THE CONTRIBUTION OF CONSTRUCTIVISM
IN TEACHING SWIMMING

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ABSTRACT. This article aims to take stock of the possible contribution of constructivism to the renewal of the pedagogy of swimming. If the pedagogies oriented by constructivism have profoundly renewed the ways of understanding the teaching of team sports, the same is not true with regard to the teaching of sports disciplines that are predominantly technical. By identifying the differences and the points in common between the various forms of constructivism, the article proposes a pedagogical framework oriented by this epistemology that can be mobilized in the teaching of swimming. Two case studies and their consequences for learning are proposed in the teaching of butterfly and breaststroke techniques.

Keywords: teaching swimming, learning and teaching of swimming, constructivist perspective.

REZUMAT. Contribuţia constructivismului în predarea înotului. Acest articol îşi propune să urmărească o posibilă contribuţie a constructivismului la reînnoirea pedagogiei specifice înotului. Dacă pedagogiile orientate de constructivism au reînnoit profund modalităţile de înţelegere a predării sporturilor de echipă, nu acelaşi lucru este valabil şi în ceea ce priveşte predarea disciplinelor sportive predominant tehnice. Prin identificarea diferenţelor şi a punctelor comune dintre diferitele forme de constructivism, articolul propune un cadru pedagogic orientat de această epistemologie care poate fi mobilizat în predarea înotului. Două studii de caz şi consecinţele lor în învăţare, sunt propuse în vederea predării tehnicilor de înot fluture şi bras.

Cuvinte cheie: predarea înotului, predarea şi învăţarea înotului, perspective constructiviste.

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INTRODUCTION

Introduction / Statement of problem

Constructivism and pedagogy in teaching swimming

Constructivist perspectives and ideas about or about learning have been a major influence on thinking about teaching and education over the past thirty to forty years (Fox, 2001). As Amade-Escot and O'Sullivan (2007, p.186) note in this regard, "constructivist theories are at the heart of educational thought". However, constructivism does not present itself as a theory or a teaching method, but as a theory of learning (this is why we will speak of "pedagogy oriented by constructivism" and not of "constructivist pedagogy"): the focus is therefore more on student learning than on the behaviour or activity of the teacher. Nevertheless, compared to traditional and prescriptive approaches inspired by behaviourism, constructivism suggests a radically different approach to teaching (Fosnot, 1996; Light, 2008). Initially applied in the context of mathematics education (for a francophone perspective, see for example Vergnaud, 1990), constructivist perspectives on learning have, in the context of more recent contributions to the reformatting of school curricula in the world of teaching physical education.

Thus, while the influence of constructivism is evident in the approaches popularized in the 1960s (Rink, 2001), their contribution was more significant from the 1990s. education is in part due to a renewed interest in the Teaching Games for Understanding (TGfU) approach in those years when researchers attempted to identify the consistency of constructivist explanations of learning. with the learning generated by this approach to teaching sports games (Kirk & Macdonald, 1998). It was also during these same years that French researchers argued the interest of mobilizing constructivist perspectives to rethink the teaching of physical education (Gréhaigne & Godbout, 1998).

Constructivism, to which we also associate the ideas of Lave and Wenger (1991) on situated learning, has therefore significantly influenced the way of thinking about learning and pedagogy in the teaching of games (Kirk & Macdonald, 1998; Richard & Wallian, 2005; Gréhaigne, Richard & Griffin, 2005). However, this contribution of constructivism has been less marked in terms of its mobilization to guide teaching and understand learning beyond games and team sports.

Research carried out in this field, however, suggests that constructivism constitutes an interesting and productive path likely to orient the teaching of other sports activities taught in the context of physical education, such as, for example, creation in dance (Chen, 2001), movement education in primary school (Rovegno & Chen, 2000), or even athletics (Light, 2008).

The writings and research on swimming in France (Catteau A., 2002; Catteau R., 2008; Refuggi, 1998) also suggest, through their references, that constructivist ideas can guide teaching and research on learning in sports swimming. However, this potential contribution of constructivism to the teaching of swimming currently remains a neglected dimension in Romanian literature, we found resources on this topic only abroad.

In the continuity of this work on the learning and teaching of swimming anchored in a constructivist perspective, this article proposes a flexible pedagogical framework for teaching swimming oriented by constructivism.

Theoretical foundation

Constructivist ideas about learning

Diversity of constructivism

Constructivist perspectives on learning reject the idea of objective reality, and in this sense define learning as an interpretive process shaped by experience and knowledge from which learners construct their own version of reality (Davis, Sumara & Luce-Kapler, 2000). However, beyond this apparent unity in the conception of learning, constructivism covers a variety of theories which, although sharing some common principles, may appear contradictory (Davis et al. 2000). These various forms of constructivism can be described from an opposition between a cognitive, psychological and individual constructivism and a socio-cultural/social constructivism (Davis & Sumara, 2003; Fosnot, 1996; Phillips, 1997).

Psychological constructivism is defined on the basis of the work of Piaget, subsequently developed by several theorists who had an influence in the educational field such as Von Glasersfeld (1995). Piaget's ideas on learning developed from his work in adaptive biology and can from this point of view be described as neo-Darwinist (Bronckart, 1999). Within the framework of the "Geneva school", learning is conceived as a process through which an actor actively constructs new knowledge from his past experiences in a process of cognitive rebalancing following a disturbance (Cobb, 1996, p.38). This cognitive constructivism focuses more particularly on the quality of individual interpretation and the development of knowledge, viewing learning as an essentially individual process (Cobb, 1996).

Social constructivism (or socio-constructivism) takes a more macro perspective to view learning as a social and interpretative process. Based on the ideas and work of Vygotsky (1934), but also developed by the later work of Bruner (1966), it was also influenced by the writings of other authors such as Dewey. This form of constructivism questions the almost exclusive focus on individual cognition of cognitive constructivism to propose the idea that learning is

culturally and socially situated within a larger framework of activity. Thus, while both approaches emphasize the importance of experience and activity, notable differences persist, for example regarding the question of whether knowledge is constructed at the individual level or is socially distributed (Cobb, 1996; Davis & Sumara, 2003).

These disparate orientations can however be seen as having more points in common than real divergences, but the diversity of forms of constructivism can also appear problematic (Cobb, 1996; Davis & Sumara, 2003). Several authors have nevertheless attempted to circumscribe these difficulties by suggesting a certain number of principles that all constructivist approaches share in the context of education (Fosnot, 1996) and in the more specific context of physical education (Rovegno & Dolly, 2006).

Davis and Sumara (2003) have thus carried out this work based on what they consider to be the three principles at the heart of constructivism in the formation of a theory of complex learning (CLT). Developed within this framework, the first suggestions for research on physical education teaching in 2008 (Light, 2008) have since gained some recognition in the physical education literature (Jess, Atencio, & Thorburn, 2011).

This CLT does not present itself as an alternative to constructivism but tries to circumvent some contradictions at the heart of the diversity of constructivist approaches so as to usefully guide the teaching of physical education (Light, 2008; Jess et al., 2011).

Complex Learning Theory CLT identifies three principles at the heart of constructivism compatible with complexity theories. These principles are as follows: Learning is a process of adaptation: strongly influenced by the ideas of Piaget, CLT adopts a neo-Darwinian definition of learning by defining it as a process of adaptation and transformation. In this framework, learning is seen as a continuous and complex process of transformation that takes place within "a changing landscape of activity" (Davis & Sumara, 2003, p. 125).

Learning is a social process: CLT recognizes the social nature of learning and cognition and how knowledge is co-constructed within social interactions. From this perspective, cognition and mind are located within what Saito describes as "a broad framework comprising the historical and socio-cultural milieu in which human beings live" (Saito, 1996, p.400). Learning is a holistic process: CLT rejects a realistic conception of cognition and learning as a transmission of knowledge. On the contrary, it envisages learning as an interpretative process without the need for a reference to a pregiven (but on the contrary constructed) external reality and a non-separation between the learner and what is learned.

Swimming instruction and constructivism

In the international literature, interest in constructivism in physical education has mainly tended to focus on the teaching of sports games from the TGfU approach (e.g. Butler, 2006). This interest is primarily linked to the help that constructivism can provide in understanding and optimizing learning within dynamic physical (and social) environments (Light, 2009). Thus, the TGfU approach and its subsequent variations have attracted the attention of researchers and educators alike (Light, 2005).

Constructivism and its developments such as CLT (Davis & Sumara, 2003) or enactivism (Varela Thompson & Rosch, 1993) are thus able to guide the teaching of collective sports games. The dynamic character of the environment as well as its social nature fully justifies pedagogical approaches such as TGfU, "Game Sense" characterized by the importance given to reflection on action (we note here the implicit reference to the work of Piaget entitled "succeeding and understanding"), the debate of ideas (Gréhaigne, Richard & Griffin, 2005) and the collaborative formulation of ideas and tested and evaluated solutions to tactical problems. All these characteristics are thus congruent with the definition of a constructivist-oriented education as defined by Fosnot (1996).

However, a less marked interest in the development of an education oriented by constructivism can be highlighted with regard to individual sports emphasizing technical learning such as athletics and swimming. One of the possible explanations for this weakness is undoubtedly linked in part to the stable nature of the environment in which these activities take place and to the importance given to technique and repetition (Light & Wallian, 2008).

The idea that constructivism can be mobilized to propose a renewed teaching of techniques is also likely to be discouraged by the belief in an oppositional relationship between techniques and tactics that has dominated debates on the teaching of games since the 1990s. and which continues to influence current debates. Unlike team sports, in teaching a discipline like swimming, there is no questioning the importance of technique.

Although there are some tactical considerations in relays as well as over long distances, most of the teaching focuses on technique as a central, if not crucial, aspect (Rusnak, 2008). This does not mean, however, that it should be taught through drill or direct instruction. Beyond theoretical perspectives that see in these forms of instructions a form of illusion (Durand, 2008), one can only note the existence of some gray areas or some paradoxes, like the teaching of decision-making in team sport, in the guiding approaches to teaching in this field.

Let us give an example: while coaches and teachers perform exercises to develop feelings, these cannot be directly instructed in so far as the teacher or coach cannot make the swimmer feel the water somehow. In this context, he

can only provide experiences from which the swimmer is likely to feel something, but this requires an indirect teaching likely to be, in this context, oriented by constructivism. In the next section, we suggest some features that could provide a useful framework for renewed skills instruction guided by constructivist theories of learning. We do not propose here a prescriptive or rigid framework, but rather a framework of thought likely to constitute a tool for the teacher or the trainer based on seven pedagogical characteristics shared by learner-centred approaches and based on the questioning models for the teaching of team sports. This is followed by two practical examples of this type of pedagogy in teaching swimming.

A pedagogical framework for teaching swimming

While acknowledging significant variations in teaching practices, individually, or more broadly internationally, it is possible to recognize a traditional style of teaching and coaching in swimming. This tends to favour direct instructions, to limit interactions between swimmers or between the teacher and swimmers, and to limit in terms of communication these latter interactions to instructions. While in groups of young swimmers, teaching and training emphasize technique, the focus quickly shifts to the physiological aspects once swimmers are engaged in more serious competition. This translates into a heavy commitment in terms of time and energy among swimmers (Lang & Light, 2010). This approach to teaching refers to the idea that the swimmer is a "mute machine" (Light & Fawns, 2001) and is underpinned by an objectivist vision of knowledge where the acquisition of this knowledge is ultimately of the transmission between the teacher or coach and the swimmer.

Under this approach, swimmers become dependent on the teacher for feedback and instruction and are ultimately discouraged from becoming intellectually engaged in their discipline by remaining locked into a form of detrimental heteronomy. Alternatives to this traditional approach to teaching in team sports, such as TGfU (UK), Game Sense (Australia) and Tactical Games (USA) or Pedagogy of Tactical Decision Models (France) employ a pedagogy centred on the learner and based on a student inquiry activity. While these alternatives differ in several aspects, they do share some common characteristics.

They all propose to (1) design a physical environment as a major educational tool; (2) mobilizing a form of questioning between teacher and student to stimulate reflection on action; (3) provide indirect, i.e. non-prescriptive, instruction; (4) fostering communication between students and between students and the teacher, where language plays a central role; (5) promote reflexivity; (6) rely on collective problem solving based on the formulation of tested and evaluated solutions; (7) connect problems and solutions on the basis of the

formulation of principles, rules of action or what Fosnot (1996) calls "big ideas". Even if the teaching of team sports differs greatly from that of the teaching of swimming, the identification of these seven principles is likely to make it possible to usefully guide the teaching of swimming, like that of other sports disciplines.

These seven principles reflect constructivist perspectives on learning as well as proposals for certain propositions developed from constructivism, such as situated learning (Lave & Wenger, 1991), enactivism (Varela, Thompson & Rosch, 1991) or even CLT (Davis & Sumara, 2003). Approaches to teaching that share most of these characteristics can be characterized as constructivist-oriented, with the degree of variation depending on how similar the teaching is to these principles.

The style of teaching offered in swimming is in this context more one of guided discovery than problem solving (Mosston & Ashworth, 1986) insofar as the emphasis is placed on understanding the technique. Ultimately, this style of teaching is not completely guided by constructivist principles that place more emphasis on forms of open inquiry that are more of a problem-solving approach (Fosnot, 1996; Light & Wallian, 2008). This style is nonetheless oriented by constructivist ideas and consistent with the three key principles identified by Davis and Sumara (2003) in their CLT.

In principle, this approach to teaching swimming encourages swimmers to understand why they are using a technique and not simply to understand how to implement it. In this framework, the emphasis is on understanding based on the understanding of principles and rules of action, as in the TGfU approach.

However, significant differences remain. While in teaching team sports the principles are related to the manipulation of space and time, the technique and detail of its execution in swimming is associated with two fundamental concepts of swimming: (1) reducing resistors; (2) increasing propulsion. The linking of the techniques used, and these principles appears capable of enabling swimmers to develop a conceptual understanding of their swimming and constitutes a knowledge base comprising bodily and rational knowledge, as well as a conscious understanding developed from language. It is from this knowledge gradually incorporated through experience that swimmers are likely to interpret what the teacher says to them, what they feel and what they do in the water to develop in as autonomous swimmers capable of asking and elucidating questions on their own.

As in the teaching of team sports, the relationship between body and mind expressed in the relationship between language and action is a crucial question, and illuminates the relationship between an actual, embodied and unconscious knowledge and a rational, conscious and articulate knowledge (Light & Fawns,

2003). Teachers design learning experiences by introducing an obstacle designed as a problem to be solved, allowing time for swimmers to adapt based on adaptation and reflection on action.

The teacher asks the swimmers to reflect and interact with each other to identify the problems and discuss the solutions they have implemented based on their reflection on the action. The next sequence consists of evaluating solutions, discussing these solutions and refining them. These sequences are implemented in small groups who then present them to the whole class.

Throughout the discussions, swimmers are encouraged to relate problems and solutions to the key principles of swimming: reducing resistance and improving propulsion. To facilitate this learning, the following examples incorporate the seven pedagogical characteristics identified as common to learner-centred team sport pedagogies.

RESEARCH METHODOLOGY

Study case 1: The second butterfly wave

This example centers on improving the technique involved in the second butterfly undulation by developing a better understanding of why it is performed and how it fits into running, its primary function being to provide thrust allowing the exit of the head for the inspiratory phase. This example is based on the teaching experience of the author of this article with a small group of competitive swimmers aged between 13 and 16, in Cluj-Napoca. Romania as part of a demonstration of the pedagogy that we argue in this article.

After a warm-up, the swimmers were organized into small groups of two swimmers per line and they were asked to swim the butterfly with one arm by breathing from the front and not from the side. We then asked them how they felt swimming in this particular situation which induced a reduction in propulsion, and to identify the particular difficulties experienced. Most swimmers mentioned difficulty in inhaling as they had difficulty getting their mouth out of the water. We then asked them how they could overcome this problem by guiding them to get an answer about the ripple. We then asked them to identify which undulation was problematic in this situation (there are two undulations per butterfly cycle).

After a discussion with the whole group on this subject, we asked each pair of swimmers to work together for five minutes to discuss, develop solutions to this problem, test them, and evaluate which wave was the most effective and how it should be done. We then asked them to teach each other (Mosston &

Ashworth, 1986) the solutions found for five minutes as well. This involved one swimming while the other guided the work of their pair through observation and by making comments and suggestions before switching roles afterwards. Following this, we brought together the team of eight swimmers to collectively discuss their experiences and asked them to share their findings with respect to the principles of thrust/propulsion and resistance reduction. We ended the session by asking them to perform a full stroke butterfly, asking them to focus and embrace the changes in their second wave, and finally asking them how they felt after the procedure. This sequence can be completed in 20-30 minutes even with a large group of swimmers.

Study case 2: Developing the Sensation of Water

This example reports on an observation made with a coach working with swimmers aged 8 to 12 in a competitive group in Cluj-Napoca, Romania. Developing sensations is an important aspect of swimming correctly, especially in breaststroke. The sensations allow the swimmer an interpretation and an adjustment of his kinesthetic experience which implies an understanding and an implicit learning, that is to say incorporated, which develops over time. However, as important as this sensory experience may seem, this "meaning" is a relatively vague concept for the teacher or coach. Like the "sense of the game" for high-level team sport players, this sensitive aspect of swimming corresponds to a grey area for coaches and teachers: it cannot be developed from instructions direct and is often seen as an innate quality in many teachers or coaches (Light & Evans, 2010). If feeling cannot be taught with direct instruction, coaches design situations in which swimmers have particular experiences from which they learn by doing, and in which feeling and sense experience are the central aspect of learning. While these situations are commonly referred to as "exercises" by teachers, however, it does not involve a simple repetition, a simple practice of technique.

These situations help develop the sense of water and are designed for swimmers to have particular kinesthetics experiences to interpret and use to improve their swimming. One of these situations proposed in the teaching of the breaststroke consists in proposing to the swimmers to perform a sculling movement to propel themselves to feel the ideal positioning of the hands and forearms at the beginning of the arm movement ("front scull").

At the same time, swimmers are asked not to use their legs or in a limited way, possibly by offering them the use of a pull-boy (a video of this type of situation can easily be found on the internet, by example: http://www.youtube.com/watch?v=XIhyw-uAXfo). The problem to be solved for the swimmer then consists in advancing in the most efficient way possible by using only the beginning of the

stroke of the arm in breaststroke. This situation emphasizes the importance of feeling the propulsion achieved during the first part of the stroke and challenges swimmers to execute it efficiently in order to compensate for the imposed constraints. It develops the sensitivity between the forearm, the hand and the water through a process of problem solving exploring the different efficient ways of performing these actions from sensations more than through a conscious cognitive process. Teachers in this setting do not generally offer technical advice, but rather rely on swimmers to develop a mobilizable sculling sensation in the breaststroke.

This situation allows a better feeling of "catching" and the movement of the hands and forearms through the water. This involves a pre-reflective form of consciousness which can be seen as a bodily adaptation or a form of reflection in action (Varela, Thompson & Rosch, 1993). Typically, this type of situation set up by the teacher does not go beyond structuring the experience of the swimmer by performing the exercise. A pedagogy oriented by constructivism would make it possible in this context to prolong and optimize learning. This would involve, for example, asking swimmers to reflect on their experience to build a conscious understanding that can be shared among peers through language. This dialogue then serves the maximization of the thrust which affects both the technical aspects of the scull, but also the sensitive aspects related to the use of this technique. Contrary to a widespread idea in this context, young swimmers are able to describe their sensory experience and share it via language (e.g. Lémonie, 2009) and it is on this possibility that such a type of pedagogy can develop.

RESULTS AND DISCUSSIONS

Even if the first of the examples focuses on technical acquisition and the other on the development of sensations, each of these two practical examples shares the seven pedagogical characteristics of a pedagogy oriented by constructivism as we have been able to describe them. They involve the teacher constructing situations designed to facilitate particular learning and experiences and the swimmer's understanding of their swimming. In both cases, this involves imposing a constraint that the swimmer must overcome, and which involves an exaggeration, as suggested by one of the principles of the TGfU approach proposed by Griffin and Patton (2005).

This is what Davis and Sumara (1997) call an "enabling constraint", that is to say a constraint allowing (enabling) learning. This also implies the use of certain rules by the teacher with regard to how a swimmer can compensate for this constraint so that the teacher can design, structure the situation, but also

guide and encourage learning based on this type of experience. Swimmers are also encouraged to reflect on this experience, which according to Dewey (1997) appears as a second form of experience. They are questioned individually and collectively to stimulate their reflection (individual and distributed) and their dialogue rather than questioned on what they should do, which limits reflection and interactions. They are engaged as active learners rather than treated as passive receivers of objective knowledge. They are encouraged to form small groups to engage in the debate of ideas (Gréhaigne, Richard & Griffin, 2005), formulate strategies and solutions, test them, evaluate them and present them to the class (Fosnot, 1996). This involves interpreting from their previous experiences and interacting with others to build and bring out both their understanding and new knowledge. This refers to a neo-Darwinian conception of learning as a process of change by adaptation suggested by (Piaget, 1974) as well as to one of the three principles of complex learning theory (Davis & Sumara. 2003).

After the setting up of situations offering experiences allowing the emergence of particular problems, the teacher asks questions which, even if they are designed to bring out a predetermined learning, can be of a very free nature, like Wright and Forrest (2007) argue the need for it in the teaching of team sports. At least initially, they should be open in nature (Carlsen, 1991). Swimmers are asked about the key concepts ("big ideas") of reducing resistance and increasing propulsion and thrust.

Understanding the importance of these concepts and how any technique relates to them is likely to enable swimmers to become self-directed learners who understand why a technique is performed in a certain way and who develops reflection in action. If young swimmers understand why they perform a technique in a certain way in relation to key swimming concepts they can build an experience from which, later, more complex instructions can be interpreted and adapted to their own way of life. swimming as a process of production of meanings.

By understanding, we mean not only the ability to reflect and articulate knowledge, but also the idea of embodied knowledge and its emergence. The conversation (Light & Fawns, 2003) between these two ways of knowing allows swimmers an in-action and after-action reflection to take that experience to a reflective level of consciousness for conceptual considerations. This helps to develop young swimmers as independent learners. Of course, they retain the benefit of the assistance of the teacher (or coach) and the social interactions with their peers in which they are actively engaged during the learning process.

The pedagogy proposed here engages swimmers in learning and promotes their ability and inclination to interpret, to work from what the teacher says, to mobilize their reflexivity and to become autonomous learners.

In swimming instruction, this involves more of a teaching style that leads to discovery rather than a problem-solving style (Mosston & Ashworth, 1986) where students are guided to discover predetermined techniques, but where the teacher must be open to new ideas and new solutions. In this sense, the pedagogy that we suggest in the context of this article reflects many of the characteristics of a pedagogy oriented by constructivism as suggested by Fosnot (1996) and relies heavily on the creativity of the students. It promotes experiences and social interactions in which learners face and adapt to physical challenges reinforced by the social aspects engaged through the conversation between an experience of a reflective body and the generation of a dialogue that the body expressed in speech (Light & Fawns, 2003).

CONCLUSIONS AND THE IMPLICATIONS FOR YOUTH SWIMMING

The pedagogy suggested in this article expresses a significant departure from traditional approaches to teaching and coaching. This involves challenges quite similar to those faced by coaches or teachers engaged in the teaching of team sports in physical education and who try to integrate the TGfU approach (Butler, 2005; Light, 2004).

Transforming one's teaching, from a teacher-centered approach to a student-centered approach, implies a change in the role of the teacher: instead of prescribing and directing learning, this change of role implies that accompanies and facilitates student learning. In activities such as swimming where there is a strong focus on technique, this transformation of teaching represents a significant challenge.

For teachers this should not constitute too difficult an obstacle if they are able to draw on and draw from their own experience in teaching other sports disciplines involved in physical education training curricula and where pedagogy involves a learner-centred and inquiry-based approach. However, this obstacle is more delicate for coaches working in an activity characterized by significant control by the coach, reflecting a conception of athletes considered as "dumb machines" (Light & Fawns, 2001).

The approach suggested in this article is also more time-consuming than a traditional approach to teaching but works as a valuable investment for students. Its adoption implies a long-term vision on the part of teachers, coaches and possibly other people involved such as parents. Furthermore, we are not suggesting that each lesson should follow the lesson structure we have outlined

and outlined. Each of the activities that we have proposed in this article takes about twenty minutes and this approach can also be mobilized only when necessary. In a group of competitive swimmers, perhaps it is appropriate to suggest this form of pedagogy at the start of the season before the intensity of training increases. For school-based teaching, however, this approach can be seen as both a good way to have students build their strokes as well as a way for students to learn how to learn.

Young swimmers who learn this way develop a deep understanding of technique and are likely, by becoming true self-directed learners, to identify and correct any technical problems and adapt changes in their technique to their own style. This should be rewarding for coaches, teachers and swimmers alike, although this more egalitarian relationship that promotes swimmer empowerment can be experienced as relatively uncomfortable.

The types of training offered in the training to which aspiring swimmers had to submit may have led to the abandonment of the practice because of the forbidding and boring nature of the type of teaching offered (see for example, Gould, Feltz, Horn & Weiss, 1982; Lang & Light, 2010). This is not just related to the intensive nature of the training, but also to the fact that traditional approaches do not promote intellectual engagement even when adolescents are curious and ask questions and feedback about what they are doing. The pedagogy that we advocate in this article is likely to make the practice of swimming more interesting and exciting in so far as it involves swimmers intellectually in understanding the how and why of their actions. This pedagogy makes them think before, during and after the action, and press the button for the brain to start working.

Helping swimmers to find in learning, to engage in dialogue with their line partners and with the teacher or coach is likely to allow the production of an intellectual and social environment which contrasts with formations where the pupils do not just reproduce, repeat and watch the blue line at the bottom of the pool length after length, day after day. In addition to helping to develop one's technique and improve one's swimming, this form of pedagogy contributes to combating the worrying disengagement from practice at the start of adolescence (Gould et al., 1982). The main problem with the adoption of this type of pedagogy is ultimately the type of more egalitarian relationship that it promotes between the teacher and the swimmers, and which can be experienced as uncomfortable. It is also possible for coaches and teachers to struggle with the development of autonomous learners.

As Lang and Light (2010) suggest in a study of swimming coaches, the preference for high volume training may result from insufficient knowledge of technique on the part of the coaches. Although coaches can develop their own

understanding of technique with this type of pedagogy, the fact remains that the understanding required to engage in a productive dialogue with swimmers can constitute a major obstacle to the adoption of such pedagogy. Even if there are some obstacles to the implementation of this type of pedagogy, we have highlighted in the context of this article all the benefits it allows for young swimmers. If this approach is adopted within the framework of the training of coaches and in the support of swimmers in the youngest categories, it would constitute an ideal preparation for swimmers wishing to engage in competitions.

The less emphasis on physiological aspects and competition in these age categories is thus likely to provide a useful space to engage children intellectually in swimming and to develop a better understanding of the technique by promoting an open mind and curious. If the construction of swimmer education relied on constructivism-oriented pedagogy as we suggest, swimmers aged 14 to 15 could rely on a well-established knowledge and understanding of swimming and would demand careful attention, less sustained than younger swimmers.

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