SPORT EDUCATION

Active Involvement and Accuracy of Calls of Novice Referees During a Season of Sport Education

Todd Layne and Peter Hastie

Abstract

Becoming an elite official of any sport takes time and experience. Fortunately, an opportunity exists for learning the role of a referee at an earlier time. The role of a referee may be taught to students in physical education classes through the sport education pedagogical model. Previous research of sport education has shown that young students enjoy taking officiating roles, but only one has served to quantify the quality of their performance. Consequently, the purpose of this study was to examine the officiating ability of students participating in a sport education season for the first time as they learn the role of a referee. Forty fourth grade students participated in the study. An evaluation of students' attentiveness and involvement in the role as a referee and an examination of the accuracy of calls the referees made were completed. A one-way ANOVA with two levels was used to analyze the percentage of involvement of referees and the percentage of referee success and referee opportunities. Results indicated a significant increase with active involvement, $F(1, 5) = 39.85$, $p = .001$, $\eta^2 = .889$, and referee success, $F(1, 5) = 26.39$, $p = .004$, $\eta^2 = .841$, as students progressed from the formal competition to the postseason. No significant difference was found with referee opportunities, $F(1, 5) = 0.01$, $p = .913$, $\eta^2 = .003$. The increase in

Todd Layne is an assistant professor, Department of Health and Sport Sciences, University of Memphis. Peter Hastie is a professor, School of Kinesiology, Auburn University. Please send author correspondence to telayne@memphis.edu.

active involvement and officiating success and the consistency in referee opportunities indicates that over time the ability to officiate games accurately may increase.

Athletic officials have a stressful role (Anshel & Weinberg, 1995; Dorsch & Paskevich, 2007; Rainey, 1995; Voight, 2009), and depending on the sport, they may be asked to make split-second decisions with few opportunities to correct their calls. The pathway that elite referees take is often similar to the pathway of elite players, who begin practicing a sport at an early age with the hopes of developing their skill (Helsen, Starkes, & Hodges, 1998). In contrast to the assumption that referees of a particular sport are former players with years of expertise, MacMahon, Helsen, Starkes, and Weston (2007) found that elite soccer referees were not former coaches or players, but rather they specialized early on as referees and focused on developing their skills. Their study also showed that referees outperformed players on the laws of the game, which would indicate that officiating is role specific. MacMahon et al. (2007) found that it took referees an average of "16 years of practice and experience to reach the elite level of the sport" (p. 77). This supports the outcomes of a study by Anshel (1995), who found that over time and with opportunities to officiate, a referees experience eventually will lead to greater officiating performance.

Referees often will start their officiating experience by officiating low level games and slowly working their way up to more advanced leagues. Indeed, Catteeuw, Helsen, Gilis, and Wagemans (2009) found that practice hours, the number of matches officiated, and years of officiating were predictors for officiating ability in the sport of soccer. Since many referees begin in adulthood, and due to the amount of time needed to become an elite referee, development of an effective method to teach students the rules of the game and proper understanding of how to be a referee may be beneficial. One opportunity for teaching students how to be a referee is through the sport education pedagogical model. The goal of sport education, which was created in the early 1990s by Dr. Daryl Siedentop, is to create an authentic sport experience that will help students develop as competent, literate, and enthusiastic sportspersons. Siedentop, Hastie, and van der Mars (2011) listed six key features of sport education: seasons, affiliation, formal competition, culminating events, record keeping, and festivity. In sport education, students are assigned to a team for a season of learning a specific sport or activ-

ity. These seasons often are longer than a typical physical education unit, which may lead to an increase in learning (see Carlson & Hastie, 1997; Hastie, 1998a; Hastie, Sinelnikov, & Guarino, 2009). In sport education, teams participate in a season of formal competition that concludes with a culminating event.

A unique aspect of sport education is that all students fulfill roles that have responsibilities that the teacher determines. Possible roles include recording statistics, becoming the coach of their team, creating and designing their team uniforms, and participating on a committee that determines team awards for the end-of-the-season festivity.

Although several optional team roles exist in sport education, all students will act as officials during a season. The intent of this role is for students to appreciate and learn more about the key features of a game other than simply in the role of a player, which leads to a more literate sports performer. Although considered a desired outcome of sport education, officiating provides a difficult challenge based on the amount of knowledge that is needed to be successful. Students are asked to make quick decisions about the play of their classmates. A good understanding of the rules and the components of game play are necessary for students to be able to officiate successfully. Students have to be diligent in completing their assigned tasks so their team will be successful. With these elements, sport education produces the complete sports player, one who has a more defined understanding of sport, instead of one who has only developed sports skills.

Research on sport education has included a brief examination of the role of officiating. First, Hastie (1996) examined the involvement and accuracy of decisions made by referees during a season of speedball for sixth grade students. Results revealed that the students achieved a high level of active involvement through the season and a gradual increase in the correctness of decisions. During the learning phase, teacher interventions occurred at an incidence of 35% of all calls, and by the end of the competition phase, the referee success rating reached 94%, with no teacher intervention. Students expressed a desire to fulfill the role of referee, even though they expressed that it was difficult. This is significant considering students will express a decrease in interest if the activity is difficult and the opportunities for success are low.

In a follow-up study in Russia, Hastie and Sinelnikov (2006) examined students' participation and perception of a season of sport education and the effectiveness and compliance of students in of-

ficiating roles. Results from that study showed a high level of active involvement by the students during their roles as referees. With this increase in comfort and confidence, students began to imagine themselves playing the game as they were officiating. Sport education is "designed to provide students with the chance to learn about the sport from a broader perspective than that of a player" (Hastie et al., 2009, p. 133). Over time, an opportunity to officiate may lead to an improved understanding of game play strategy.

Sinelnikov and Hastie (2010) examined the autobiographical memory of students in relation to their participation in sport education and found that students were able to specifically remember officiating numerous games. Students believed that the repeated opportunities to officiate led to a greater understanding of the rules of the game and thus an improvement in their ability to officiate. Although students found officiating difficult in the beginning, after a few opportunities, they found it easier and thus more rewarding. Specifically, students felt a sense of accomplishment when a game went according to plan.

Becoming an elite official takes time and experience. Although the previously referenced studies have shown that young students enjoy taking officiating roles, only one served to quantify the quality of their performance. By consequence, the purpose of this study was to examine the officiating ability of students participating in a sport education season for the first time as they learned the role of a referee. Specifically, students were evaluated to determine whether there was a significant difference in their levels of active involvement and success in the role of an official as the season progressed.

Methods

Participants and Setting

The study occurred in a public elementary school located in southeastern Alabama. The school enrolled 472 students, of whom 16% received free school meals and 89% had English as their first language. Students have physical education 5 days a week for 30 min each day.

The participants in the study were 40 fourth grade students. The students were from two classes, one consisting of 10 girls and 10 boys, the other having 8 girls and 12 boys. Informed consent was obtained from all participants and their parents prior to the beginning of data collection, and the university's Institutional Review Board for Human Subjects Research approved the research protocol.

The participants in the study did not have experience with sport education. Furthermore, the game that was played (swirl ball) was created by a previous class during a unit of student-designed games, and consequently, all students were novice players due to their limited understanding and experience of the game being played. In addition, students had no experience with officiating, which created a further element of learning.

Season Plan

The classes completed identical seasons of swirl ball that occurred over thirteen 30-min lessons. Following a typical sport education protocol, students were placed on teams at the beginning of the season and stayed with their respective teams for the duration of the season. Students served as referees, as well as in other roles, in three phases of the season. In the first phase (called the preseason), which lasted from Lessons 1–6, students were introduced to sport education, game roles, and protocols; were placed on teams; and participated in individual and team skill practice. During this phase, students were introduced to the game of swirl ball, the rules governing the game, and the decisions that referees would be asked to make. In the second phase (called the formal competition), which lasted from Lessons 7–11, students were involved in formal competition. Students served as referees during games that their team was not scheduled to play. In the third phase (called the culminating events), which lasted from Lessons 12–13, the culminating events and awards ceremony occurred. Referees for this phase were selected based on teams that were not scheduled to play.

The game selected for the season, swirl ball, was an invasion game created by a previous fourth grade class from the same school. In swirl ball, students attempt to throw a soft foam ball (the size of a softball) into a floor hockey goal. Each team has four players and one goalie. Students may pass the ball from player to player and may move three steps with the ball. However, if they are tagged by an opposing player while holding the ball, they must drop the ball and the opposing team obtains possession. Teams are not penalized for incomplete passes. The ball may touch the floor during any possession.

Another component of swirl ball is the free shot hoop. One Hula-Hoop is placed between 10 and 15 ft diagonally from the goal at each end. If a player catches a pass from a teammate while standing in either of these hoops, they may take a free shot (i.e., with no defender or goalkeeper) at their opponent's goal. Swirl ball is continu-

ous, meaning that when a goal is made, the goalkeeper collects the ball and passes it to a teammate to resume play.

When students were referees, they were assigned to make accurate decisions on rules related to swirl ball: (a) Was the player tagged while in possession of the ball? If so, the player would drop the ball and the other team would gain possession with an opportunity to make a free throw to continue game play. (b) Did the player in possession of the ball take more than three steps? If so, the same procedure as before was followed. (c) Was the catch of a successful pass from a teammate made with at least one foot in the free shot hoop? (d) Was the in-play shot or free shot on goal successful? Each referee held a colored scarf in each hand. When a call was made, students would wave their hands in the air and verbalize why the call was made. In some instances, referees would move into the play area to make a call and indicate possession and the spot where play should continue.

Data Collection

Given that significant time is devoted to teaching officiating skills, under teacher direction and practice games, and that sport education seasons are longer than a typical physical education unit, by the end of the season, students should experience an increase in attentiveness and accuracy of calls based on the duration of the season. To test this hypothesis, the following data are necessary: (a) an evaluation of student attentiveness and involvement in the role of referee and (b) an examination of the accuracy of calls referees made.

Lessons of the season were recorded on a Canon digital video recorder mounted on a tripod. The camera was located in the corner of the gym so it did not interfere with the activity. The lessons then were transferred to a personal computer for observation to occur.

Duration recording was used to determine student involvement in the role of a referee (Hastie, 1996). Table 1 provides a description of the categories for student involvement while officiating. An observation protocol similar to the one Hastie (1996) used was followed for measuring the active involvement of referees during game play. The following sequence was followed:

1. At the beginning of game play, a random referee would be selected for observation.

2. The referee was observed for 15 seconds.

3. The researcher would determine the involvement of the referee based on the established definitions of whether they were actively or passively involved, distracted, or off task.

With respect to officiating success, frequency data were collected for the following instances:

1. A player was tagged while in possession of the ball.
2. A player took more than three steps while in possession of the ball.
3. A player was awarded a free shot due to the ball being caught with at least one foot in the free shot hoop.
4. A shot on goal or free shot attempt was successful or saved.

Table 1
Coding System for Referees (Hastie, 1996)

Category	Definition
Actively involved	Keeps up with the ball, follows play, consistently enforces the rules, uses whistle definitely.
Passively involved	Watches play, but does not move to keep up with the ball; makes occasional rulings or uses whistle passively.
Distracted	In the field of play, but attends to outside factors (e.g., the other match); misses a call due to inattention.
Off task	Does not watch or follow play, does not make rule decisions, is engaged in activity detrimental to officiating performance.

For each situation, the referee under observation was coded as either *correct* or *non-responsive*. That is, if a player took four steps while in possession, and the referee made a signal to this effect, that action was coded as *correct*. If however, the referee failed to make a response, this was coded as *non-responsive*. In addition, students also were coded as *incorrect* if they made a call that was unwarranted (e.g., if a referee called a player for running when they had only taken three steps or if they indicated a player should be awarded a free shot when they were not within the free shot hoop).

During the game, referees were located in the four corners of the playing area. Due to the limited viewing area of the video, the referee closest to the action of the players was analyzed for the data collection of officiating success.

Data Analysis

Active involvement of referees. A one-way ANOVA with two levels was used to compare the percentage of involvement of referees to determine whether a difference existed in the level of active involvement from the season of formal competition to the postseason.

Students' officiating ability. A one-way ANOVA with two levels was used to compare the percentage of referee success and referee opportunities to determine whether a difference existed in the level of success and opportunities from the season of formal competition to the postseason.

Results

Mean, standard deviation, and significance of levels of referee task involvement are presented in Table 2, and Figure 1 is a visual presentation of percentage of referee active involvement for each lesson. The data in Table 2 confirm that as the sport education season progressed from formal competition to the postseason, active involvement of referees increased significantly, $F(1, 5) = 39.85$, $p = .001$, $\eta^2 = .889$, and passive involvement of referees decreased significantly, $F(1, 5) = 31.41$, $p = .002$, $\eta^2 = .863$.

Table 2
Task Involvement While Refereeing

	Formal competition *M* (*SD*) % of time	Postseason *M* (*SD*) % of time	*F*(1, 5)	*p*	η^2
Actively involved	74.06 (2.56)	94.92 (7.19)	39.85	.001	.889
Passively involved	23.01 (2.31)	5.09 (7.19)	31.41	.002	.863
Distracted	2.94 (4.43)	0.00 (0.00)	0.79	.416	.136

Figure 1 shows that active and passive involvement was consistent throughout the formal competition season. However, during the postseason, active involvement increased and passive involvement decreased.

Mean, standard deviation, and significance data for referee success and opportunities are presented in Table 3, and Figure 2 is a visual presentation of referee success for each lesson.

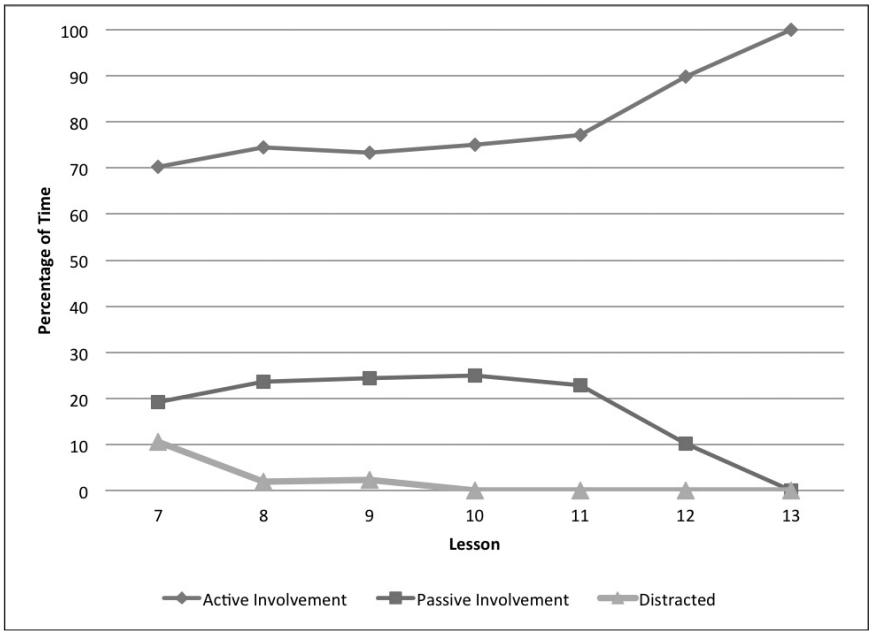

Figure 1. Referee involvement per lesson during game play.

Table 3
Referee Success and Opportunities

	Formal competition *M* (*SD*) % of time	**Postseason *M* (*SD*) % of time**	***F*(1, 5)**	***p***	**η^2**
Success	48.28 (8.19)	84.00 (8.77)	26.39	.004	.841
Opportunities	37.80 (7.98)	38.50 (3.54)	0.01	.913	.003

The statistics in Table 3 show that when the sport education season progressed from formal competition to the postseason, a significant difference was found in referee success, $F(1, 5) = 26.39$, $p = .004$, $\eta^2 = .841$. In addition, no significant differences were found in referee opportunities, $F(1, 5) = 0.01$, $p = .913$, $\eta^2 = .003$.

Likewise, Figure 2 shows a continuous increase in the success rates of referees. With the exception of Lesson 11, success rates for officiating gradually increased with each lesson of the formal competition and postseason.

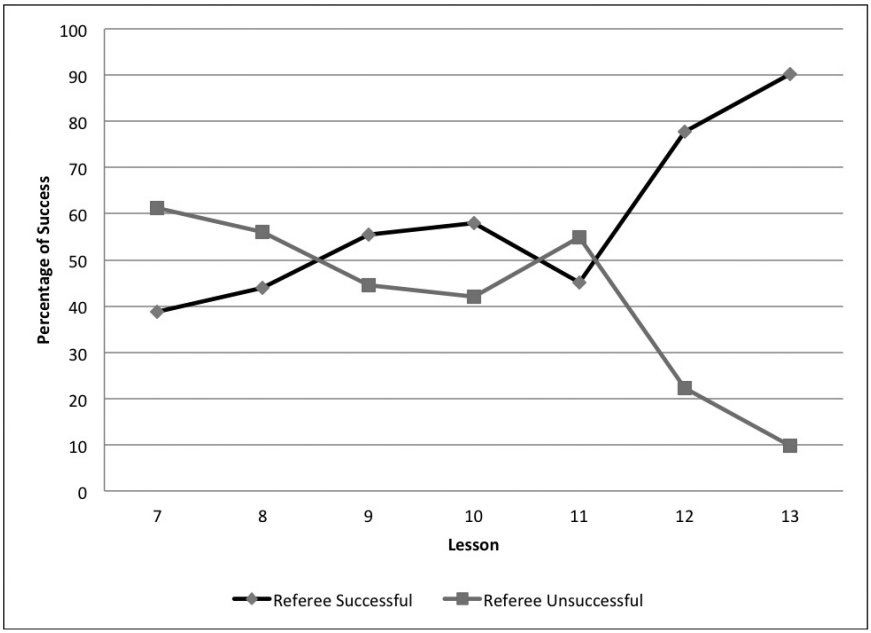

Figure 2. Referee success during game play.

Discussion

In the current study, active involvement of student officials increased significantly as the season progressed from the formal competition (74%) to the postseason (95%). These findings support the results from studies by Hastie (1996) and Hastie and Sinelnikov (2006), who concluded that students were actively involved in their role as an official. The significance for active involvement suggests that students are enthusiastic about their role as an official. As previously mentioned, the role of an official may be stressful (Anshel & Weinberg, 1995; Dorsch & Paskevich, 2007; Rainey, 1995; Voight, 2009). By taking advantage of this early enthusiasm, teachers have the potential to support student growth through their cognitive understanding of game rules and the impact on developing game strategy.

Results also revealed a significant increase with referee success as students progressed from the formal competition (48%) to the postseason (84%). No significant difference was found with referee opportunities. Consistency in referee opportunities indicates that over time the ability to officiate games accurately may increase.

These results show that throughout game play students received consistent referee opportunities.

The significance for referee success suggests that over time, and with the same opportunities, students participating in a sport education season will show improvement in overall ability. The results of referee success suggest that as active involvement of referees improves, so does referee success. The results show that improvement in ability takes time. Students in this study did not reach 70% success in officiating until the next to last lesson of the season. These data confirm the suggestion for longer seasons (Carlson & Hastie, 1997; Hastie, 1996; Hastie, 1998a, 1998b; Hastie et al., 2009) due to the many new aspects needed to be learned in a sport education season and the amount of time needed for consistent officiating success.

Two significant points were related to referee success. First, in swirl ball, students had to be decisive in their decision-making ability. MacMahon and Mildenhall (2012) stated that referees face the common challenge to "process incomplete, intentionally deceptive and fast-paced information under time pressure" (p. 153). Being able to distinguish whether the student had the ball in their hand while tagged, or whether they had released it already, was critical to making the correct call. In the beginning, students played the game in swarms. In other words, students were packed together and possession was difficult to distinguish. As game performance improved, the opportunities to make accurate calls decisively were more available. Second, during postseason play, a couple of variables may have impacted the overall ability of the student referee.

The teacher was more involved with students because only one game was being played at a time. During the course of the game the teacher would make comments such as "Good call ref!" or "I like how you took charge of the situation!" Having a teacher observe student performance and the actual game could impact officiating positively. The magnitude of the game may impact the performance of a referee. Results revealed that active involvement was at 100% for the championship game. Many people observed the game, and the excitement level was high. Student involvement and success may have been the result of understanding that the game was important and that their performance was being observed. Research has shown that referees admit to making mistakes and having the opportunity to "have a bad game" (Wolfson & Neave, 2007). However, the referee's response to the negative performance was a posi-

tive realization that something could be learned from the situation. An objective of sport education is to help students "understand how important a good referee is to the quality of the game and to the enjoyment of the competitors" (Siedentop et al., 2011, p. 8). Teachers have an obligation to help students learn and grow as officials so the sport experience may be more beneficial to all involved.

Based on the limited amount of research devoted to the study of officiating within the sport education model, great potential for future studies exists. Given that evidence from the current study suggests that students improved in their ability to officiate game play, determining the correlation between officiating success and content knowledge of the sport may be beneficial. An analysis of students who excel at officiating to determine whether a correlation exists with sport content knowledge and tactical awareness may provide a positive argument for including officiating in the physical education content. Many people choose to enter the officiating profession due to their "love of the game" (Burke, Joyner, Pim, & Czech, 2000; Furst, 1991) and a desire to maintain a connection to the sport. Most often, these referees will possess a great understanding of the game and the rules that govern the game. Physical education classes could provide a location for students to develop their officiating ability and a greater understanding of the sport.

Another study of interest would involve examining the methodology of teaching officiating mechanics and terminology to students. In a typical sport education season, a couple of days during the preseason may be devoted to an "officiating training camp." During this time, students will receive instruction and feedback related to officiating. However, the majority of learning occurs during their time as referees in the regular season. Experience may be a great teacher, but determining the proper methodology and time to devote to the teaching of officiating to determine whether maximum efficiency occurs may be beneficial.

Conclusion/Practical Application

The results from this study provide persuasive evidence for including the teaching of officiating in a sport education physical education curriculum. Standard 3 of the National Standards of Physical Education produced by the National Association for Sport and Physical Education (2004) states that the student "participates regularly in physical activity." Students' active involvement as referees displays evidence that students may be involved in a different dimension of sport that provides another venue for promoting physical fitness.

In addition, students displayed an increase in accuracy of decision making with each lesson with the exception of one. Regardless, students showed improvement in their ability to call a game of swirl ball accurately from the beginning to the end of the sport education season. Although the sample size was small, this supports the need for longer seasons of study to increase the potential of student learning in the physical education classroom. The most noteworthy evidence is that the sport education season was the first for the students involved in the study. The potential to improve continually on their ability to officiate and to improve on their understanding of the sport due to their involvement as a referee is strong.

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