining possession of the ball (Passing/Rules/Officiating)
5	Maintaining possession of the ball (Passing Against Defense)
6	Attacking the basket (Shooting)/Statistics
7	Creating space to attack (Shooting against defense)
8	Defending space and using space to attack (Offensive/Defensive Strategies)
9	Defending space and using space to attack (Offensive/Defensive Strategies)
10	Regular season/Reinforce tactics/Officiating
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Table 1 (cont.)

Lesson	Instructional Focus
11	Regular season/Reinforce tactics/Officiating
12	Regular season/Reinforce tactics/Officiating
13	Regular season/Reinforce tactics/Officiating
14	Regular season/Reinforce tactics/Officiating
15	Regular season/Reinforce tactics/Officiating
16	Tournament
17	Tournament
18	Championship/Awards Ceremony

Instrumentation

The GPAI (Oslin et al., 1998) was developed to measure “game performance behaviors that demonstrate tactical understanding, as well as the player’s ability to solve problems by selecting and applying appropriate skill” (p. 231). To characterize game performance in invasion games, it was necessary to identify observable components including (1) decisions made, (2) skill execution, and (3) support.

The decisions made category consisted of two behaviors: passing the ball to an open teammate and deciding to shoot when appropriate. For example, a participant received a tally for appropriate decision by passing the ball to an open teammate or deciding to shoot when he or she was open. An inappropriate decision was tallied when a participant passed the basketball to a teammate that was not open or decided to shoot when the participant was guarded closely or too far from the basket. The skill execution category comprised the basketball pass, shot, and reception. Researchers coded *appropriate* when the participant’s pass made it to their teammates, when the participant made a shot, or when the participant received the basketball from a teammate. An inappropriate skill execution also included the participant not making the correct pass, missing a shot, or being unable to receive a good pass. The support category was defined as the player appearing to attempt to support the ball carrier by being in or moving to an appropriate position to receive a pass. It was inappropriate when the participant did not attempt to move to an open space to receive a pass.

To calculate each game performance category, scores were computed by dividing the number of appropriate codes by the total number of codes within each category then multiplied by 100,

resulting in percentage scores for decisions made, skill execution, and support as recommended by Mitchell et al. (2006). The average of these three scores served as an overall game performance score for each participant. Participants in the study plausibly varied by level of active engagement, and thus game involvement was calculated as the sum of decisions made (i.e., appropriate and inappropriate), skill executions (i.e., appropriate and inappropriate), and appropriate support.

Teachers' and Data Collectors' Training

Two student teachers (i.e., male and female) who were trained to use the SETM were chosen to teach the basketball season. The student teachers were selected based on their current training and teaching ability based on previous experiences using the SETM. Training entailed two semesters of courses that included a 5-week field experience requiring the teachers to use the SETM at a middle school setting. This field experience was implemented the semester before the current research. The male teacher taught two coeducational PE classes of one sixth grade and one seventh grade. The male teacher taught two single gender PE classes of one sixth grade and one seventh grade that consisted of only males. The female teacher taught two coeducational PE classes of one sixth grade and one seventh grade. The female teacher taught two single gender PE classes of one sixth grade and one seventh grade that consisted of only females.

To ensure the SETM was implemented, researchers followed the teacher and student benchmarks of the SEM and TGM described by Metzler (2011) because the SETM combined the characteristics of both models (Pritchard & McCollum, 2009). Planning of the basketball SETM season was conducted by two researchers, and they went over the materials (e.g., season plan, lesson plans, coaching plans) with the teachers before season implementation. All lessons were videotaped and analyzed by the researchers to ensure the characteristics of the SETM were followed. Teachers used the same lessons in both environments (i.e., coeducational and single gender).

Training to use the GPAI entailed the primary researcher and a second researcher to observe a previously taped game of students playing a 15-min game of basketball. Game performance was scored using the GPAI by the primary investigator and a second researcher

for each participant. Interobserver agreement was achieved at least by 80% for GPAI scores of the participants. The primary investigator and the trained second observer coded 20% of the participants' game performances during game play episodes of each testing occasion, and interobserver agreement scores were calculated. Agreement scores ranged from 80% to 100% with an average of 86%.

Procedures for Data Collection

Assessing pretest game performance occurred on Day 1 by having participants placed on teams within their classes based on single gender or coeducational classes by the teachers. The teachers selected teams because they knew the participants physical activity abilities. Participants played in three-versus-three half-court basketball games lasting 15 min. Posttesting occurred on the last day of the basketball season using the same protocol as pretesting. All games were videotaped, and then game performance was measured using the GPAI.

Basketball Season

The basketball season consisted of 18 lessons that contained the six characteristics of the SETM described by Pritchard and McCollum (2009). Each basketball lesson lasted 50 min. Participants conducted daily roles (i.e., coach, fitness trainer, equipment manager, statistician, substitute, and reporter). During Lessons 1 to 9 of the preseason, teachers introduced new content after coaches reviewed the previous material. Participants would gather with their team and perform the fitness card warm-up activity led by the fitness trainer. After teams completed the fitness card, team coaches would review the previous lesson's content with the coaching plan provided by the teacher. The coaching plan would have the cues of previous skills taught and the tactical problem of the day's lesson. The first modified game would be on the coaching plan, so coaches would split their team and play the modified game (e.g., 3 vs. 3, no dribbling, must make three passes to teammates before shooting) based on the tactical problem. The modified game would last approximately 6 min, and then the teacher would blow the whistle to ask questions about the tactical problem of the modified game. When students provided the correct answers to the questions, the teacher instructed on the skill necessary to solve the lesson's tactical problem. Students would practice the skills provided by the teacher

that included extensions and challenges. After practicing the skills, the students played a second modified game that allowed teams to practice the skills in a game situation. The second modified game was 1 min longer than the first modified game. At the end of the lesson, the teacher provided a lesson closure of the lesson's content and provided information on the next lesson's tactical problem. In Lessons 10 to 15 (i.e., regular season), teams practiced after doing the fitness card to prepare for regular season competitions. Teams competed against each other in modified games (e.g., 3 vs. 3) and learned roles such as statistician and referee. During Lessons 16 to 18 (i.e., postseason), teams played three versus three in a tournament with the championship game and awards ceremony taking place on the last day.

During the basketball season, teams earned team points on the second day of the season until the last day of the season. Students on each team were encouraged to wear team colors, perform a team cheer, execute daily roles, and work together to earn team points. Teams earned points for winning their games during regular and postseason, but losing teams also earned points. The point system encouraged competition, but points were not awarded solely for team success. The teams with the most points at the end of the season won the championship. The point system of the SETM encouraged teamwork, thus allowing lower skilled students to be a part of the team.

Data Analysis

SPSS 19.0 statistical package was used to perform 2 (time) x 2 (group) x 2 (gender) analysis of variances (ANOVAs) with a priori alpha set at .01 due to a Bonferroni adjustment.

Results

Descriptive statistics generated on the dependent variables including game performance, decision making, skill execution, support, and game involvement are provided for coeducational PE classes and single gender PE classes in Table 2.

Table 2*Descriptive Statistics for Game Performance, Decision Making, Skill Execution, Support, and Game Involvement*

	Pretest		Posttest	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Total (<i>n</i> = 90)				
Game performance	63.73	(15.06)	73.81	(11.06)
Decisions made	78.15	(19.63)	88.40	(14.85)
Skill execution	55.24	(19.91)	62.69	(15.98)
Support	57.79	(33.17)	70.34	(20.62)
Game involvement	50.92	(27.95)	47.33	(23.71)
Total males (<i>n</i> = 48)				
Game performance	67.51	(13.55)	75.71	(8.74)
Decisions made	80.19	(13.51)	89.91	(12.14)
Skill execution	58.69	(18.61)	63.31	(12.52)
Support	63.64	(34.04)	73.92	(18.98)
Game involvement	52.46	(23.80)	53.06	(23.03)
Total females (<i>n</i> = 42)				
Game performance	59.41	(15.69)	71.64	(13.00)
Decisions made	75.83	(24.84)	86.67	(17.44)
Skill execution	51.30	(20.82)	61.98	(19.33)
Support	51.10	(31.21)	66.26	(21.86)
Game involvement	49.17	(32.26)	40.79	(23.03)
Coeducational class: Males (<i>n</i> = 22)				
Game performance	63.35	(16.75)	75.49	(9.02)
Decisions made	81.23	(11.49)	91.09	(9.54)
Skill execution	53.45	(17.55)	61.42	(11.63)
Support	55.38	(37.99)	73.95	(21.66)
Game involvement	57.95	(21.93)	50.64	(20.81)
Coeducational class: Females (<i>n</i> = 17)				
Game performance	54.52	(16.09)	71.08	(14.32)
Decisions made	66.53	(28.93)	85.69	(24.29)
Skill execution	49.28	(24.48)	70.53	(17.67)
Support	47.76	(30.13)	57.03	(24.15)
Game involvement	35.12	(29.79)	28.18	(15.69)
Single gender class: Males (<i>n</i> = 26)				
Game performance	71.03	(9.03)	75.90	(8.67)
Decisions made	79.30	(15.18)	88.91	(14.08)
Skill execution	63.13	(18.65)	64.90	(13.24)
Support	70.64	(29.23)	73.89	(16.83)
Game involvement	47.81	(24.73)	55.11	(24.98)

Table 2 (cont.)

	Pretest		Posttest	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Single gender class: Females (<i>n</i> = 25)				
Game performance	62.73	(14.81)	72.01	(12.31)
Decisions made	82.15	(19.82)	87.34	(11.17)
Skill execution	52.67	(18.33)	56.16	(18.53)
Support	53.37	(32.33)	72.54	(18.06)
Game involvement	58.72	(30.84)	49.36	(23.50)

Note. Game performance, decisions made, skill execution, and support mean scores are expressed as a percentage. Game involvement mean scores are expressed as a sum total of appropriate decisions made, inappropriate decisions made, appropriate skill execution, inappropriate skill execution, and appropriate support.

Game Performance

A 2 x 2 x 2 repeated measures ANOVA was calculated to examine effects of time (pretest and posttest), group (coeducational and single gender), and gender (male and female) on game performance. Significant main effects for time, $F(1, 86) = 39.93, p < .01$, and gender, $F(1, 86) = 8.93, p < .01, \eta^2 = .32$, were present. The main effect for group was not significant, $F(1, 86) = 4.10, p > .01$. There were no significant interaction effects for time x group, $F(1, 86) = 4.60, p > .01$; group x gender, $F(1, 86) = .02, p > .01$; time x gender, $F(1, 86) = 1.70, p > .01$; and time x group x gender, $F(1, 86) = .00, p > .01$.

Decisions made. When investigating the decisions made in the subcategory of game performance, we found a significant main effect for time, $F(1, 86) = 20.14, p < .01, \eta^2 = .19$. The other main effects were not significant for group, $F(1, 86) = 1.44, p > .01$, and gender, $F(1, 86) = 2.95, p > .01$. There were no significant interaction effects for time x group, $F(1, 86) = 2.13, p > .01$; group x gender, $F(1, 86) = 3.81, p > .01$; time x gender, $F(1, 86) = .25, p > .01$; and time x group x gender, $F(1, 86) = 1.98, p > .01$.

Skill execution. The skill execution subcategory of game performance revealed a significant main effect for time, $F(1, 86) = 12.02, p < .01, \eta^2 = .12$, but no significant main effects for group, $F(1, 86) = .04, p > .01$, and gender, $F(1, 86) = 1.60, p > .01$. All interaction effects revealed no significant differences for time x group, $F(1, 86) = 5.80, p > .01$; group x gender, $F(1, 86) = 4.57, p > .01$; time x gender, $F(1, 86) = 2.28, p > .01$; and time x group x gender, $F(1, 86) = 1.35, p > .01$.

Support. The same results were found for the subcategory of support in measuring game performance. A significant main effect for time, $F(1, 86) = 11.10, p < .01, \eta^2 = .11$, was revealed, but there were no significant main effects for group, $F(1, 86) = 4.33, p > .01$, and gender, $F(1, 86) = 6.12, p > .01$. Interactions effects revealed no significant differences for time x group, $F(1, 86) = .13, p > .01$; group x gender, $F(1, 86) = .12, p > .01$; time x gender, $F(1, 86) = .19, p > .01$; and time x group x gender, $F(1, 86) = 2.79, p > .01$.

Game Involvement

A repeated measures ANOVA on game involvement evaluated differences in how involved participants were during basketball games. There were no significant main effects for time, $F(1, 86) = 1.80, p > .01$; group, $F(1, 86) = 5.18, p > .01$; and gender, $F(1, 86) = 5.45, p > .01$. There was one significant interaction for group x gender, $F(1, 86) = 8.61, p < .01, \eta^2 = .09$. A Tukey post hoc test revealed a significant difference between coeducational male classes and single gender female classes, along with a significant difference between coeducational female classes and single gender female classes (see Figure 1 for interaction). There were no significant interactions for time x group, $F(1, 86) = 1.01, p > .01$; time x gender $F(1, 86) = 1.80, p > .01$; and time x group x gender, $F(1, 86) = 1.97, p > .01$.

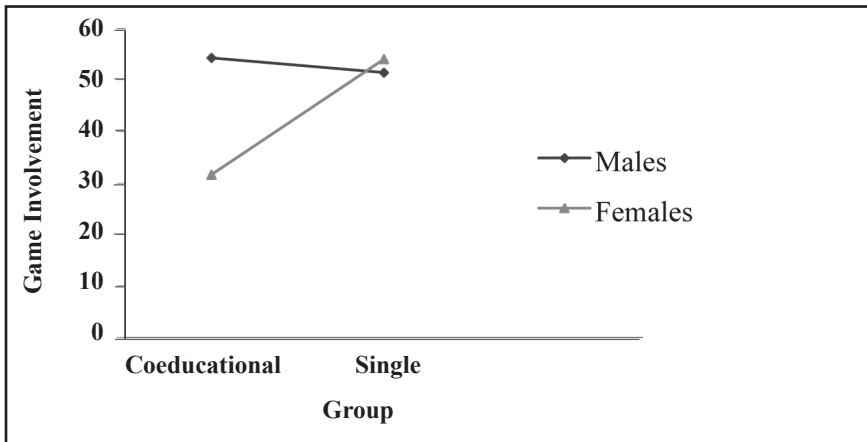


Figure 1. Game involvement group x gender interaction.

Discussion

The first purpose was to investigate the effectiveness of the SETM on game performance in middle school PE. The results of this study provided support that the SETM was an effective instructional model in significantly improving game performance including the subcategories of decisions made, skill execution, and support in the sport of basketball. One goal of the SETM was for PE students to be competent in the activity being taught (Pritchard & McCollum, 2009). Siedentop, Hastie, and van der Mars (2011) stated a competent sportsperson has the skills necessary to participate in games satisfactorily and understand and execute strategies appropriate to the complexity of the game being played and is a knowledgeable game player. By the end of the SETM basketball season, participants made better decisions to shoot or pass to an open teammate. Participants increased skill execution by correctly shooting the basketball or making appropriate passes to their teammates. Participants supported their teammates by moving to get open when they did not have the basketball. By combining the components of SEM and TGM, the SETM improved the skill levels and tactical knowledge of participants playing small-sided three-versus-three basketball games.

Overall Game Performance

Game performance scores significantly increased after the implementation of the SETM. As noted by previous studies of game performance using the original SEM (Hastie, 1998c; Hastie, Sinelnikov, & Guarino, 2009; Pritchard, Hawkins, Wiegand, & Metzler, 2008), the SETM used characteristics of the SEM. One of those characteristics was having a longer unit to allow participants the time needed to learn the activity being taught. Siedentop (1994) stated longer units in PE are necessary for students to have the opportunities to learn the activity to be at competent levels. French et al. (1996) revealed an intervention of 3 weeks was not long enough for participants to improve game performance in badminton. When the intervention continued to 6 weeks, participants increased badminton playing ability by improving skill levels. Hastie, Sinelnikov, and Guarino (2009) found similar results measuring badminton game performance. Early in the badminton season, game performance scores did not significantly improve until Lesson 7 of 18. Most PE programs have shorter units, but shorter units do not provide equal opportunities for students to become competent within the sport

(Siedentop & Tannehill, 2000). The SETM used a longer unit (i.e., 18 lessons) to provide students the opportunities to learn the sport of basketball to reach the goals of SETM for students to be competent, literate, and enthusiastic (Pritchard & McCollum, 2009).

A second characteristic of the SETM that could have attributed to the significant increases in game performance scores, along with the subcategories of decisions made, skill execution, and support, was the affiliation characteristic. Affiliation was a characteristic of the original SEM and was adopted into the SETM. The SETM required participants to be put on teams early in the basketball season based on playing abilities of the participants. Siedentop et al. (2011) described several techniques to put students on teams using SEM. The researchers decided to allow the teachers to select teams based on playing abilities and gender. During the pretesting phase of videotaping, participants played three-versus-three half-court basketball games; the two teachers observed the participants and selected teams. Teams were announced on the second day of the basketball season by the teachers. Teams selected a team name, team color, team cheer, and team mascot. The participants stayed on the same team throughout the SETM basketball season. By staying on the same team, participants were able to practice together during the preseason to prepare for the competition phase of the regular season and postseason. Previous research reveals this team affiliation is a strong characteristic of the SEM (Hastie, 1998b; Pritchard et al., 2008). Hastie (1998b) stated that one participant stated, “fun came from improvement and being part of a team and feeling important as part of that team” (p. 168). Pritchard et al. (2008) researched the effects of the SEM and a traditional style on game performance in volleyball. The participants in the SEM group significantly improved volleyball game performance scores compared to the traditional style group even though the intervention was the same length of time (i.e., 20 lessons). The SEM participants were put on teams on Lesson 2, and the traditional style group was put on teams on Lesson 16 to ensure no affiliation would occur. One teacher from the Pritchard et al. study stated during the volleyball season, “The SEM participants would tell their teammates ‘set me up’ during game play whereas the TS participants were interested in hitting the volleyball over the net as fast as possible” (p. 233). By playing on the same team in the current study, students were encouraged to support teammates to improve their team’s chances of winning during the regular season and postseason competitions.

Teamwork can be seen in how participants played the game of basketball. Instead of shooting after one pass, participants set up plays to get open and passed multiple times before shooting. These findings are similar to Ormond, DeMarco, Smith, and Fisher (1995) and Ormond et al. (2002). Both studies reported the SEM high school class played a superior game of basketball by using strategies and the higher skilled students included lower skilled students more than the traditional approach of teaching PE.

Coeducational Versus Single Gender

The second purpose investigated game performance of male and female students in coeducational and single gender PE environments. For overall game performance, both groups (i.e., coeducational and single gender) significantly increased their game performance scores after the implementation of the SETM. The results revealed a significant difference for game performance by gender, with males outperforming females, but did not find significant interactions. The females in the single gender environment did not significantly score higher than the females in the coeducational PE environment for the measurement of game performance or the subcategories of decisions made, skill execution, and support. Females in the coeducational environment made correct decisions, executed skills correctly, and supported their teammates as much as females in the single gender environment. One possible reason for these results is due to the affiliation characteristic of the SETM. By being put on teams early in the season and incorporating the team affiliation (i.e., team name, team color, team cheer), females want to improve their playing ability to help the team. Hastie (1998b) reported that females had the same opportunities to respond as the boys during the SEM floor hockey preseason in a coeducational PE environment, but males dominated during the competition phase of the unit. Although males dominated, females had significantly more responses and higher success levels than earlier in the floor hockey season, and females stated they had fun during the unit.

As for game involvement, the results found a significant interaction between group and gender, with coeducational females having the lowest game involvement scores. These results have been seen by Hannon and Ratliffe (2007) who revealed that females in single gender PE had more opportunities to participate in invasion games of flag football, ultimate Frisbee, and soccer. They measured touches during game play of the three sports, but they

did not state the context of the games such as how many students were on a team, how big were the fields, and any rule modifications. Siedentop, Hastie, and van der Mars (2011) stated games should be developmentally appropriate for students to be successful. Participants in the current study played modified games of three-versus-three half-court basketball. During the preseason of the SETM, students were exposed to modified games to solve a tactical problem (Pritchard & McCollum, 2009). These modifications helped to provide an environment to include everyone on the team no matter his or her skill level. For example, a modified game of three versus three with no dribbling was introduced to students in Lesson 2. Students had to pass to teammates before they could shoot. Defense had to stay one arm's length from the offensive player with the ball. With modifications such as these, teammates had to participate with each other to accomplish the goal of scoring. Although these modifications were made during the basketball season, the game involvement for females in the coeducational environment was low compared to males and females in the single gender environment. One reason may have been the competition that SETM promotes during the basketball midseason and postseason. Teams earned points throughout the season, which included wins and losses. If a team won, they earned 2 points for the team point contest. If a team lost, they earned 1 point for the team contest. Posttesting of game performance occurred during the tournament of the basketball season. In the coeducational environment, higher skilled students took control of the game to provide a higher chance of their team winning the game as supported by Hastie (1998b), who indicated males dominated the competition phase of a floor hockey season. A solution to increase game involvement would be to modify the rules of game play. To counteract the domination of higher skilled students, a teacher should incorporate a rule that all three players must touch the ball before shooting. This modification could encourage lower skilled students of both genders to be more involved in the game.

Although females in the coeducational environment were not as involved in the basketball game as females in the single gender environment during testing, the results revealed the females improved game performance scores including decisions made, skill execution, and support. When given the chance to touch the basketball, the coeducational females made better decisions to shoot or pass to an open teammate and increased skill execution of shooting and passing. Hastie (1998b, 1998c) supported these results, finding that

marginalized students had an increased number of opportunities to respond and effectively increased game play.

Limitations

Generalizations of the study results cannot be made in other PE settings or other student populations. The current study only investigated game performance after an 18-lesson season of basketball. Other PE activities and settings should be studied to see whether the SETM is effective in improving game performance for coeducational and single gender PE environments. Participant enjoyment of the SETM season should have been measured to compare coeducational and single gender PE.

Another limitation of the current study is that the teachers were student teachers. The teachers were trained to use the SETM and were provided all learning materials before the implementation of the SETM. The teachers were chosen based on their teaching abilities and experience in using the SETM while training to be teachers in a physical education teacher education program. The results might have been different if experienced teachers were used to implement the SETM. Teachers who have more pedagogical content knowledge that comes with teaching experience and more experience using the SETM could influence the results. Using more experienced teachers who have used the SETM would be an improvement to using student teachers who were trained to use the model.

Conclusions

In conclusion, the SETM was an effective model in promoting game performance in basketball whether the environment was coeducational or single gender. Females in the single gender environment had higher game involvement than females in the coeducational environment. PE teachers and administrators need to revisit the idea of having single gender or coeducational PE classes. PE classes need to provide an environment that allows all students opportunities to respond so they can have the chance to learn an activity to be enjoyed throughout their lives.

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