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Research article

Sport Education as a Curriculum Approach to Student Learning of Invasion Games: Effects on Game Performance and Game Involvement

Cláudio Farias [1]✉, Carla Valério [2] and Isabel Mesquita [2]
[1] Faculty of Physical Education and Sport, Lusófona University, Lisboa, Portugal
[2] Faculty of Sport, University of Porto, Porto, Portugal

Abstract
The teaching and learning of games and sport-based activities has historically been the dominant form of the physical education curricula. With an interest in providing to students meaningful and culturally situated sporting experiences, Sport Education is probably the most implemented and researched pedagogical model worldwide. However, although there is considerable evidence that the model as a curriculum approach can benefit the development of social goals and healthy sport behaviors, not a single study as to date examined students' game-play development beyond participation in single and isolated teaching units. Therefore, the purpose of this study was to examine students' development of Game Performance and Game Involvement during participation in three consecutive Sport Education seasons of invasion games. The participants were an experienced physical education teacher and one seventh-grade class totaling 26 students (10 girls and 16 boys). Using the Game Performance Assessment Instrument (Oslin et al., 1998), pre-test to post-tests measures of students' Game Performance and Game Involvement were collected during their participation in basketball (20 lessons), handball (16 lessons), and football (18 lessons) units. Inter-group differences and pre-test to post-test improvements within each season were analyzed through 2 (time) x group (sport) repeated measures ANOVA tests. There were found significant pre-test to post-test improvements in Game Performance and Game Involvement in the second (handball) and third (football) seasons, but not in the first season (basketball). Students' Game Performance and Involvement scores of handball and football were significantly higher than their scores while playing basketball. The opportunity for an extended engagement in game-play activities and prolonged membership of students in the same teams throughout three consecutive seasons of Sport Education were key to the outcomes found. The specific configurations of the game forms played by students either inhibited or enabled their game-play development.

Key words: Physical education, pedagogical models, prolonged participation, consecutive seasons, tactical learning.

Introduction

Sport Education (Siedentop, 1994) was built on the aspiration to provide to students a more meaningful curriculum alternative to the "decontextualized", "one-size-fits-all", "physical-education-as-sports-techniques" approach, which is traditionally present in the practice of many physical education teachers (Kirk, 2013). The large-scale implementation of Sport Education in the national curriculum programs of Australia and New Zealand in the early 1990s brought about renewed teacher enthusiasm that the model could deliver on many of the fundamental educational goals of physical education (Wallhead and O'Sullivan, 2005). The teachers highlighted the high enthusiasm generated by the affiliation and competition features of the model and the possibilities made available for pupils' high engagement in the activities through extensive participation in appropriately modified game practice (Alexander et al., 1993). Despite this enthusiasm, teachers were also skeptical of the effective development of skills and game-play as an outcome of Sport Education, for the model 'relinquishes' to students much of the responsibility for the delivery of the tactical and motor-skills content in the form of peer-teaching activities (Alexander and Luckman, 2001).

Two decades elapsed since the first trials of Sport Education as a curriculum approach and a fully-fledged model is currently gathering wide acceptance from teachers and scholars alike in numerous physical education sites around the world (Hastie, 2012). Concurrently, there is a cumulative extensive body of evidence (from over 100 research papers) that Sport Education, when taught well by committed teachers, can indeed cater for the development of *literacy* (healthy sports culture) and generate high *enthusiastic* responses (motivation to participate in sport) by students (Hastie et al., 2011). Nonetheless, although sport-based physical education has historically been the dominant form of physical education (Harvey and Jarret, 2014), evidence of the impact of Sport Education in students' *competency* in playing games is still "burgeoning and developing" (Hastie et al., 2011, p. 129), as this topic has received less interest of the researchers (Farias et al., 2016).

In Sport Education, consistent with an understanding of sport competency as the intelligent coupling of technical and tactical skills during game-play, "the primary focus is on developing game sense" (Siedentop et al., 2011, p. 26). In agreement, the existing research has measured the program's impact on competency development largely by quantifying pre- to post-test improvements in students' ability to make appropriate decisions during game-play (i.e., decision-making; Hastie et al., 2009). Competency has also been assessed as students' ability to execute motor skills according with the circumstances of the game situations (i.e., skill-execution; Farias et al., 2015) and overall game performance indexes (i.e., ratio appropriate/effective over inappropriate/ineffective game-play; Mesquita et al., 2012). Due to Sport Education's utter concern in promoting high rates of game-play

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participation, the research has also measured students' game involvement (i.e., volume of play: appropriate/efficient plus inappropriate/inefficient game-play; see Hastie et al., 2009).

Most of the research on Sport Education focused on competency and participation found significant increases altogether in several components of students' game performance (e.g., Araújo et al., 2016) and game involvement (e.g., Wallhead et al., 2013). However, despite these highly positive results, there are two fundamental reasons as why the potential of Sport Education to be used as a prolonged curricular proposal in physical education classes is not yet unequivocally established (Farias et al., 2016). First, though to a lesser extent, a few studies have also found a lack of student improvements in game-play components such as overall game performance (e.g., Mahedero et al., 2015), skill-execution (e.g., Mesquita et al., 2012), or game involvement (e.g., Pritchard et al., 2014). Second, there is evidence from recent large-scale empirical research that students' participation in yearlong programs of Sport Education can have a positive impact in areas such as students' future intentions to participate in extra-curricular physical activity (Wallhead et al., 2013) or in the reshaping of unbalanced power relations towards more equitable learning environments (Farias et al., 2017a). Surprisingly, not a single study has, to date, objectively assessed students' development of game performance and involvement beyond "student experience of a single season of the curriculum" (Wallhead and O'Sullivan, 2005, p. 204). Moreover, the absence of study designs exploring the long-term evolution of competency during students' participation in consecutive seasons of sport (Hastie et al., 2011) is yet to validate the conceptual cornerstone of game-based pedagogies. Namely, the potential for transfer of performance across games within a same category (Mitchell et al., 2013).

Therefore, in line with the reasoning presented so far, the purpose of this study was to examine students' development of game performance and game involvement during participation in three consecutive seasons of invasion games.

Methods

Participants and setting

Setting: The setting of this study was a middle school located in a northern county of a southern European country, which included classes from the fifth to the ninth grades. This was an average-sized school with around 750 students enrolled in compulsory physical education lessons. The students were required to complete a three-terms (October to June) program which included weekly participation in one 45-mins session and one 90-mins session. Most students in this school came from working class families from low to middle income households, about a fifth of the cohort benefited of free school meals, and the representation of ethnic-minority students within the school was approximately 12%.

Selection of the participant students: The class that participated in this study was composed of 26 students of the seventh grade (10 girls and 16 boys, average age 12.3 ± 1.3). In agreement to the procedures followed in other research (MacPhail et al., 2008), 10 participant players were selected for Game Performance tracking across the school year through a nominal group technique. Figure 1 illustrates the procedural steps taken in the selection of the 10 players whose Game Performance was examined. The key selection criterion was that the 10-players' cohort played against each other in all initial and ending lessons of each season (10 players: Team 'A' and Team 'B', three boys and two girls per team).

Teacher: The teacher in this study was a member of the research team who had been a former physical education teacher in the school where this research was conducted. He was deemed a physical education specialist (12 years of experience) by the teaching community and he had previous experience implementing both Sport Education and game-centered approaches (e.g., Tactical Games model).

Procedures

Permission to conduct the study was obtained from the host University's Ethical Committee Review Board. For gathering consent for data collection, the first author participated in formal meetings with the school's principal and members of the physical education department, the participants' legal guardians, and the participant students. The researcher explained to all stakeholders in a detailed and truthful manner the goals of the research project, the nature, focus, and duration of data collection and means of dissemination of the research findings. Both the legal guardians and the students selected for the study were formally addressed in a classroom context and informed of the nature of the project, the pedagogical and research procedures, the main goals and features of Sport Education, and the responsibilities inherent to role-playing. All of those involved in the project signed informed consent forms.

The seasons, learning content, and instructional processes: All members of the research team were experts in Sport Education and other instructional models (e.g., the Tactical Games Model), and had an extensive record of prior investigation of the model and experience in teaching physical education both at a school and higher education levels. In agreement, the decisions related to the content addressed in the teaching units, means of content development, type of roles and levels of responsibility assigned to students, nature of the instruction employed by the teacher, and strategies used to mediate peer-teaching activities, were collectively taken as a team and continually reflected upon and adjusted. Moreover, based on the daily examination of the videotape images of all the lessons, there was kept a daily record in the format of a field diary that recorded in a systematic and chronological manner all the procedures mentioned above. Table 1 provides details on the content addressed in the seasons, while the following sections inform about the instructional processes employed.

The sport education seasons: As required by the school's physical education curriculum for the seventh grade, the teaching units included three consecutive sport-based units. In this case, the units were taught within a

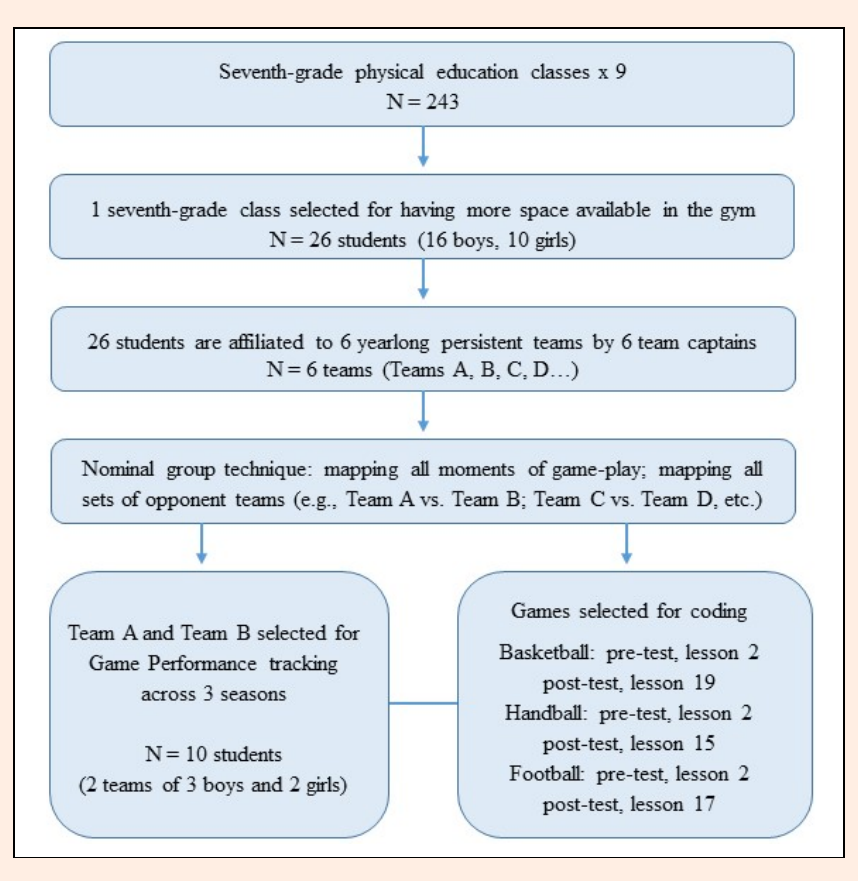

Figure 1. Flow chart depicting the selection of study participants after ethical approval (note that Teams A and B played against each other for the purposes of Game Performance Analysis and this was consistent throughout the study).

Sport Education framework and consisted of basketball (20 lessons of 45-mins), team handball (16 lessons of 45-mins), and football (18 lessons of 45-mins).

In the first lesson of the first Sport Education season (basketball), as a method of team selection suggested by Siedentop (1994), six student-coaches (three boys and three girls) were voted to constitute a selection committee which worked with the teacher to allocate all students to six heterogeneous, but balanced teams (Teams 'A' to 'F'). The teams contained similar number of boys and girls and of lower-, average-, and higher-skilled players. At the end of the first season, all teams agreed that persistent membership should be extended in time. Consequently, the same students were kept in the same six teams throughout the entire school year.

The roles performed by students on a rotational basis included daily managerial roles taken up by all students (referees, equipment manager, practice time managers, etc.) and additional 'special roles' involving higher instructional and organizational responsibilities (coach, captain, sports director, etc.).

Teacher's instruction and peer-teaching mediation: The nature of the teacher's instruction varied along the year. During the first season, the teacher encouraged students' reproduction of the tactical solutions he introduced and direct instruction was the style predominantly used. In the second and third seasons, akin to the procedures used in tactical approaches to content and instruction (e.g., the Tactical Games Model, Mitchell et al., 2013), there was a prevailing use of questioning and freeze/rehearsal strategies, where students were encouraged to explore solutions to the emergent game-play problems.

There were numerous strategies used by the teacher
to mediate the student-coaches' instruction during peer-teaching activities. Guided practice (short demonstrations of the upcoming tasks conducted by the teacher to the entire class prior to the coaches establishing the tasks within their own teams; Metzler, 2011) and in-task interventions (the teacher pausing game-play to clarify task criteria or/and explain content in different ways; Wallhead and O'Sullivan, 2007) were strategies used mainly in the first season.

The second and third seasons included guided observation exercises (the teacher engaging the student-coaches in observation of their teams' game practice to identify emerging problems and inefficient performance before student-coaches step in to provide instruction/feedback; Farias et al., 2017b), and pre-lesson briefings used mostly in the last season (personalized tutorials provided to student-coaches to explore their awareness of game problems, support their task selection and peer-instruction; Wallhead and O'Sullivan, 2007).

Content development: Table 1 provides detailed information about the tactical problems, game components,

Table 1. Learning content across the three seasons.

Season	Tactical problems	Game components	Content	Main game form	Practice game forms	Modifications
Basketball 20 lessons (45-mins)	Scoring Attacking the basket Using space in attack Defending space/marking	Shooting Passing Dribbling Control Support Mark Cover	Dribbling, chest pass, shooting, control Duel Support, give-and-go, fake and replace, v-cut Dueling	3 vs. 3	1 vs.1 2 vs. 0 2 vs. 1 3 vs. 1	Safety zone for setting up an attack Player-to-player match up No interception allowed during shooting at basket Defense stay one arm's length from on-the-ball play of lower/average skilled players
Handball 16 lessons (45-mins)	Creating/using space in the attack Scoring Defending space/closing space	Passing Dribbling Control Support Shooting Cover Adjust	Pass-and-overlap Width/depth Progressing, freezing the defender, passing to open player Zone defense Tackling	3 vs. 2 plus GK	4 vs.4 3 vs. 3 2 vs. 1	Compulsory passing before shooting No interception areas No interception allowed after give-and-go Extra scoring points for using 2 to 1 plays
Football 18 lessons (45-mins)	Creating/using space in the attack Maintaining ball possession Attacking the goal Scoring Defending space	Passing Dribbling Control Support Shooting Cover Adjust	Progressing, freezing the defender, passing to open player Width/depth, keep open lane Offensive/ defensive cover Crossing wide and shooting Control and shooting Closing 'back door'	3 vs. 2 plus GK	4 vs.4 3 vs. 3 2 vs. 1 3 vs. 1 3 vs. 2	No Interception allowed in each team's defensive zone Only one defender allowed interception in opponent's defensive zone Extra scoring points for using 2 to 1 plays Extra scoring points for using pass-an-go plays

content, game forms and modifications imposed on the game forms practiced by students throughout the three seasons. To what regards content and task progression (Metzler, 2011), students were expected to learn how to play proficiently one main basic game form in each season (i.e., basketball: 3 vs. 3 played in one basket half-sized court format; handball and football: 3 vs. 2 plus dynamic goalkeeper, two goals, a 20m x 15m court). These game forms were practiced in every lesson of every season and all the championship competition matches were disputed while playing these same main game forms. Additionally, the students interspersed practice of the main game forms with practice of modified tasks that were aligned in their tactical structure to the main game form. These practice tasks had either a tactical focus (modified games involving asymmetric opposition relationship: 3 vs. 1) or a technical focus (tasks not involving opposition relationships: 2 vs. 0, dribbling and shooting).

Sport Education model fidelity: The fidelity of the three Sport Education seasons was assessed against the inclusion of the following benchmarks (Hastie et al., 2017): (1) the seasons were prolonged over an extended period of time; (2) the teams were persistent; (3) there was developmentally appropriate competition consisting of modified versions of the formal sport; (4) the students assumed roles and responsibilities other than that of player; (5) team practice of small-sided games was aligned to each season's modified main game form; (6) there was festivity throughout; (7) there were records and accountability systems put in place; and (8) the end of the seasons was celebrated through a festive event.

The videotape records of 12 lessons (four per each season) were randomly sampled. Additionally, for addressing criteria number eight, all the three final lessons of each season were also included in the verification analysis. An outsider observer was invited to examine the videos and code the lessons using the benchmarks checklist. His observations reached 100% agreement that all benchmarks were included in every season. The observer's coding was also checked for inter-observer agreement (agreements ÷ agreements + disagreements; Van der Mars, 1989) of 40% of the sampled lessons. An inter-observer agreement of 100% was reached.

Data collection

The games selected in this study for purposes of Game Performance analysis consisted of the first, and last, formal or informal matches disputed between 'Team A' and 'Team B' in every season. Figure 1 locates the pre-test and post-test moments in the three seasons.

Each of the games analyzed in this study had 10-mins of duration. The baseline for assessment was set at full five minutes of interrupted game-play for every player (time counting was stopped every time the ball went out of bounds, teams swapped courts or during teams' time-breaks to discuss strategy) to guarantee that equal proportions of game-play was coded for each participant (see other studies using similar procedures, e.g., Farias et

al., 2015).

Videotape recording: Videotaped images of all the 52 Sport Education lessons were captured by two crossed-angled cameras located in the gym. One of the cameras was placed at a ground floor level and a second camera was placed at a balcony four meters above the floor level.

Coding instrument and protocol: The coding instrument used in this study was based on the Game Performance Assessment Instrument (Oslin et al., 1998). The GPAI was developed both "to measure Game Performance behaviors that demonstrate tactical understanding as well as players' ability (…) to applying appropriate skills" during game-play (Oslin et al., 1998, p. 231), and "so that teachers could link what was being taught and learned to the assessment of their students" (Memmert and Harvey, 2008, p. 221). In agreement, this study analyzed the game components of *Decision-Making* (DM), *Skill-Execution* (SE), *Support* and *Cover* as the learning content related to these components were commonly addressed in the three seasons.

The on-the-ball game actions coded in this study were included in the category of DM and SE (passing, dribbling, control, shooting, attempting to conquer ball possession). The off-the-ball game-play was assessed through the categories of Support and Cover. Every appropriate decision made, was coded either as appropriate (e.g., passing to an open player) or inappropriate (e.g., passing to a marked player), or successful (e.g., the pass reaches the intended target) or unsuccessful (e.g., the pass does not reach the intended target). In addition, the off-the-ball Support movements were coded either as appropriate (i.e., moves to an open place to receive the ball) or inappropriate (i.e., moves to a spot already taken by a teammate or too far/close of the on-the-ball teammate, or not moving when necessary), and so were the Cover actions (appropriate cover: provides support to the defender attacking the ball; inappropriate: moves inappropriately or not providing support when necessary) (Oslin et al., 1998).

The performance indexes of DM, Support and Cover were calculated using the formula: appropriate ÷ appropriate + inappropriate decision or movement and the SE index was calculated through the successful ÷ successful + unsuccessful formula. Given the high number of variables explored in this study, and because it involved the examination of pre-test and post-test measures in three consecutive seasons, only the compounded measures of Game Performance and Game Involvement are presented in results. The Game Performance index was calculated through the formula: DM index + SE index + Support index + Cover index ÷ 4. Game Involvement was calculated as follows: appropriate DM + inappropriate DM + successful SE + unsuccessful SE + appropriate Support + inappropriate Support + appropriate Cover + inappropriate Cover. It should be noted that for purposes of Game Involvement calculation, only the inappropriate Support and Cover coding entries that actually involved an action (e.g., moving inappropriately to support) were considered.

Coders training and reliability: The reliability of the coding process was examined through intra-observer and inter-observer testing procedures and was calculated using the agreements ÷ agreements + disagreements formula (Van der Mars, 1989).

After the end of the school year, the coding of the pre-test and post-test games in each of the three seasons was conducted during a two-months period by the first author, in a total of 5072 game actions coded. As the first procedural step, the research team established the 'golden standard criteria' for judging the appropriateness/inappropriateness and successful/unsuccessful criteria for every category of the coding instrument. Secondly, the first author and a second coder not related to the study coded together one minute of interrupted game-play per each of six games selected from a different database. This comprised two games per season held in the same lesson of the original database (pre-test and post-test) by different students playing the same main game forms. The games were jointly and systematically coded until the two coders reached agreement in over 90% of the actions coded.

Thirdly, the first author coded all the assessment games. Fourthly, the two coders recoded separately 25 % of the database exceeding the 15% value recommended by Hopkins (2006). The intra-observer reliability showed values of 91% (DM), 95 % (SE), 91% (Support) and 92% (Cover). Inter-observer reliability showed values of 89% (DM), 91 % (SE), 90% (Support) and 90% (Cover). Van der Mars (1989) recommends that values above 80% show strong agreement.

Data analysis

Mean scores and standard deviations were calculated for the Game Performance and Game Involvement measures. All dependent variables were tested for normality according to the Shapiro–Wilks method before performing analyses. SPSS 23.0 statistical package was used to perform repeated measures ANOVA with assumed sphericity to analyze 2 (time: pre-test, post-test) x 3 (group: basketball, handball, football) interactions with a priori alpha set at .01 due to a Bonferroni adjustment. Effect size partial eta-squared ($\eta^2 p$) was also computed. Cohen (1988) provides benchmarks to define small ($\eta^2 = 0.01$ to $\eta^2 = 0.05$), medium ($\eta^2 = 0.06$ to $\eta^2 = 0.13$), and large ($\eta^2 \geq 0.14$) effects.

Results

Descriptive statistics including mean and standard variation values for pre-test and post-test in each season are presented in Table 2. Table 3 indicates the main effects for each of the independent variables and interactions. Table 4 displays the results of the post hoc pairwise comparisons of Game Performance and Game Involvement between seasons and the within-seasons differences (pre-test to post-test). Figures 2, 3 and 4 display the progression of the Game Performance an Involvement means values over the three seasons. The results are presented separately for Game Performance and Game involvement.

Game performance

A 2 x 3 repeated measures ANOVA was calculated to examine effects of time (pre-test and post-test), and group (basketball, handball, football) on Game Performance.

The statistics tests showed significant large effects for time and group, but not for time x group interactions (see Table 3). According to the results displayed in Tables 2 and 4, both the pre-test and post-test Game Performance scores of the second (handball) and third (football) seasons were significantly higher than the pre-test and post-test scores found in the first season (basketball).

There were statistically significant increments in Game Performance from pre-test to post-test in handball and football (see Tables 2 and 4, and Figures 2 and 4). The small pre-test to post-test increment of the basketball's scores (see Table 2 and Figures 2 and 4) was not statistically significant (see Table 2 and Table 4, and Figure 2).

Table 2. Descriptive statistics for Game Performance and Game Involvement.

Category	Context	Pre-test	Post-test
Game performance	Basketball	57.3 (16.6)	66.3 (17.4)
	Handball	81.2 ((8.4)	90.8 (5.6)
	Football	79.9 (8.3)	87.8 (4.2)
Game Involvement	Basketball	60.3 (13.3)	67.3 (8.4)
	Handball	98.7 (14.3)	116.0 (10.0)
	Football	105.7 (12.8)	112.8 (10.3)

Table 3. Summary of analytical outcomes.

Game Performance			
Source	***F***	***p***	***η2***
Intercept	830.89	.000	.989
Time (pre-test, post-test)	31.85	.000	.780
Group (basketball, handball, football)	35.88	.000	.787
Time * group	3.72	.939	.007
Game Involvement			
Source	***F***	***p***	***η2***
Intercept	1539.67	.000	.994
Time (pre-test, post-test)	22.28	.001	.712
Group (basketball, handball, football)	115.48	.000	.928
Time * group	1.96	.169	.179

Game involvement

A repeated measures ANOVA evaluated differences in how participants were involved in game-play throughout the three seasons. Both a main effect for time, and group was revealed, but there were no effects of time x group interactions (see Table 3). Table 2 (means and standard deviation values) and Table 4 (post hoc *p* values) show the differences in participants Game Involvement (see also Figure 4). Specifically, Game Involvement in the second (handball) and third (football) seasons was significantly higher than Game Involvement in the first season (basketball), both at the pre-test and post-test measures (see also Figures 3 and 4).

There was a statistically significant increment in Game Involvement from pre-test to post-test, both in handball and football (see Tables 2 and 4, and Figures 3 and 4). Further, although there was a slight increment of Game Involvement scores in basketball (see Table 2, and Figures 3 and 4), this was not statistically significant (see Table 4).

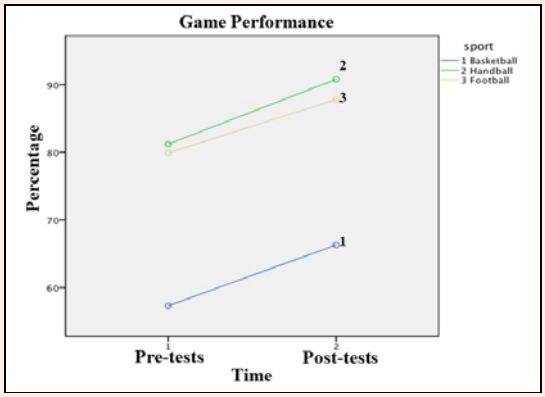

Figure 2. Progression of Game Performance in each of the three seasons.

Table 4. Analysis of differences between sports (in pre-tests and post-tests), and within-sport pre-test to post-test differences, in Game Performance and Game Involvement scores.

Time	Category	Interaction	Mean diff.	Stand. Error	*p*
Pre-test	Game Performance	Handball > Basketball	- 23.90	4.71	.002**
		Football > Basketball	- 22.60	3.93	.001**
		Handball/Football	1.30	1.63	1.000
	Game Involvement	Handball > Basketball	- 38.40	5.83	.000**
		Football > Basketball	- 45.40	5.51	.000**
		Handball/Football	- 7.00	5.36	.671
Post-test	Game Performance	Handball > Basketball	- 24.50	5.20	.003**
		Football > Basketball	- 21.50	5.43	.010**
		Handball/Football	3.00	1.83	.404
	Game Involvement	Handball > Basketball	- 48.70	3.51	.000**
		Football > Basketball	- 45.50	3.94	.000**
		Handball/Football	3.20	1.14	.062
Time	**Context**	**Category**	**Mean diff**	**Stand. Error**	***p***
Pre-test to Post-test	Basketball	Game Performance	- 9.00	4.42	.072
		Game Involvement	- 7.00	4.97	.193
	Handball	Game Performance	- 9.60	2.32	.003 **
		Game Involvement	- 17.30	4.76	.005 **
	Football	Game Performance	- 9.90	2.47	.010 **
		Game Involvement	- 7.10	1.74	.003 **

* $p \leq 0.05$; ** statistically significant at $p \leq 0.01$.

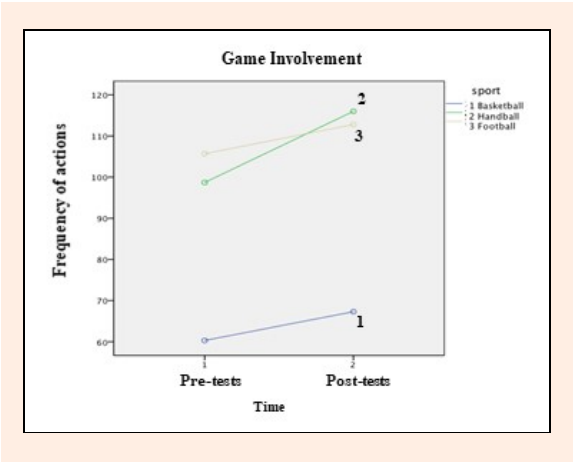

Figure 3. Progression of Game Involvement in each of the three seasons.

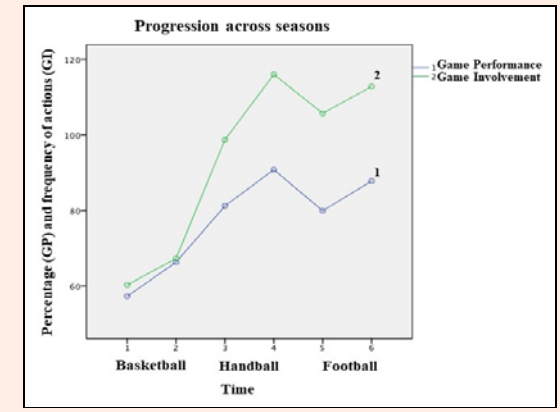

Figure 4. Game Performance (GP) and Game Involvement (GI) across the three consecutive seasons.

Discussion

The purpose of this study was to examine the evolution of students' Game Performance and Game Involvement during participation in three consecutive Sport Education seasons of invasion games. This study found statistically significant pre-test to post-test improvements both in Game Performance and Game Involvement in the second (handball) and third (football) seasons, but not in the first season (basketball). Furthermore, students' Game Performance and Involvement at the entry (pre-tests) and exit (post-tests) of the second and third seasons, was significantly higher than their pre-test and post-test scorings during the first season. The following discussion of the outcomes of this study is organized in reference to two principal considerations: (a) effects of time and contextual circumstances, and (b) effects of task design and transfer.

Effects of time and contextual circumstances

In season one, basketball, although there was a small increment in students' Game Performance and Game Involvement scores, this was not statistically significant. These results are only partially aligned with findings from a few other studies on Sport Education, which have also analyzed competency development in basketball (Hastie and Sinelnikov, 2006; Pritchard et al., 2014). For example, in the study by Pritchard et al. (2014) with participants within the same age range to the participants in this study (seventh grade), there were found increases in Game Performance (Decision-making, Skill-execution, and Support), but in line with the results of the present study, there were no improvements in students' Game Involvement.

Several authors have commonly argued there is a positive association between game-play development and contextual circumstances such as the enjoyment, commitment and cooperative work prompted by the persistent affiliation and festivity features of Sport Education (e.g., Hastie and Sinelnikov, 2006; Pritchard et al., 2014). Likewise, recent research has shown an extension of students' participation in consecutive units of the model as a necessary condition for creating a more equitable context of participation in game-play (Farias et al., 2017a). The study by Farias et al. (2017a) showed that the exposure of students to one sole season of Sport Education was insufficient to dismantle specific gender stereotypes prevailing in the class that were conducive to game-play dominance of boys and students of higher status. Consequently, this led to unbalanced game-play participation of girls and some less-skilled players (see also Brock et al., 2009). As the participant players examined in this study included an equal number of boys, and girls and students of different ability range (i.e., lower-, averaged-, and higher-skilled), and measures were taken by students as a group, any potential low involvement of girls would have led to the overall decline in the average participation rates.

However, these conclusions are speculative in that the analysis of the circumstantial dynamics that accompanied the seasons was beyond the scope of this study. Therefore, we suggest future research should align the analysis of objective measures of students' game-play extended in time with the examination of power relations at a micro level of students' social interactions. As Wallhead and O'Sullivan (2005) emphasized early in the first executive summary of the research conducted on the model, such analysis would bring about deepened knowledge on the relational interplays that might either constrain or enable student participation and game-play development in Sport Education. It would also provide information on potential strategies that teachers might use to counteract such disparities.

Additionally, the outcomes of this study might also be explained by the extended participation of students in consecutive seasons of the model. Indeed, there were found pre-test to post-test improvements in Game Performance and Involvement, both in season two (handball) and season three (football). Taking the case of football as an example, the widespread improvements found in the current study are in opposition to the lack of Game Performance improvements found in the study by Mesquita et al. (2012), also in football. Whereas in the study by Mesquita et al. (2012) students participated in a single season of the model, in the current study, football was the third season.

The recent study by Farias et al. (2017b) examining student participation in a yearlong curriculum of Sport

Education showed that, as students' participation in the seasons progressed, they became increasingly efficient in extending the time available to practice games and game-related activities. The authors showed this was a consequence of students' cumulative efficiency in coping with managerial and instructional duties across seasons. Pereira et al. (2015) further suggested that the mastery of role-playing duties increased the time available for students' active engagement in the learning tasks with a positive effect in their success rates. In every lesson of the present study, the students practiced the main game form within which their Game Performance and Involvement were assessed during the pre- and post-test sessions. It could be argued that such increased time of game practice was beneficial to students' development of game-play performance (Pritchard et al., 2008).

Finally, the persistent membership of students in the same teams throughout the three seasons implied an extension of their participation in debate sessions aimed at strategy and problem solving as a group (Siedentop et al., 2011). Gréhaigne et al. (2010) posit that the tactical reflection inherent to regular participation in debates-of-ideas helps students develop deeper knowledge of each team member's strengths and weakness. It is hypothesized in this study that the extended time granted to students for tactical reflection as members of the same cohort helped them develop increasingly efficient game routines and plans of action with an impact on game-play improvement (Gréhaigne et al., 2010).

Effects of task design and transfer

Given the pronounced differences found in students' Game Performance and Game Involvement when comparing their pre-test/post-test scorings in handball and football against their game-play in the first season, basketball, it is very likely that other aspects beyond time effect were also influential of the results.

An extensive body of literature and empirical research centered on the teaching and learning of sport and games in physical education has recognized increasing importance to the participation of young people in small-sided games and to the effects different constraints and modifications imposed on these games have on learning (Gréhaigne et al., 2010; Mitchell et al., 2013; Slade et al., 2015). The underpinning conceptual assumption of such tactical approaches to content is that learners' acquisition of movement behaviors is dependent on their participation in game forms that are developmentally suitable to students' current learning needs (e.g., Hastie et al., 2017). Furthermore, players' ability to grasp the opportunities for action implicit in the modified game settings and their development of adaptive movement behaviors and successful decision-making are also deemed to progress across different phases of their tactical understanding and skill development (e.g., Gréhaigne et al., 2010).

In attempting a more comprehensive understanding of the results of this study considering the conceptual considerations mentioned above, it is very likely that the configuration of the main form within which students were assessed in basketball was not efficiently modified to afford participation opportunities to all participants and generate improved quality of play. Indeed, some of the average-, and most of the lower-skilled players (particularly girls), benefited of facilitative rules such as no interception allowed during shooting at the basket. Furthermore, their direct markers/opponents were required to stay one arm's length every time these players became in possession of the ball or wanted to progress to the basket through dribbling. However, the 3 vs. 3, player-to-player match-up format of the main game form, implied that while off-the-ball, players were constantly marked at a whole court range, and thus, were continuously attempting to get free from their direct opponents. Although the individually adjusted rules afforded these players with time to think and execute during their on-the-ball actions, the 'man-to-man' defensive format was very likely a constraint just too difficult to overcome by many players. In fact, informal observations of game-play identified numerous situations where several girls stood passively towards inside or by the side of the basket circle waiting for a pass. In the main, several players struggled to deceive their direct opponent in terms of cutting and getting open to receive passes successfully.

On the other hand, the 3 vs. 2 + goalkeeper format of the main game forms used both in handball and football contained modifications that were arguably more favorable to foster players' success and involvement during game-play. In fact, the widespread improvements found in handball and football are in keeping with the results of other studies conducted on the same sports, involving similar game forms, and participants within the same age range (i.e., handball: Hastie et al., 2017; football: Farias et al., 2015; Mesquita et al., 2012). For instance, in the study by Mesquita et al. (2012), specific elements of the tasks played by students, such as only a designated number of players could retrieve the ball, lessened the "game's contextual pressure" (Slade et al., 2015, p. 74). According to Farias et al. (2015), such situational arrangement of circumstances benefits a more secure ball exchange, providing students time and space for deciding appropriately on- and off-the-ball and executing such decisions more efficiently.

Moreover, the recent study by Hastie et al. (2017) in modified team handball, also suggests the asymmetric opposing relation between attack and defense promoted by the 3 vs. 2 + goalkeeper game format, while it keeps true to the parent game of handball, also heightens the amount of successful defensive game-play. First, due the outnumbered attack-defense relation, as players develop growing awareness of the impact of the game conditions on the tactic and motor actions they need to deploy (Kirk and MacPhail, 2002), they are 'prompted' to repositioning systematically to their defensive zones to close space more efficiently (Ward and Griggs, 2011). Second, from an attack point of view, it offers learners "more productive ways to discover and explore the range of decisions and actions available to them", which heightens the players' success and game-play participation (Hastie et al., 2017, p. 324).

In this study, the similarity of the Game Performance scores found between handball and football, both at the pre-test (handball: 81.20 ± 8.40 percent; football:

79.90 ± 8.28 percent) and post-test (handball: 90.80 ± 5.65 percent; football: 87.80 ± 4.16 percent) game-play may indicate a potential transfer of game-play performance (e.g., Mitchell et al., 2013). It could be said that the apparent transfer of ability to make appropriate decisions between handball and football was a consequence of students' participation in game forms (i.e., 3 vs. 2 + goalkeeper) that preserved a similar internal logical and structural configuration (e.g., Gréhaigne et al., 2010). In fact, recent research by Memmert and Harvey (2010) examined young students' participation in different sports (in handball, football, and hockey), but while playing identical game test situations that presented similar tactical problems to players (e.g., attacking the goal, identification of gaps, etc.). Irrespectively of the different motor patterns required by each sport (hands-, feet-, or implements-related skills), the authors found that players transferred the tactical solutions used from one sport to another.

Nonetheless, further consideration should be given to the study of knowledge and performance transfer across sport-based activities. In this study, although seasons two and three highlighted greater Game Involvement and Game Performance than season one, season three did not build 'linearly' on season two. The discrepancy found between the exit scorings of season two (handball) and entry scorings of season three (football) suggests there might be factors related to the internal nature of sports, or other cultural and social aspects, that need further examination.

Finally, although basketball, handball, and football coexist within the same game category, there was a pronounced discrepancy between students' basketball scorings and their scorings in the two other sports. Future studies should conduct a thorough examination of the effects specific elements in the constraints imposed on the small-sided games have on the configurations of play enacted by students (Gréhaigne et al., 2010). In order to inform teachers of the best practices towards effective teaching of games, it is also necessary to deepen knowledge about the elements in the tasks that can either inhibit or enable tactical transfer between games within a same category.

Conclusions

This study presents evidence that Sport Education can be implemented as a curricular approach for the effective learning of games. It also highlights the importance of student participation in consecutive seasons of sports pertaining to a same category as a means to facilitate the transfer of performance across seasons. However, although the effect of time might be paramount to foster the transfer of knowledge on management and instructional role-play across seasons, thus impacting positively in the game practice time, special consideration should be given to the tasks design. Teachers should ponder carefully the modifications imposed on the games and continually reflect upon and adjust those modifications according to students' ongoing responses.

Finally, given the small sampling used in this study, any generalizations of the conclusions derived from this research should be moderate. Future research should conduct performance tracking of a larger number of participants, of different age ranges, while playing games of different categories. In order to uncover potential differences existing in the game-play configuration of different players, future studies should analyze Game Performance and Involvement by taking separate consideration to players' gender and skill level.

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Key points

- The effect of time fostered by the extended participation of students in consecutive seasons of the model was paramount to promote effective gains in Game Performance and Game Involvement.
- Specific modifications imposed on the game, such as asymmetric attack-defense game configurations had a positive effect on the development of the learning outcomes.
- The persistent membership that was extended across sequential units of invasion games helped players build more sophisticated game-play routines and problem-solving.

AUTHOR BIOGRAPHY

Cláudio FARIAS
Employment
Lecturer at Faculty of Physical Education and Sport, University Lusófona of Humanities and Technology, Lisboa, Portugal
Degree
PhD
Research interests
Instructional models, physical education, PETE, sports coaching, coach education, football
E-mail: claudiofariasef@gmail.com

Carla VALÉRIO
Employment
PhD student at the Faculty of Sport, University of Porto, Porto, Portugal
Degree
MSc
Research interests
Instructional models, physical education, sports coaching, coach education, gymnastics
E-mail: carllavalerio@gmail.com

Isabel MESQUITA
Employment
Associate Professor with aggregation at Faculty of Sport, University of Porto, Porto, Portugal
Degree
PhD
Research interests
Instructional models, physical education, sports coaching, coach education, volleyball
E-mail: imesquita@fade.up.pt

✉ **Cláudio Farias**
Faculty of Physical Education and Sport, University Lusófona of Humanities and Technology, Campo Grande, 376, 1749-024, Lisboa, Portugal