

Influence of Teaching Games for Understanding on Game Performance, Knowledge, and Variables Related to Adherence in Youth Sailing

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Purpose: To determine whether a TGfU intervention improved participants' decision-making, skill execution, game performance, game involvement, game knowledge, enjoyment, perceived competence, and intention to continue practicing sailing. **Method:** Participants were 19 sailors (age: $M = 8.44$, $SD = 1.24$ years old). This study followed a mixed-methods approach. The children participated in 12 TGfU intervention sessions and 2 prepost assessment sessions. We designed and validated the sessions, and the coach was trained in TGfU. Data were collected using GPAI during an Olympic triangle race, an ad hoc knowledge questionnaire, two psychological scales, and interviews of children and coach. **Results:** Statistically significant improvements were found in decision-making, $\Delta = 3.97$, skill execution, $\Delta = .43$, game performance, $\Delta = 5.34$, and game involvement, $\Delta = 7.89$. **Discussion/Conclusion:** The results support TGfU may serve to sail training in youth sport. Sailing coaches now have a teaching-learning framework that determines “what” and “how” the tasks must be, the feedback, and participant and coach behavior.

Keywords: TGfU, GPAI, youth sport, sport pedagogy, sailor, optimist

Youth sailing has become a very popular activity but it has received little attention, and it has been studied with different aims. These studies revealed the following: Sailors with more expertise made better decisions (Araújo, Davis, & Serpa, 2005; Araújo & Serpa, 1998); motivation and visualization predicted sailing performance (Fernandes, Bombas, Lázaro, & Vasconcelos-Raposo, 2007); sail training positively benefits participants' social confidence and self-perceptions of capacity to work collaboratively (McCulloch, McLaughlin, Allison, Edwards, & Tett, 2010); key interacting constraints can be manipulated to enhance sailors' perceptual attunement in competition (Araújo et al., 2014); morphological characteristics and knowledge of sailing are not related to each other (Oreb, Prlenda, & Kolega, 2013); and sailors' impressions when changing from optimist to another type of boat (Renom & Subirats, 2004). However, studies in youth sailing reveal a gap in the research of teaching and learning. There are no studies on sailing that use the Teaching Games for Understanding (TGfU) approach or that conjointly rate the variables that determine game performance, game knowledge and adherence-related

variables. The present work is necessary and could support the sailing community, helping participants to achieve greater success regardless of their present level of mastery; achieve significant learning; become independent of the coach; become more involved in practicing sailing; develop tactical understanding, knowledge, and flexible techniques; improve cognitively; increase their motivation; and decide to continue practicing sailing in the future.

TGfU is supported by the constructivist theory of learning (Kirk & Macdonald, 1998). According to constructivism, learning is a process of adaptation to environmental changes through which learners actively make sense of new information by relating it to past experience and knowledge, constructing ways of knowing by restoring a state of cognitive equilibrium to their personal experience (Cobb, 1996). Constructivist perspectives of learning emphasize processes through which learners play an active role, wrestle with problems, propose solutions, explore, answer questions, and carry out ideas.

TGfU is an approach to games teaching-and-learning by which players learn the tactics of game play as they develop skill execution (Bunker & Thorpe, 1982). TGfU interventions take place within the framework of game play and a modified game form. The game form is adapted to the players as they improve to continue to challenge them in terms of game appreciation, tactical awareness, decision-making, and skill execution. Bunker and Thorpe (1982) argued that some categories of games

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(see Almond, 1986) show similar tactical strategies. They suggested that games could be used to teach the main tactics required by each game following four pedagogical principles: Sampling, tactical complexity, modification by exaggeration, and modification by representation (Holt, Streat, & García-Bengoechea, 2002).

TGfU studies have been conducted mainly in school settings and in traditional games (e.g., Allison & Thorpe, 1997; Balakrishnan, Rengasamy, & Aman, 2011; Jones, Marshall, & Peters, 2010; Tejada, 2012; Turner, 1996; Turner & Martinek, 1999; Yang & Lu, 2013). A small number of studies was carried out in extracurricular settings in basketball, soccer, and tennis (e.g., Conte, Moreno-Murcia, Pérez, & Iglesias, 2013; Harvey, Cushion, Wegis, & Massa-González, 2010; Robinson & Foran, 2011). Normally, these studies found improvements in decision-making, game performance, and game involvement but not in skill execution after the application of TGfU. No studies have found a negative effect of TGfU on the variables analyzed.

Sailing is a sport with a high level of uncertainty in which decision-making is just as important, if not more so, than skill execution (Parlebas, 1999). According to Araújo et al. (2014), it is preferable for coaches to teach sailing within the framework of a game race to encourage the development of decision-making. Thus, a modified version of TGfU might improve the teaching of sailing. The purpose of the present research was to determine whether an intervention using the TGfU approach led to the improvement of: (a) decision-making (DM); (b) skill execution (SE); (c) game performance (GP); (d) game involvement (GI); (e) game knowledge; (f) enjoyment; (g) perceived competence; and (h) intention to continue practicing sailing. In accordance with TGfU, our first hypothesis was that, after the sailing sessions, DM, SE, GP, and GI would improve. Secondly, we hypothesized improvements in game knowledge, enjoyment, perceived competence, and intention to continue practicing sailing.

Method

Participants

The participants were twenty-three children from a racing club. The club was randomly selected using a systematic sampling from among 15 sailing clubs in southern Europe. The selection criterion was that the clubs had to have between 10 and 25 sailors in optimist class aged between 8 and 11 years, and with previous sailing experience. The optimist is one of the most popular sailing dinghies. It is a one-person small boat in which youngsters up to age 15 learn to sail (Figure 1). Normally, children are organized by racing clubs and compete at levels in different categories according to chronological age, expertise, and sex, on the weekend or at meetings on almost any stretch of the sea. Only 19 participants (five boys and fourteen girls, $M_{\text{age}} = 8.44$ years old, age range: 8–11 years) completed the study because they met the

inclusion criteria: (a) they only could miss a maximum of two sessions; (b) they had to perform the sessions in an optimist class boat; (c) they had to practice at youth sailing level. The sailors had been practicing sailing in an organized way for 1.73 years ($SD = .56$) through a traditional approach, they practiced 5.15 hours per week ($SD = .60$), on 2 days ($SD = .51$). Outside the club sessions, the children did not practice sailing. The coach was 36 years old; she had 15 years' experience teaching sailing in the same club using a traditional approach. This traditional approach was confirmed during five sessions of observation before the study commencing during which she primarily used direct instruction. During the study, the instructor taught from a pneumatic boat. Participants' parents and the coaches completed informed consent forms, and participants provided their assent. The University's Research Ethics Committee approved the study.

Setting

This study followed a mixed-methods approach. Quantitative data were evaluated using a quasi-experimental pretest-posttest design. In both assessments, data of DM, SE, GP, GI, game knowledge, enjoyment, perceived competence and intention to continue practicing sailing were collected. Between pre- and posttest, an intervention consisting of teaching sailing with TGfU sessions was carried out. Qualitative data were evaluated through an interview of the children and the coach on completion of the study to record their perceptions of the season about the variables we had previously evaluated quantitatively.

Coach's Instruction in TGfU. As recommended by Metzler (2005), we trained the coach during 14.5 hours in TGfU. The training consisted of seven procedures. First, the approach was explained. Second, we showed the coach how to behave during the intervention. For example, coaches should propose challenges adapted to the sailors' capabilities, use a tactical problem as the organizing center to learn tasks, use deductive questions to get students to solve the tactical problem, and promote players' GI. Third, we showed what behaviors were expected from the participants. For example, they should understand how to set up situated learning tasks, and they should make situated tactical decisions. Fourth, we explained the sessions and gave feedback. For example, coaches should use a lot of guides and feedback during situated learning tasks, provide a review that includes the tactical problems of the session, use interrogative and reflexive feedback, and remain open to a range of sailor interpretations rather than to a unique solution determined by the coach. Fifth, we showed the results obtained in studies on TGfU, for example, improvements in variables related to performance and adherence. Sixth, we clarified doubts (Harvey et al., 2010). Seventh, together with the coach, we designed a pilot session that was conducted by her. We filmed this session, which she and we subsequently analyzed, identifying the aspects of her behavior that should be improved.

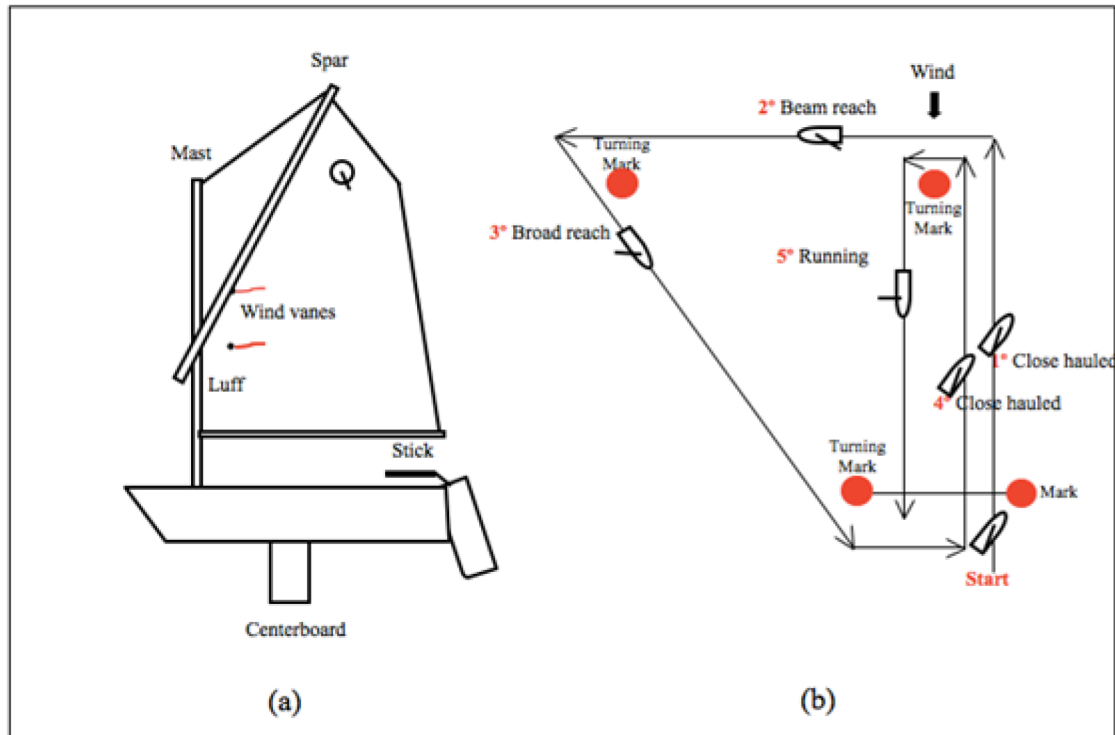


Figure 1 — Optimist (a) and Olympic triangle race (b). *Note:* Olympic triangle race: A sailing course used in racing dinghies. Course: The position that the boat adopts with respect to the wind; the sail is situated at different degrees with regard to the wind. Tack: Turn boat sharply into the wind from close-hauled position, so that it momentarily points straight into the wind with sail(s) flapping and then continues turning until its sail(s) fill again with wind from the opposite side. Port tack: Sailing with the wind coming over the port side of the boat. Gybe: Turn boat further and further away from wind, through the running position, until sails have to swing across from one side to the other. Flapping/fluttering: To swing or sway back and forth loosely, especially with noise. The Olympic triangle race included four courses: close hauled (almost against the wind, 45°), broad reach (135°), beam reach (90°), other close hauled (there are two close hauled), and running (in favor the wind, 360°).

Design of the Intervention Sessions. We designed the 14 sessions (Figure 2) in collaboration with the coach, following the session segments proposed by Metzler (2005): (a) the teacher set up the “game form” so that the participants would work on the tactical aspect similar to a real race; (b) “teaching for understanding” so that the children would reflect on what they had to do and why; (c) “drills for skill” development so that participants would improve their *SE*; (d) return to “game form” so that the participants would perform a task very similar to the initial task; (e) “review and closure” so that the participants would reflect on the integration and understanding of DM and *SE*.

The coach conducted the sessions on Saturdays and Sundays while training sailing from 10:00–13:00, for five weeks. A total of 14 sessions were conducted, of which two were pretest-posttest assessment, and 12 were intervention sessions (Figure 2). Some days included two sessions to guarantee similar environmental practice conditions on knots of wind, temperature, and humidity and to prevent different practice situations from influencing the intervention. Each session lasted 60 minutes. There was

a 30-minute break in-between. Each session consisted of each child sailing in his/her own optimist. These sessions took place at sea except in the “review and closure” session segment, which was conducted at the seashore. The instructor, from her own pneumatic boat, called the children, who were in groups of four or five, to give them the information. She also approached them in her boat to give individualized information. During the tasks, the participants had to choose the best response to overcome a challenge. The challenge was to acquire tactical and *SE* knowledge about the content of the session. Normally, the goal was to arrive at a particular place and, for this purpose, the teacher limited or allowed the use of the body, the centerboard, or the sail, relative to the wind, other boats, and racing rules. For example, in the third session, they had to go from one mark to another in the shortest possible time, only adapting the sail to the direction of the wind.

Data Collection

Verifying the Treatment. To verify the treatment, two procedures were implemented. First, we asked six TGfU

Number	Session content	Focusing on
1	Pretest	Pretest assessment
2	Direction of the wind	Adjust the position of the sails, noting the luff, according to the wind direction
3	Courses	Adapt the sail to the wind direction to choose the appropriate course
4	The centerboard	Adjust the centerboard's position according to the wind direction
5	Wind strength	Adapt aspects of the sail that can be modified to increase the boat's speed, depending on the intensity of the wind
6	Placement of the weight in the boat	Adjust the placement of the body's weight according to the intensity of the wind
7	Beam reach	Adapt the boat's direction (position of the body, sail, and centerboard) in the beam reach course (according to wind)
8	Close hauled	Adapt the boat's direction (position of the body, sail, and centerboard) in the close hauled course (according to wind)
9	Improvement close hauled	Choose the appropriate tack (position of the body, sail, and centerboard) based on roles of the wind and racing rules
10	Running	Adjust the sail on the appropriate side in the running course (according to other boats and wind)
11	Duration of the courses	Discover what course is faster (according to other boats and wind)
12	Wind direction attending to Racing Rules	Adjust the position of the sail, centerboard and the body's weight according to the direction of the wind, other boats, and racing rules
13	Courses more appropriate to pass	Know how to cover another boat to increase the speed according to the direction of the wind, other boats, and racing rules
14	Posttest	Posttest assessment

Figure 2 — Schedule, contents, and focus of sessions.

experts to determine whether the sessions were designed in accordance with TGfU. The selection criteria of these experts were having a Ph.D. related to Physical Education and Sport, and being authors of renowned prestige of more than six years at an international level in implementation and research with TGfU. The experts rated the quantitative (on a scale from 1 to 5) and qualitative overall adequacy of the sessions to the TGfU approach, as well as the feedback and goals, looking at the session plans. Second, an external reviewer confirmed that the coach had implemented the sessions according to Metzler's (2005) TGfU checklist. This expert completed the checklist at the end of each session after watching the live sessions.

Assessment of the Intervention. The children participated in a 30-minute race, performing an Olympic triangle (Figure 1) race for the pretest-posttest assessments. Both assessments were performed on two Saturdays from 11:30–12:00, in similar conditions of wind, temperature, and humidity (pretest: 6 knots of wind, 14

°C temperature and 59% humidity; posttest: 6 knots of wind, 16 °C temperature, 45% humidity).

DM, SE, GP, and GI. Ten observers used the Game Performance Assessment Instrument (GPAI; Oslin, Mitchell, & Griffin, 1998) to assess these variables. Assessment means that each observer classified each sailors' DM and SE either as appropriate or inappropriate for each course (close hauled, broad reach, beam reach, and running), as a function of our definitions of appropriate for each component (DM and SE) in the course (Figure 3). They added the number of appropriate and inappropriate DM and SE (see an example in Arias & Castejón, 2014). Adequate DM included making appropriate choices about what to do during the race. Correct SE corresponded to an efficient performance of the selected skills in each course. DM criteria were defined according to the positioning of the boat with respect to other boats, the wind, and the racing rules. SE criteria were defined according to how the body, centerboard, and sail were used. The

Game component	Course	Criteria
DM	Close hauled	- Start on the favored side (only on the first close hauled).
	Close hauled and Running	- Boat receiving wind on the port tack moved away from the tack of the other boat. - Boat cover moved away from cover.
	Broad reach and Beam reach	- Boat receiving wind on tack moved away from the tack of the other boat. - Overtaking boat remained far from the overtaken boat.
	All	- If it is very windy: Weight outside the boat; not windy: Weight inside the boat.
SE	Close hauled	- Sitting on the side, with legs together and the stick on the knees. - Centerboard fully draft. - Sailing at 45°. - Luff not fluttering/flapping. - Wind vanes parallel.
	Running	- Sitting on the side, forward knee turned toward the mast, rear knee to the ground, stick held at the base, pointing upwards. - Centerboard raised 3/3. - Sailing at 170°-180°.
	Broad reach	- Sitting on the side, with legs together and the stick on the knees. - Centerboard raised 2/3. - Sailing at 120°. - Luff not fluttering/flapping.
	Beam reach	- Sitting on the side, with legs together and the stick on the knees. - Centerboard raised 1/3. - Sailing at 90°. - Luff not fluttering/flapping. - Wind vanes parallel.

Figure 3 — Criteria used to assess DM and SE on the GPAI. *Note.* GPAI: Game performance assessment instrument. DM: Decision-making. SE: Skill execution.

observers gathered the data while watching the live session. Each observer observed two children. Observation was systematic because the observers assessed SE at the beginning and the end of each course, close to the turning marks that delimited the race, and they assessed DM across the courses, with the exception of the beginning.

The GPAI was adapted by consulting 10 expert coaches in youth sailing with more than 10 years' experience, and six researchers with more than six years' experience in the use of the GPAI in different sports. The adaptation consisted of defining the criteria that determined the appropriate DM and the correct SE for each course. We organized five meetings for a total of 10 hours to reach a general consensus. Subsequently, the validity was ratified by the high reliability obtained by the observers and in the observation.

From the sum of the appropriate and inappropriate DM and SE, we obtained the decision-making index (DMI) and skill execution index (SEI) through the

formula used in both cases (Metzler, 2005): Number of appropriate DM or SE / number of inappropriate DM or SE. We obtained the GP from the formula: $[DMI + SEI] / 2$. We obtained GI from the sum of the appropriate and inappropriate SE and DM.

The observers, who were coaches with more than ten years' experience in coaching in the optimist, were trained for 25 hours in the use of the GPAI. We verified observer reliability in GPAI use by measuring interrater reliability of the observation of a 30-minute race fragment, other than the pre- and posttest research race. We verified observation reliability by measuring interrater reliability from the research race, both pre- and posttest. We obtained the reliability of the observation of appropriate/inappropriate DM and SE in the four courses. That is, the observers assessed the same DM and SE as appropriate or inappropriate. We used the percentage of agreement and the Kappa coefficient to measure observer and observation reliability. Observer reliability was greater

than 90%, with a Kappa coefficient of .89. Observation reliability was over 91%, with a Kappa coefficient of .90.

Game Knowledge. We designed an ad hoc questionnaire from the contents addressed in the sessions and in collaboration with the coach. The test consisted of 13 questions related to *SE* (6), *DM* (4), and the rules (3), following the proposal of French and Thomas (1987), with four response options. An example of a *DM* question is: If the wind changes and you go on in the same direction and course, do you think that you will achieve maximum speed and reach the mark in the shortest time? The sailors required about 15 minutes to complete the questionnaire in writing. Game knowledge descriptive data were generated by adding the correct and incorrect responses, coded as 1 and 0, respectively.

Enjoyment and Perceived Competence. Participants responded to the scale validated by Arias, Alonso, and Yuste (2013). This instrument was made up of seven items, four items referring to feeling good or considering oneself to be good at sailing (Cronbach's $\alpha = .95$): 1. After sailing, I felt pretty competent; 3. I think I am pretty good at sailing; 5. I am satisfied with my performance in this sport; 7. I am pretty skilled at sailing; and three items referring to enjoyment of this sport (Cronbach's $\alpha = .98$): 2. I enjoyed sailing very much; 4. Sailing was fun; 6. I would describe this sport as very interesting. Agreement with the items was rated on a 5-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The test required about 5 minutes to complete.

Intention to Continue Practicing Sailing. Participants completed the scale of intention to be physically active (Arias, Castejón, & Yuste, 2013). This instrument was made up of five items referring to the practice of sailing and the intention to continue sailing (Cronbach's $\alpha = .95$): 1. I'm interested in developing my physical fitness by practicing sailing to feel good; 2. Outside of the training sessions, I like to sail; 3. After I finish the present season, I would like to take part in sailing club training; 4. After I finish the present season, I would like to be physically active practicing sailing; 5. I often sail in my free time. Agreement with the items was rated on a 5-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The test required about 5 minutes to complete.

The three above questionnaires were completed, individually and anonymously, by the participants at the pretest-posttest assessments, using a specific number to identify them. The children completed the questionnaire in writing directly after sailing, in a classroom on the seashore. The principal investigator explained that they were not tests and that the participants should complete them in the coach's absence, but in the presence of the principal investigator. The two above questionnaires generated quantitative data for each item. Quantitative raw data were manipulated to calculate the mean value of the items of each variable, adding the values marked by the sailors for each item and dividing them by the number of items of each variable.

Perception of the Sailors and the Coach. We designed two ad hoc interviews. One targeted the sailors as a group (e.g., "Do you seem to have more fun in these sessions than the way you did them before? Why?"). The other interview targeted the coach individually (e.g., "Do you think that they are more competent practicing sailing? Why?"). Although they addressed the same variables, the focus of questions of the two interviews and the language differed depending on the interviewee. These interviews were designed to corroborate the information obtained from the *DM*, *SE*, *GP*, *GI*, game knowledge, enjoyment, perceived competence, and intention to continue practicing sailing at the posttest assessment. The duration of the coach's interview was 10 minutes, and of the children's interview, 25 minutes. The interviews were recorded on a tape recorder.

Data Analysis

Treatment Verification. To determine whether the sessions were designed in accordance with TGfU, we counted the experts' quantitative values to verify that none was less than seven, according to Bulger and Housner (2007) recommendations. Thereafter, we read and contrasted the experts' suggestions about the adequacy of the sessions, feedback, and goals of the TGfU approach. We calculated the percentage of TGfU premises achieved by the coach in each session according to the external reviewer to confirm that the coach implemented the sessions following the approach.

Data Assessment. Statistical analysis of the quantitative data on *DM*, *SE*, *GP*, *GI*, game knowledge, enjoyment, perceived competence, and intention to continue practicing sailing was conducted using SPSS v. 22.0 for Windows (SPSS, Inc., Chicago, IL). Descriptive analyses, through means and standard deviations, were calculated for each variable. We determined the normality of the data through the Kolmogorov-Smirnov test, finding that the data were parametric. The *t* test was used to determine possible significant preposttest differences among the means of the compared variables. Statistical significance was set at $p < .05$. Effect sizes (*ES*) for significant preposttest differences of each variable were also determined. The interviews were analyzed using the categories corresponding to the target variables: *DM*, *SE*, *GP*, *GI*, game knowledge, enjoyment, perceived competence, and intention to continue practicing sailing. All the interviews were transcribed, coded, and analyzed inductively, classifying the response to each variable as positive or negative (Bogdan & Biklen, 1992). We performed the analysis concurrently with data transcription from tape recorder to paper. We read the transcriptions to get a sense of their scope and to detect recurring topics for emerging themes. Data were coded numerically in categories, which were applied to text segments. We analyzed the responses to each question of the interview, calculating the children's percentage of agreement in their responses.

Results

Treatment Verification

The experts' individual quantitative assessment was higher than seven in each criterion: Adequacy of the TGfU approach, adequacy of feedback and goals. That is, according to the experts, the sessions were designed following the TGfU approach. The external reviewer reported that the coach had implemented the intervention following 100% of the TGfU premises in each session.

Quantitative Data

The results showed statistically significant improvements at the posttest compared with the pretest assessment in DM, $t_{19} = -2.59$, $p = .03$, SE, $t_{19} = -3.32$, $p = .01$, GP, $t_{19} = -4.85$, $p = .001$, and GI, $t_{19} = -2.87$, $p = .02$. However, we found no statistically significant differences in game knowledge, $t_{19} = -1.88$, $p = .96$, enjoyment, $t_{19} = -1.00$, $p = .34$, perceived competence, $t_{19} = -.46$, $p = .68$, and intention to continue practicing sailing, $t_{19} = -1.51$, $p = .16$ (Table 1). That is, there was strong evidence that, after the intervention, the participants improved in DM, GP, and GI and that this was no mere coincidence. In addition, statistically significant differences were ratified by the great practical significance of the outcomes in DM = 1.22, GP = 1.78, and GI = 2.10. This meant that the treatment had a significant impact, as we obtained values of *ES* above 1, which were much higher than those obtained for SE = .50, game knowledge = .74, enjoyment = .76, perceived competence = .58, and intention to continue practicing sailing = .61. The participants improved DM by 3.97 points, SE by .43 points, GP by 5.34 points, GI by 7.89 points, game knowledge by 1.44 points, enjoyment by .01 points, perceived competence by .11 points, and intention to continue practicing sailing by .22 points. The improvements after the intervention were extraordinarily high for DM, GP, and GI. The improvements for game knowledge, enjoyment perceived competence,

and intention to continue practicing sailing were smaller because the initial score was high.

Qualitative Data

Figure 4 presents some of the responses of the sailors and the coaches. All (100%) the sailors' statements during the interview indicated that, after the TGfU sessions, they had improved in DM, SE, GP, GI, game knowledge, and perceived competence. Enjoyment and intention to continue practicing sailing were the only two variables in which the sailors were not unanimous about the positive nature of the intervention, obtaining values of 66% and 77% of agreement, respectively. However, both percentages were favorable to the use of the sessions with the TGfU approach. In the interview, the coach said that she had observed an improvement in all the variables analyzed as a consequence of the intervention implemented with the TGfU approach.

Discussion

The purpose of the present work was to determine whether intervention with the TGfU approach led to the improvement of DM, SE, GP, GI, game knowledge, enjoyment, perceived competence, and intention to continue practicing sailing. The results ratified the first hypothesis, as improvements in DM, SE, GP, and GI were obtained. However, the second hypothesis was not verified because results showed no significant improvement of game knowledge, perceived competence, enjoyment, and intention to continue practicing sailing. The results support the constructivist perspective (Cobb, 1996): (a) learners build new learning experiences on their prior knowledge and experiences, (b) learners actively construct knowledge with knowledge and thinking skills intertwined, and (c) learning occurs through social interactions. However, changes may have been due to a host of other factors because we did not use a control group.

Table 1 Means, Standard Deviations, Effect Sizes and Significant Differences of the Variables in the Pretest-Posttest Assessment

Variable	Pretest		Posttest		ES	p
	M	SD	M	SD		
DM	1.44	2.57	5.41	4.95	1.22	*
SE	.90	.82	1.33	1.46	.50	*
GP	1.76	2.47	7.10	4.49	1.78	**
GI	38.66	3.93	46.55	5.17	2.10	*
Game knowledge	7.22	1.98	8.66	2.50	.74	
Enjoyment	4.99	.00	5	.00	.76	
Perceived competence	4.66	.50	4.77	.44	.58	
Intention to continue practicing sailing	4.67	.50	4.89	.33	.61	

Note. DM: Decision-making. SE: Skill execution. GP: Game performance. GI: Game involvement. ES: Effect sizes. * $p < .05$. ** $p < .00$.

Variable	Some interview responses of sailors and coach
DM	Participants: "I've improved my zigzagging", "Now I know when to use each course", "The feedback provided by the coach helped me to understand what to do and why". Coach: "For example, the children have understood why they have to modify the sailing and the centerboard".
SE	Participants: "I have improved SE of the running, the beam reach and the centerboard, now I change them", "I've improved the wind vane, and now I sail better". "Now I understand why it's better to carry out a certain skill because we always reach a conclusion at the end of the session". Coach: "We have got them to hold the stick properly and to sit correctly". "The task drill for skill helps them to understand the most appropriate skill for each action".
GP	Participants: "I have improved a lot in the courses and in going round the turning marks", "I have improved the close hauled and the gybes, I adapt the sailing and the centerboard better to the course". Coach: "There used to be people who did not finish the race or the close hauled completely and now they can finish an entire race; they can finish a race".
GI	Participants: "I pay more attention to my mates and my boat, I change the controls and my position more", "Now we are more involved". Coach: "They have all increased their participation. They are now more focused and more involved in the races". "They seem more active, independent, and autonomous".
Game knowledge	Participants: "I've learned every course, the wind vane, the spar and the right of way". Coach: "The children have evolved and improved their knowledge a lot".
Enjoyment	Participants: "The sessions were fun, entertaining, and I had a very good time", "I liked both of them because I like to sail". Coach: "They had more fun, they noticed a big change, and the sessions were extraordinarily dynamic and fun".
Perceived competence	Participants: "Yes, I've improved in the boat, navigating", "I've improved in the maneuvers". Coach: "Yes, because when they see more results, they feel more confident when it comes to doing things safely, before, when something didn't turn out well, they used to throw themselves onto the ground. They feel more self-confident, and that confidence will make them want to go out on the water more".
Intention to be physically active practicing sailing	Participants: "Now I have more fun because I can learn a new sport and I can go out with more boats, I'm learning more". "I feel the same desire, because last year, I had just as much fun". Coach: "I think that we have fed their "sailing bug", which they didn't feel with the exercises and techniques that they had learned; now, I think that improving through the exercises will be a good way to engage them more".

Figure 4 — Example of coach and sailors' responses on each variable in the interviews. Note. DM: Decision-making. SE: Skill execution. GP: Game performance. GI: Game involvement.

In previous studies, improvements were also observed in DM, GP, and GI (e.g., Allison & Thorpe, 1997; Harvey et al., 2010; Turner & Martinek, 1999). Indeed, in our work, the participants improved SE, in contrast to previous studies (e.g., Allison & Thorpe, 1997; Balakrishnan et al., 2011; Conte et al., 2013; Turner, 1996; Turner & Martinek, 1999). However, our participants did not improve game knowledge, perceived competence, enjoyment, and intention to be physically active, in contrast to previous studies (e.g., Allison & Thorpe, 1997; Jones et al., 2010; Turner, 1996; Turner

& Martinek, 1999; Yang & Lu, 2013). When comparing the interventions carried out in prior studies with the one in the present work, we observe the difference that our intervention was carried out in an extracurricular setting, and the participants had previous experience of the sport. However, there were similarities: The mean number of sessions was 15, their duration was between 45 and 90 minutes, and the sports were of high tactical complexity. This means that, despite that sailing is not an invasion or net/wall game, it has a high level of uncertainty due to the environment and the opponents (Parlebas, 1999), which

requires tactical game understanding to be introduced before *SE*. Under the practice conditions of this work, we showed that TGfU can also be successfully employed in sailing. The results of this work could be the first step toward extending the application of TGfU to other nontraditional games in which DM is very important to improve participants' GP.

In our study, DM changes could be due to the fact that the tasks that we designed required the children to solve problems within a game framework (Bunker & Thorpe, 1982). In accordance with Metzler (2005), the tasks "teaching for understanding" and "review and closure" required participants to experience their actions and reflect on them, as they expressed in the interview (see Figure 4). The pedagogical strategies employed by the teacher—tasks similar to a real race, sailors' reflection, and asking them what to do—could have caused improvement of DM.

In our work, practicing task "drill for skill" could have allowed to the participants how to perform the technique (Butler, 1996; Holt et al., 2002; Jani, Pearson, Forrest, & Webb, 2012). With TGfU, *SE* is incorporated in the game, and the students saw that its application made sense (Turner & Martinek, 1995; Yang & Lu, 2013) as they worked on "drill for skill" and "review and closure" tasks (Metzler, 2005). The participants and the coach mentioned these pedagogical strategies in the interview (see Figure 4).

The GP outcome in the present work could be attributed to improvements in DM and *SE*. This is because GP is the result of the quality of DM and *SE* (French & Thomas, 1987; Harvey et al., 2010). According to Araújo et al. (2005), in sailing, it is important for sailors to learn to adapt their performance to the contextual demands instead of memorizing concepts, due to the high level of the uncertainty that characterizes this sport. Furthermore, a course of action evolves in real time in a sailing regatta and this type of intentional behavior must be rationalized by teaching-learning models centered on DM (Araújo et al., 2014).

The theoretical proposals highlight that TGfU leads to greater participant involvement. Our participants could improve in GI because one of the aims of TGfU is for all the students to participate (Bunker & Thorpe, 1982). According to TGfU, if our study really met the TGfU premises, GI had to increase because: The sailors had to become involved; they were the protagonists of their own learning; they behaved actively and autonomously; and they could solve problems by themselves (Pope, 2005). The sailors and the coach ratified these during the interview (see Figure 4).

According to Turner (1996), learners tend to acquire the knowledge base because the TGfU approach emphasizes game appreciation and tactical awareness. However, the present work compared data from the same group within an organized context in which the sailors already had some prior degree of game knowledge because they had an average of 1.73 years of practical experience in sailing. This could explain the absence of statistically

significant improvements in game knowledge. Notwithstanding the lack of statistically significant differences, their knowledge was higher after the intervention.

The absence of statistically significant differences in enjoyment was due to the fact that, initially, the participants reported a high enjoyment score. According to Holt et al. (2002), interest in the sport and the level of GP development can influence enjoyment. As proposed by Turner (1996), the affective component could be one of the benefits of using TGfU. However, in after-school programs, participants are already interested and motivated to participate in their sport (Robinson & Foran, 2011). The finding in enjoyment has to do with the fact that the participants practiced sailing as an organized sport and they had some years of voluntary practice. According to the literature, such practice conditions are usually related to very high scores in enjoyment, regardless of the intervention carried out (Moreno, Hellín, González-Cutre, & Martínez-Galindo, 2011).

According to Moreno et al. (2011), increased involvement has a positive impact on perceived competence. A greater perception of competence produces higher interest in continuing to practice (Ullrich-French & Smith, 2009). The slight tendency in our study toward a higher mean of perceived competence and intention to continue practicing sailing at posttest could be attributed to the increase in GI after the intervention and to the improvements obtained in the GP variables. However, the differences were not statistically significant because, as noted by Brière, Vallerand, Blais, and Pelletier (1995) and Arias et al. (2013), enjoyment determines the values obtained in perceived competence and adherence to the practice of sports.

This is the first study of the adaptation of the TGfU approach to sailing. The results suggest that the intervention was successful in DM, *SE*, GP, and GI, but the results obtained should be interpreted with caution because there was no control group in the design. However, this means that TGfU may serve as a viable approach to training sailing in youth sport, like in other traditional games. For this purpose, coaches should take into account the following key issues. First, it is necessary for participants to be aware of the reasons for their decision-making and to reflect on them to improve their performance in the real game race context. Second, TGfU provides coaches with a teaching framework that determines "what" and "how" the tasks must be, the feedback, sailor and coach behavior, and it provides learners with a review focused on the cognitive aspects of the session. Third, coaches should consider the following key implications to adapt TGfU to sailing, as we explained in the method section of the present paper. First, tactical complexity can be managed according to the positioning of the boat with regard to other boats, the wind, and the racing rules, given the environment and opponents' continuous change during the race. Second, tasks can be designed as challenges based on the race sailing competitions, which consist of arriving at a particular place but adapted to pupil's age and experience, as a modified game. For this purpose, the four above-mentioned pedagogical

principles should be taken into account (Holt et al., 2002). Third, feedback should promote that, before making decisions, participants first reflect on the influence of the environment and then, on that of the opponents. Fourth, feedback should be given in small groups (four or five boats at the same time). Fifth, the “review and closure” session segment must take place out of the sea. The results exemplify the way the TGfU approach can be adapted to sailing, placing learners at the center of the act of teaching-learning, and showing that learning takes place through adaptation to the environment. This supports the need to ground the foundation of TGfU in the constructivist theory. New studies that confirm our results are needed. Future works should compare the results with those of a control group and with those of participants who possess a knowledge base; they should compare the effect of the intervention according to the participants’ level; and they should collect observational data during the intervention or use stimulated recall interviews.

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