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REVIEW PAPER

PLANNING AND MONITORING OF SPORTS TRAINING: WHAT IS IT AND HOW TO TEACH IT?

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Abstract

Planning training is an important sport coaching topic. It is frequently taught in large-scale education programs targeting coaches with various profiles and experience. However, there are different ways of delivering planning training, and there is a need to question the content and teaching methods used in workshops that offer education on this topic. The objectives of this article are (a) to present definitions and models related to planning and monitoring training, (b) to present the results of a case study on coaches' experience while participating in workshops that teach planning training, and (c) to reflect on an approach to teaching planning training that is based on reflective practice and critical thinking. The participants were thirteen coaches who attended workshops on planning training. Interviews were conducted with each coach before and after their respective workshops. These coaches also created training plans before and after their workshops, and these were analysed to understand what coaches had learned and what modifications have been brought to their plan. Overall, the workshops were evaluated as being useful, for various reasons. It was difficult to determine precisely what the coaches have learned during the workshops. Results confirmed the conclusions of many authors about the impact of large-scale coach education programs: education on planning training should be tailored on the coaches' profiles and needs, and this education should follow a socioconstructivist approach, emphasizing an experiential and reflective approach.

Key words: *Training, Planning, Monitoring, Coach Educatio*

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Introduction

Planning training in sport dates back as far as Greco-Roman antiquity (Issurin, 2010). The goal was to sequence training content and training loads in preparation for the Olympic Games (Issurin, 2010; Siff, 2003). More modern foundations of training plans date back to the Soviet Revolution. Other countries such as Finland and Germany (*German Democratic Republic*) also contributed to this literature. Frequently quoted authors are often of Soviet origin (*Ozolin, Letunov, Yakolev, Matveiev*) and their work on periodization (*periods/cycles organization*) dates back to the 1950s (Issurin, 2010; Siff, 2003). In the West, planning training began around the late 1940s in England, where work inspired by the Eastern countries included a review of training phases (Siff, 2003).

In the 21st century, planning training is still an important task for a sport coach (Lyle, 2002) but it remains a complex, time consuming and often an unrewarded task. Often, coaches either do not engage in it, or, if they do, do not do it particularly well (Abraham et al., 2015). Many strength and conditioning coaches in North American professional sports (*National Hockey League - Ebben, Carroll, & Simenz, 2004; National Basketball Association - Simenz, Dugan, & Ebben, 2005; Major League Baseball – Ebben, Hintz, & Simenz, 2005; National Football League – Ebben, & Blackard, 2001*) plan training, but little is known about (a) what sport coaches plan, (b) what concepts of planning are coaches taught, (c) what teaching methods are used to teach planning and monitoring, (d) how coaches learned to plan, and (e) what barriers may exist to coaches' engagement in planning (*e.g., lack of knowledge, etc.).*

This paper is divided into two sections. In the first section the topics of planning and monitoring sports training are discussed. This section presents definitions, theoretical concepts, principles and models related to planning training. Monitoring training from three different approaches is presented as well. In the second section, the topic of how to teach planning and monitoring to coaches is discussed. A case study is presented to answer the following research questions: What coaching education format is used to teach planning training? What are the outcomes of the education format used? What are the limits of this approach? Finally, a reflection on potential suggestions to train coaches on planning and monitoring training is presented. It is suggested that planning and monitoring training should complement one another (Lyle, 2002), not only to help athletes to achieve their goals, but also to help coaches who aspire to improve their planning and monitoring skills.

Planning and Monitoring Sports Training

Planning Training. Definition of planning training and rationale for its use. Based on definitions from several authors, planning training is a predictive process based on experience and scientific knowledge aimed at rationally, systematically, and sequentially organizing training tasks and the recovery process in order to reach performance goals at specific times. This process is dictated by (a) the athlete's profile (*training and competition experience*), (b) his training context, and (c) the requirements of the tasks to be performed (Gambetta, 2007; 2015; Issurin, 2010; Kiely, 2011; Lyle, 2010; Plisk & Stone, 2003; Siff, 2003; Smith, 2003; Turner, 2011; Weineck, 1997). It is often referred as periodization of training (Bompa, 1999ab).

There are many reasons that justify the importance of planning training. First, the reflective effort to produce a plan should provide a global vision to everyone concerned by the training process and guide its implementation. It should help to keep the training goals and priorities in perspective (Gambetta, 2007), without losing sight of its purpose. This reflective effort should involve the contribution of everyone involved in the training process such as coaches, assistants, specialists (*integrated support team - IST*), and athletes (*according to the maturity level of the latter*). The goal is to make sure that everyone involved with the athletes is on the same page and moving forward together in the direction set by the coach. Therefore, the integration of many training components such as physical, technical, tactical and mental skills is required (Plisk & Stone, 2003). This joint reflection should ensure that training tasks fit well together to optimize the cumulative and interactive effects of the different methods (e.*g., physiological and motor adaptations*) to achieve the highest level of preparation for the selected events such as training camps and competitions (Hartmann et al., 2015; Weineck, 1997). It could also help to manage fatigue by integrating recovery strategies, and prevent, as much as possible, training plateaus, overtraining symptoms, and, injuries (Brown & Greenwood, 2005; Issurin, 2010; Rhea & Alderman, 2004; Siff, 2003).

Overview of the planning models. The classical (*linear*) model of planning (Bompa, 1999a; Gamble, 2006; Issurin, 2010; Matveiev, 1983; Weineck, 1997) is still presented in much of the literature concerning planning training. The model proposes a progressive arrangement across training cycles (e.*g., macrocycle, periods, phases, mesocycles, microcycles*) which involves: (a) preparation (*general and specific*), (b) competition (*precompetition and main competition period*) and (c) transition (Matveiev, 1983). The start of the preparation period focuses on foundations of basic physical skills (*e.g., endurance, strength and flexibility*), through

high volume, then intensive training, and specific training before the main competition period. In Matveiev's model, the volume and the intensity increases gradually and regularly in the general preparatory phase. In the specific preparatory phase, the volume is reduced from optimal to medium, while the intensity increases to the optimal level. Then, in the main competition phase, the volume fluctuates from high to medium while the intensity varies from high to optimal related to the performance competitions. The model also allows time for recovery as the athlete progresses forward the main competition period or as training becomes more specific (Brown, 2001; Issurin, 2010, Kiely, 2012; Matveiev, 1983).

Many authors have since adapted the cyclical concepts from the classical model of planning. At the microcycle level for example, Issurin (2008) uses the following terminology to define the general objective of a microcycle: (a) adjustment, (b) loading, (c) impact, (d) pre-competitive, (e) competitive, and (f) restoration. At the mesocycle level, authors such as Issurin (2008), and Zatsiorsky and Kraemer (2006) use the terms (a) accumulation, (b) transmutation, and (c) realization while Dick (2007) uses the following terminology for the macrocycles: (a) preparation (*adaptation*), (b) competition (*application*), and (c) transition (*regeneration)*.

Sport scientists and practitioners have expressed concern regarding to the use of the classical model. They have claimed that such a model does not apply to today's high level/professional sport, since the athletes' contextual reality involves an extended period of competitions (Gambetta, 2015; Gamble, 2006; Siff, 2003). Enduring a low to medium volume of training for these extensive periods, which are devoted to maintain previously developed skills, could prevent athletes from achieving peak performance for critical events that occur at the end of the main competition period. The training load and the importance of various competitions are also likely to change during the competitive season, based on on-going results, injuries, opponents and breaks. In such contexts, technical and tactical skills and strategies can still be improved during the competitive season. A clear distinction between preparation and competitive periods thus seems unrealistic. It is also irrelevant to start the short training season (*preparation period*) of high level athletes with a long period of progressive volume of training, with low-intensity training loads used for general methods and exercises. Such prescriptions do not apply to high level athletes who have been training year-round for several years. These athletes could rather benefit from high intensity and specific training methods early in their preparation, as their training backgrounds allow them to handle such training regime (Issurin, 2010; Siff, 2003; Thibault, 2009). Other limitation

of the model is the oversimplification of the model, which emphasizes the training volume and intensity of physical training. It also targets sports where performance relies heavily on physical skills, such as swimming, weightlifting, and athletics, with less regard to sports in which technical and tactical skills may have an impact on performance.

Recently, many models related to planning training have been suggested. Most of them apply to physical skills and are particularly relevant to strength and conditioning coaches. First, there is the nonlinear (*wavelike or undulating*) model of planning (Brown, 2001; Gamble, 2006; Issurin, 2010; Kiely, 2012). It proposes that the training load (*volume, intensity*) varies significantly from microcycle (*week*) to microcycle or from session to session within a week to favor recovery between training (Brown, 2001). For example, series of 8 repetitions at a medium intensity level could be performed on day 1, series of 4 repetitions at a high intensity on day 2 and series of 12 to 15 repetitions on day 3 at a lower intensity. Second, the "Block Periodization" model consists of blocks of training (*mesocycles of 2 to 6 weeks*) where trainings tasks are specific and focused on a minimum set of skills/abilities to prevent interference (Issurin, 2010; Loturco & Nakamura, 2016). For example, during a "block" of training, power and speed (*high intensity training*) could be developed and prioritized while other less important or less specific skills can be maintained for the same time period. The combination of cycles takes into account the "cumulative" effects (*adaptations following a planned, sustained and monitored training*) and "residual" effects (*retention of adaptations, following a systematic and prolonged training after interruption of training*). The coach must therefore know the residual effects of the trained skills (Issurin, 2010). Third, there is the *"*Fractal Periodization*"* model. This model simply consists of repeating and magnifying a similar training load structure, in this case, volume and intensity over a long time period (Brown & Greenwood, 2005). Fourth, the *"*Conjugate Sequence System*"* aims to exploit the effects of fatigue and fitness by arranging consecutive mesocycles (*approximately one month*) where the focus is placed alternately on different skills to create deferred adaptations (Gamble, 2006; Plisk & Stone, 2003; Turner, 2011).

Finally, the "Tactical Periodization" model applies to train athletes/teams participating in sports for which technical and tactical skills prevail (Crespo, 2011; Delgado-Bordonau & Mendez-Villanueva, 2012). This is an integrated coaching approach where the coach assists the athlete in training and competition through training goals and methods that converge on the tactical component of the sport. The model postulates that methodologies and training systems must converge on the organization,

structure, style of play that the coach wants the athletes to adopt, and this, taking the context into account (*level, resources, schedule, etc.).* The tactical dimension is at the heart of planning and defines technical, physical, and mental training. The different skills and abilities are trained simultaneously. In each task, multiple skills are solicited. The technical, muscular, speed and endurance components must not be trained in isolation, out of context, but rather using modified play. The training sessions must aim at the quality of execution, the concentration, the cognitive effort through the proposed exercises. The intensity (*physical and cognitive*) is essential, leading the athlete to be prepared for game situations. The volume applies for high intensity exercises. There is no significant variation of "volume" and "intensity". Physical skills must be optimal and functional over a long time period. Planning must be able to adapt to the unpredictable aspect of the game. There is no longer a peak performance to reach, but rather a high level of performance to maintain. This approach seems to be applicable to sports such as soccer (Delgado-Bordonau & Mendez-Villanueva, 2012) and tennis (Crespo, 2011).

Training principles. The purpose of presenting the preceding models was not to convince coaches to adopt one for their own practice. Rather, from a coach education standpoint, the models were presented in order to borrow ideas and concepts from these models to be adopted in their own practice. Coaches should be able to understand to which athletes and contexts these ideas can be applied, for which skills, and to attain which goals? What resources are necessary for their implementation?

Although these models are different from one another, they are all based on the implementation of training principles. In this paper, we list 12 important training principles that should guide the coach in planning training. Coaches should be encouraged to be creative and competent in implementing key training principles. Full understanding and competent application of these 12 principles are a prerequisite for the development of any training plans. They should be part of the learning objectives of any coach undertaking professional development on planning training, regardless of his/her profile.

1-Individualization: The training load must be based on the athlete's actual state of training (*physical, motor and psychological*), training and competition experience, potential, characteristics and needs (Bompa, 1999b; Kurz, 2001; Norris & Smith, 2002; Weineck, 1997; Zatsiorsky, 1995).

2-Specificity: The effects sought (*adaptations*), and consequently the tasks and training loads, are determined by the physiological, motor and cognitive demands of the sport (Bompa, 1999b; Gambetta, 2007; Kurz, 2001; Norris & Smith, 2002; Saury & Sève, 2004; Siff, 2003;

3-Thibault, 2009; Weineck, 1997; Zatsiorsky, 1995). It is call the SAID principle (*specific adaptations to imposed demands*).

4-Overload: The training load (*determined by the nature, intensity, volume, density and frequency of administration of the stimulus*) must be sufficient (*above a certain threshold*) to cause a temporary decrease in the functional level of the athlete's body (*fatigue*) according to his/her profile, and then, to increase his/her performance (Bompa, 1999b; Gambetta, 2007; Norris & Smith, 2002; Rhea & Alderman, 2004; Thibault, 2009; Weineck, 1997; Zatsiorsky, 1995).

5-Recovery: The state of supercompensation/improvement following a training load is only possible if the organism has the possibility of recovering enough from fatigue or the decrease of its functional level (Gambetta, 2007; Saury & Sève, 2004; Thibault, 2009). A recovery phase is important to restore the athlete's work capacity before a new stimulus is introduced again.

6-Progression: The load and training methods must be respectively increased and adjusted in a progressive and rational way over time for the athlete and his level of development in order to achieve the desired adaptations (*training effects*) (Bompa, 1999b; Gambetta, 2007; Norris & Smith, 2002; Saury & Sève, 2004; Weineck, 1997).

7-Cyclic Character of the Training Process*:* The training load (*tasks, loads, and recovery*) must be planned according to an arrangement of cycles so that the athlete reaches the optimal sport shape/form at the decisive competitions (Issurin, 2010; Kurz, 2001; Norris & Smith, 2002; Saury & Sève, 2004; Weineck, 1997). Therefore, the macrocycle is broken down into periods, phases, mesocycles and microcycles.

8-Variety: The training loads, methods and exercises (*angles of movement, apparatus to be used, etc.*) must be periodically adjusted and diversified to achieve maximal adaptations and prevent the athlete from staleness or becoming saturated (Bompa, 1999b; Gambetta, 2007; Zatsiosky, 1995).

9-Balance: The whole body must be trained to develop strength for the agonist and antagonist muscles thus reducing the risks of injuries.

10-Accommodation or accumulation: The administration of a repetitive stimulus induces adaptation (*habituation*) of the body so that it becomes more resistant to the stimulus which can help inhibit disruption on subsequent exposures (Thibault, 2009; Zatsiosky, 1995). Adaptation requires a sufficient load in terms of intensity, volume, and frequency to stay within the optimal training effect range (Gambetta, 2007; Kurz, 2001).

11-Regressive improvement: Adaptations do not occur in a linear and predictable way over time. They are fast at the beginning of a program,

12-but can also stagnate after a certain period of training (Gambetta, 2007). For a given training stimulus, the increase in the level of development of physical fitness or motor skill decreases as the cumulative amount of training devoted to it increases (Thibault, 2009). Thus as the training experience progresses, the potential for performance improvement is reduced.

13-Reversibility: Adaptations (*changes in the body resulting from training*) are not permanent. If training is not frequent or difficult enough, there is a detraining phase (*loss of conditioning*) (Norris & Smith, 2002).

14-Interference: In some cases, the training of a particular physical skill may temporarily or permanently affect the expression of the performance of another skill. For example, high volume of endurance can interfere with hypertrophy if they are trained in the same microcycle. It is therefore important to optimally organize training tasks to reduce negative interactions between the trained skills (Saury & Sève, 2004).

Monitoring Training. Sport coaches find it important to see the outcomes of their planning. We may then wonder: do they have to wait until the most important events of the season to answer the question? Obviously not. As Lyle (2010) claims, planning training should be seen as an iterative and cyclical process that involves systematic evaluation. This evaluation can be achieved through monitoring training, which means adapting to the reality of what has been planned from measurements of different training variables and responses of the athlete following training (Krantz & Dartnell, 2007). The literature suggests that the external training load and internal training load are measured and quantified to monitor training. The external training load is defined as the work completed by an athlete measured independently of his/her internal characteristics (Scott, Black, Quinn, & Coutts, 2013; Wallace, Slattery, & Coutts, 2009). The number of sets, repetitions, intensity of effort and duration of recovery between sets and exercises are all parts of the external training load. On the other hand, the internal training load is the relative physiological stress imposed on the athlete (Wallace, Slattery, & Coutts, 2009), the athlete's response (*heart rate, fatigue perception-RPE, etc.)* to the external training load (Akubat, Barrett, & Abt, 2014; Impellizzeri, Rampinini, Coutts, Sassi, & Marcora, 2004; Scott et al., 2013). It is important to measure the internal training through the monitoring of training since it expresses the athlete's ability to adapt to the external training load (Impellizzeri et al., 2004; Viru & Viru, 2000). Planning and monitoring are then highly related since the monitoring may provide to the coaches relevant information about the training plan and its development, then allowing coaches to adjust accordingly (Norris & Smith, 2002; Roy, Chevrier, Nadeau, & knowledge

Spallanzani, 2016). The information gathered by regularly monitoring the athletes throughout the sport season should help to improve the training process by potentially: (a) improving the chances of achieving the desired performance (*reaching a peak performance*) at a specific time, (b) identifying athletes who may not tolerate the stress of training load and potentially reduce the risk of over training or injury, (c) stimulating reflection, for both athletes and coaches, which can help them to find solutions to their training problems, and (d) providing material for discussion between coaches and their athletes (Borresen & Lambert, 2008; Casamichana, Castellano, Calleja-Gonzalez, San Roman, & Castagna, 2013; Lyle, 2010, Robson-Ansley, Gleeson, & Ansley, 2009; Roy, Chevrier, Nadeau, & Spallanzani, 2016; Smith, 2003). Teaching how to monitor sport training is a topic as important as the planning process itself.

The figure 1 below illustrates the training process, integrating planning and monitoring training. First, planning training is based on knowledge of (a) the sport requirements, (b) the athlete's profile, and (c) the context. With these information, the coach can set training objectives to give direction to the training plans that will be implemented using appropriate training methods, exercises and loads.

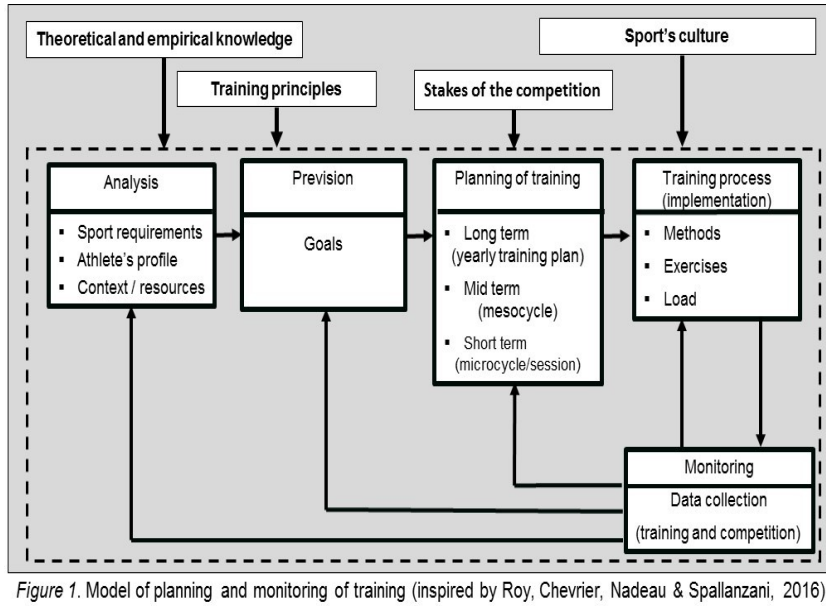

Figure 1. Model of planning and monitoring of training (inspired by Roy, Chevrier, Nadeau & Spallanzani, 2016).

The use of instruments to collect data (*see approaches presented below*) on the athlete's response to training will help the coach to analyze and adjust the training process accordingly. The whole training process is determined by variables such as: (a) the coach's theoretical and empirical

on training, (b) the application of training principles, (c) the stakes of the competition, and (d) the sport's culture (values, habits, etc.).

Monitoring training is based on the use of systems or instruments that help coaches to best measure the internal training load (Robson-Ansley, Gleeson, & Ansley, 2009; Norris & Smith, 2002). Three approaches are proposed in the literature: (a) the objective approach, (b) the physiological approach, and (c) the subjective approach (Borresen & Lambert, 2008; 2009; Foster & McGuigan, 2004; Kelly & Coutts, 2007; Richard, 2011; Robson-Ansley, Gleeson, & Ansley, 2009; Wallace, Coutts, Bell, Simpson, & Slattery, 2008).

The objective approach is based essentially on observation and collection of objective measurements on variables such as (a) volume of training achieved (*number of sets, repetitions*), (b) load lifted, (c) speed, (d) motion analysis, and (e) various sport statistics. This approach may be demanding since it may require (a) to access the training/competition site, (b) to collect real time data or to execute retrospective analysis on data recorded, and (c) to collect and to analyse data for a large group of athletes (Borresen & Lambert, 2009; Deutsch, Kearney, & Rehrer, 2007; Richard, 2011; Robson-Ansley, Gleeson, & Ansley, 2009).

The physiological approach is based on the measurement of various variables related to the functioning of the human body to obtain information about intensity of effort and the physiological adaptation of the athletes. Data that are collected may include (a) heart rate during exercise, (b) oxygen consumption, (c) concentration of blood lactate, etc. Even if those data may be highly valuable, the validity of the measurements and the accuracy of data may be limited by the protocols and devices used and the goals pursued by the training. For example, there may not be any relevance to the assessment of heart rate in very short and intense efforts (*sprint, weightlifting*) or intermittent efforts. Such rigid protocols may require expensive materials and qualified personnel to collect and analyse data. Moreover, all those resources may not be accessible to all coaches and their contexts, particularly for large groups of athletes. Finally, those protocols may be difficult to implement during training sessions or competitions (Borresen & Lambert, 2009; Clarke, Farthing, Norris, Arnold, & Lanovaz, 2013; Foster & McGuigan, 2004; Impellizzeri et al., 2004; Lambert & Borresen, 2010; Little & Williams, 2007; Minganti et al., 2010; Richard, 2011; Robson-Ansley, Gleeson, & Ansley, 2009; Wallace, Coutts, Bell, Simpson, & Slattery, 2008).

The subjective approach aims to describe qualitatively, from the athletes' perspective, the effort or the effects caused by an external training load from various instruments such as (a) training logs, (b) questionnaires

and (c) rating scales (*rate of perceived effort – RPE*). The relevance of this approach lies in its potential application to different types of sports or efforts. Overall, it is a more user-friendly approach for data entry and data analysis. Such instruments can be used for (a) team sports, (b) endurance sports, (c) intermittent efforts, and (d) to assess the athletes' cognitive effort (*tactical sports – decision making*). They are potentially user-friendly since they do not interfere with the course of training sessions and they do not require complex devices or expert analysis. They only require the use of precise guidelines, wording, and references to help the athletes provide reliable information. It is also important that the collected data are compared to those of the same athlete rather to those of others, since the meaning of a "difficult or hard training" may not have the same meaning for every athlete (Borg, Hassmen, & Langerstrom, 1985; Borg & Kaijser, 2006; Foster & McGuigan, 2004; Larue, 2002; Noble, Borg, Jacobs, & Kaiser, 1983; Richard, 2011; Robson-Ansley, Gleeson, & Ansley, 2009; Swank, Steinel, & Moore, 2003; Wallace, Coutts, Bell, Simpson, & Slattery, 2008).

Overall, the use of practical tools to properly monitor training to plan and determine the training load is essential to optimize the training process. The monitoring tools must be user-friendly for both the coach and the athlete, easily understandable (*instructions adapted to the participants, wording of the instruments, etc.*), and accessible (*material used, speed of access*), both for data entry and analysis. The confidentiality of the data is important (Roy, Chevrier, Nadeau, & Spallanzani, 2016); athlete's data should only be known by the concerned athlete and his/her coach. Knowing other athletes' scores may influence someone to provide biased data to be perceived favorably by the coach. For example, if an athlete knows his/her teammates assess the training as of "moderate difficulty", he/she may be tempted to provide the same rating, despite he/she thinks it was a tough one; an unfavourable rating that may be perceived negatively by the coach, maybe as an "out-of-shape" athlete. The athlete must be aware of the potential impact of the information provided for future training plans and be reminded that wrong information is potentially more harmful than lack of information. Data provided may be valuable for the athlete (*training progression*) and for the professional development of the coach. The coach becomes more knowledgeable about the athletes' reaction to various training loads. The benefits of the monitoring protocol depend on the commitment of the coaches to (a) encourage athletes to provide information, (b) analyze the information received, and (c) ensure follow-up during training. The usefulness of the instruments and data collected may differ from one coach to another, whether it is to (a) monitor training, (b) confirm coaches' perceptions, or (c) reflect on the training situation (Richard, 2011;

Robson-Ansley, Gleeson, & Ansley, 2009; Roy, Chevrier, Nadeau, & Spallanzani, 2016). Given the uncontrollable nature of several contextual factors influencing the training process, monitoring training through collected data obtained from the previous approaches is a very important coaching skill (Richard, 2011; Siff, 2003).

Teaching Planning and Monitoring to Coaches. After our presentation of definitions and models, this paper explores how planning and monitoring training should be taught to coaches. For more than 30 years, coaching education programs have been developed to increase coaches' knowledge and, consequently, to improve the quality of coaching. The definition of learning that is used in the following text is based on Hayes (2010): learning can be described as the process that allows the learner to make sense of the information received and to create something new from it; learning transforms and enriches one's current understanding; learning uses the knowledge and new understandings developed through one's experiences to respond more effectively to new situations; learning allows learners to step out of their comfort zone and explore new pathways. Given this definition, it is warranted to explore what coaches learn about planning and monitoring training, and how they learn it.

Planning and periodization of training is a topic covered in large-scale coach education programs (Campbell, 1993). Such education programs are categorized as formal learning situations, which are supervised by institutions where teaching is curriculum-driven (*selection of learning goals, content selection, pedagogical methods, etc.*), and achievement in learning is acknowledged with grades or certifications (Trudel, Gilbert & Werthner, 2010). The teaching paradigm follows mostly a positivist approach: the Learning Facilitator (LF) presents theoretical frameworks or frames of references that must be known by the coaches. Large-scale education can be limited mostly because the content delivered does not meet the coaches' needs, or is not readily applicable to their own context (Gilbert & Trudel, 1999; Trudel, Gilbert, & Werthner, 2010). A major shift was made in Canada in 2005 to restructure the coaching education program (*National Coaching Certification Program – N.C.C.P.*), from a progressive level approach to a contextual approach, according to coaching contexts such as: (a) community sport stream (*initiation, ongoing participation*), (b) competition stream (*introduction, development, high performance*), and (c) instruction stream (*beginners, intermediate, advanced performers*) (Roy, Beaudoin, & Spallanzani, 2010). The new teaching approach is based on "learning by doing". This change may be promising, but coaches involved in the same stream, but coming from different sports, may have different educational needs. Grouping coaches from the same sport may be a valuable

option, since they may experience the same coaching challenges. However, a limitation then may be that coaches would not be willing to share their knowledge with possible opponents (Culver & Trudel, 2008). Despite this adjustment, instruction on planning training has traditionally be limited to informing the coaches on how to design a plan. Building a seasonal/yearly training plan is often a required task. Many concepts taught come from the classical or linear model of periodization (Matveiev, 1983). We may then wonder: Do coaches really need to know how to design a seasonal/yearly plan of training, particularly the volunteer coaches, who work a few hours per week with young athletes? At the "Introduction to Competition" stream, the coaches learn "How to design a practice". However, this module does not deal with the pursuit of multiple objectives in a training session. Would it be more useful for beginner coaches to fully understand and able to implement competently the training principles presented earlier?

A Case Study

Roy, Beaudoin, and Spallanzani (2010) have studied learning outcomes for coaches who attended a module on designing a sport program (*planning training*) from the Coaching Association of Canada. The module was designed for coaches who work with children and/or adolescents who learn basic athletic and athletic skills in a fun and safe environment, where they are usually trained to participate in local and/or regional competitions (Roy, Beaudoin, & Spallanzani, 2010). The module is taught throughout a 3.5 hour workshop. The learning goals of the workshop were to: (a) specify the structure of the coach's program based on the training and competition events it contains, (b) compare the main directions of the coach's program to those proposed by the N.C.C.P. for long-term athlete development, (c) evaluate the athletic development possibilities of the coach's program, (d) identify some possible solutions to increase the athletic development opportunities of coach's program, (e) interpret the information contained in a typical program pertaining to the coach's sports family to identify training priorities and goals at different times, and (f) set training program priorities and objectives in relation to the content of the training sessions on a weekly and daily basis. The goals of this study were to: (a) describe the profile of coaches participating in three "Introduction to Competition - Part B" workshops, on their training context, their planning training practice, and their knowledge and sources of knowledge about the subject, (b) document the coaches' evaluation of the workshop (*perceived usefulness and limits*), and (c) identify benefits of the coaching learning workshop (*what did they learn? Has their way of planning training changed?).*

Methods and Materials

Thirteen coaches from three workshops have participated in the study. A semi-structured interview was first conducted with each coach prior to each workshop to learn about (a) his/her coaching status, (b) his/her knowledge of planning training, and (c) their sources of knowledge about the subject. Each coach also had to submit a training plan for the first interview. No framework or presentation format has been proposed to respect the usual practices of coaches. In the weeks following the workshop, a second semi-structured interview was conducted with each coach. This time, the objective was to collect the perceptions of each coach in relation to the workshop, to know (a) what was his/her evaluation, (b) what was the perceived usefulness of the workshop, and (c) what learning had been achieved during the workshop. Each coach resubmitted a training plan *(no predetermined frame)* for the researchers to determine if there were any differences from the training plan that was initially provided. This process was repeated in the months following the workshop in order to explore the long-term effectiveness of the workshop (*exploring if coaches' evaluations of the workshop had changed, if their learning was sustained, and if their training plans had changed*).

Results and Discussion

Coaches' profiles – their coaching context and knowledge. Results show that even if one of the objectives of the Coaching Association of Canada, when reviewing the N.C.C.P., was to bring coaches together according to the reality of their coaching context, coaches who participated in the study were quite different on a number factors. The sample of 13 coaches differed from one another in age (*ranging from 18 to 65 years old*) and experience (*ranging from 2 to 12 years*), worked in nine different sports (*both team and individual sports*), and some trained more than one team or several groups of athletes if working in individual sport. Coaches also differed from one another on status: some were head coaches, others were assistants; some coaches occupied both these positions. This also contributed to the time spent on coaching, which varied from coach to coach (*ranging from 4 to 40 hours per week*). The amount of time devoted to planning training was also different from coach to coach. This result also varied according to the time of year. The athletes coached by these coaches were also different from one another, by age, level of performance, or participation in competitive or recreational contexts. .

Eleven of the 13 coaches submitted training plans. Some did long-term planning at the beginning of the season and spent little to no time on this task during or after the season. For the most part, a few hours of

planning were done per week, mostly focusing on individual practices or weekly training plans (*microcycle*). Two coaches provided seasonal plans for their athletes. One coach submitted an annual training plan before the start of the workshop. Some coaches lead their practice based on routines, without necessarily writing their plan down. Coaches who devoted more time to planning were essentially those who devoted more time to coaching in general. It is important to mention that coaches spoke about planning using their own set of sports terminologies. Therefore, the terminology used varied from one coach to another. For instance, while the terminology used for features of training load (*volume, intensity, etc.)* were relatively well-known by the coaches, the same terms did not have the same meaning for everyone; the meanings being dependent on the coach's discipline and sport context. This may be a reason why some coaches preferred to be in sport-specific groups for such workshops, as they could communicate through a shared and meaningful vocabulary. The terminology related to cyclical organization of training was lesser known, except for the university students in physical education and kinesiology.

Prior to starting the training workshop, the coaches' knowledge on planning training was already strong. Many coaches knew more about it than they had initially suggested in their pre-interviews. All coaches understood that planning training involves a combination of different training tasks over time in order to achieve goals at specific moments and events. At least ten coaches recognized that these training tasks must consider the participant's profile. Ten coaches also spoke about ensuring the modulating of load and training tasks over time, depending on the importance of the events. Beyond the profile of the participants, nine coaches know that the planning process is initiated by an accurate assessment of the participants, their strengths and weaknesses, as well as their needs. Eight coaches were also aware that fatigue and recovery are factors to consider in planning training, to be ready to perform at important events. Eleven coaches also elaborated on the sequence of different training tasks during their sessions.

The coaches' extensive knowledge on planning training comes from a multitude of sources. For all coaches, knowledge was acquired through interaction with others: (a) coaches of different levels, (b) strength and conditioning coaches, (c) friends, (d) athletes' parents, etc. Knowledge being acquired through experience, especially as an athlete, is mentioned by 11 coaches. The technical workshops offered by the sports' federations were also recognized as significant since ten coaches reported having learned about planning training through this source. Nine coaches also learned about this topic through workshops offered by the N.C.C.P. Three coaches also

participated in other coaching clinics. Five coaches also had taken steps to consult various documents, such as (a) books, (b) DVDs, or (c) websites. Four coaches had also completed, or were enrolled at the time of the study, in a university program that combined the practice of physical activity and sport, namely physical education or kinesiology. Each coach identified at least two significant sources of knowledge about planning training. Overall, informal sources of knowledge predominated other sources. Use of informal sources is dependent on the initiative of coaches, outside institutionalized activities (s*uch as discussions with colleagues*), experience as an athlete and coach, and document retrieval. The results confirmed the conclusions of the research on the contribution of these sources of knowledge (Lemyre & Trudel, 2004; Lyle, 2002; Sage, 1989; Trudel, 2008; Trudel & Gilbert, 2006) and their complementarity, whether formal, non-formal, or informal (Nelson, Cushion, & Potrac, 2006).

Coaches' global evaluation of the workshop. The evaluations of the workshops that were received were favourable. Nineteen of the 23 ratings (82.3 %) were either “very useful”, “useful” or “somewhat useful”. Coaches rated the evaluation most frequently as “Somewhat useful” (39.1 %). University students in physical education or kinesiology had a favorable opinion of the workshop even if they had already been taught the content in their classes. In-depth analysis of the results revealed that the coaches who spent the most time on coaching perceived the workshop as “very useful”. Despite the changes made in the training approach of the NCCP, the limitations raised during the analysis of the workshops are similar to those raised in the literature. First, it is questionable whether teaching “planning training” is a relevant or applicable topic (Abrahams & Collins, 1998) for coaches dealing with young athletes or older participants, who are not aiming to achieve high performance. If the subject taught is not applicable, the workshop may not meet the knowledge needs of coaches (Douge & Hastie, 1993, Haslam, 1990). Second, six coaches discussed how there was too much information presented in a short period of time, a finding also noted in the literature (Lemyre, Trudel, & Durand-Bush, 2007; Trudel & Gilbert, 2006). For one coach who had taken a university course on planning training, his or her perception is different. The short duration of the training activity did not have as great an impact on coach’s knowledge as the four-month university course that the coach had taken. Finally, four of the 13 coaches interviewed expressed a preference to have participants in the training workshop be grouped by sport, or by families of sports (*team sports; endurance sports; etc*.), to have training that would meet their needs.

The limitations raised could be explained by the vast diversity of coaching profiles across nine different sports. The profiles of the athletes

they worked with were also different from one another, and each coach had different coaching education experiences. It can be difficult for the course facilitator to provide examples that could reach all coaches, and even more difficult to deepen the content of the course to meet everyone's expectations and needs. This task may be easier in "integrated" training workshops where coaches come from the same sport backgrounds. It would be interesting to analyze the perceived usefulness and benefits of "integrated" training workshops that are currently offered by sport federations.

These results lead to questions such as: what content is relevant to teach about planning training (*e.g., the yearly training plan*)? Is the classical periodization model the only one to be presented to coaches? Is it more useful to teach how to design other types of plans such as monthly (*mesocycle*) or weekly (*microcycle*) training plans, as they may be more applicable for the coaches in training? How detailed should the training plan be? Is it more relevant to teach training principles that can be applied to various types of planning (*mesocycle, microcycle, etc.*) (Kurz, 2001; Weineck, 1997; Zatsiorsky, 1995)?

What coaches have learned and/or changed. The benefits of the workshops that were discussed by coaches varied greatly from one coach to another, a finding that is held true even if the coaches attended workshops covering the same content. These findings support the idiosyncratic nature of knowledge (Lemyre, Trudel, & Durand-Bush, 2007; Mallett, 2010; Werthner & Trudel, 2009). These findings could be explained by the variance in profiles of the coaches: (a) their different educational backgrounds, (b) their different coaching status (e.g., part time vs. full time), (c) the different sport cultures (*e.g., values, backgrounds*), (d) the various requirements of the sport being coached, etc.

For ten coaches, the workshop was an opportunity to confirm or review their actual state of knowledge, such as the skills progression to be trained and the breakdown of the yearly training plan. Ten coaches also alluded to the usefulness of the documentation handed out in class. Several intended to consult it later. Three of the four students with physical education or kinesiology backgrounds took the opportunity to network with other coaches (*even those beyond their own sports*). It would be interesting to explore the profile of coaches who were willing to share their knowledge with coaches of other sports. Would they be more able to conceptualize shared information, and thus be able to draw parallels with other sports? Would they be more curious? Would they be more confident in their knowledge? These findings are contrasted with one young coach who did not have the same academic training and who preferred to participate in workshops targeting coaches in her sport. More precisely, Roy, Beaudoin, &

Spallanzani (2010) wanted to know what were the learnings acquired by the coaches participating in the workshops. Unfortunately, the data obtained did not provide a clear answer to this question. Indeed, it had been difficult for coaches to clearly determine, beyond any doubt, where their actual state of knowledge came from, and under what circumstances was it acquired. The results could therefore confirm Jarvis' theory (2006) that learning is a process that continues over a lifetime. Since it was difficult from the interviews for the researchers to clearly identify what was learned during the workshop, a description of what the coaches discussed when asked about what they learned from the workshops was developed. Overall, nearly 25 different topics were discussed to express what had been learned during the workshops. The topics that were identified are similar to what had already been mentioned in the pre-workshop interview. Here is list of these topics:

- All coaches (n=13) spoke about training evolution or development that moves from general to specific or the sequencing of training tasks in the long term;
- Twelve coaches talked about the cyclical organization of training;
- Eleven coaches developed the sequencing of tasks, objectives, and priorities during a single training session;
- Ten coaches raised the importance of tasks and athlete analysis;
- Ten coaches discussed physical fitness training (*conditioning*);
- Nine coaches considered the athlete's developmental level to plan training;
- Eight coaches addressed the structure and time breakdown of the training session as well as the training load;
- Five coaches mentioned topics that were not included in the training program and were actually addressed, as confirmed by the observation of each of the three workshops. For example, young coaches in gymnastics have found it useful to work with a training diary and develop tools to appreciate the attitude and presence of their athletes in the training environment. It is worth asking if it was really a limitation of a training workshop to have a course leader who takes the initiative to provide examples and additional information that meets the needs of the participants. This result confirms that the material presented is not standardized from one workshop to another (Gilbert & Trudel, 1999).

The coaches' comments revealed that the workshop did not significantly change their planning practice. In addition to the data that were collected during the interviews, the training plans produced by the coaches were identified as significant sources of information which supplemented and further appreciated the coaches' knowledge on planning training and the impact of the training workshops. The workshop was an opportunity that

allowed coaches to confirm what they were already doing. There were coaches for whom the workshop had not significantly changed their planning practice. This was the case for two coaches who were experienced and who were pursuing their studies in a physical education or kinesiology program and for another coach. There was also a coach who had not changed his planning training practice but he realized that the number of competitions for his team were insufficient, and that he needed to find solutions to develop the athletes he coached. However, these comments suggested that one of the objectives of the workshop was achieved: "Evaluate the athletic development possibilities of your program". There were other coaches who slightly changed the way they plan training. Such changes included: (a) identification of the allocated time within the sessions (*start and end times*), (b) identification and brief description of the training tasks (*skills to be trained*), (c) identification of the duration and sequencing of training tasks, (d) identification of the objective of the session and (e) information on the training load (*volume-number of repetitions to be performed and intensity*).

There were also coaches for whom the workshop had been very helpful. The one for whom the workshop was certainly the most beneficial was a full time soccer coach and a municipal technical director. He devoted 40 hours a week to coaching. From the first interview, he had already developed a yearly training plan. The plan indicated different training topics that needed to be addressed at different dates. Another portion of the coach's plan revealed the frequency of training, the topics to be addressed, and specified the physical, technical and tactical skills to train. His learning required a continued effort to return to the information in the reference documents. He also claimed to have developed confidence in his knowledge - one of the goals sought by coaches' education programs (Douge & Hastie, 1993). Finally, the main contribution of the workshop for a young coach in gymnastics was to help her learn how to produce plans that can help her better manage the attitude and participation of her athletes. This was content that was not part of the original workshop program. These issues may have been brought up as a result of the learning facilitator's initiative to address a discussion about this topic. Finally, beyond the documents collected during the study, two coaches had become aware, after the workshop, that their training context did not provide ideal conditions for developing young athletes; because of this awareness the coaches began considering solutions to these issues.

It was very difficult to judge whether the documents produced by the coaches were high quality training plans and whether training goals that were chosen were appropriate. Even though the researchers were able to

interview the coaches and receive their training plans, there are still questions concerning the evaluation of short, medium and long term outcomes of the training plans, such as (a) the progress made by the athletes, (b) the extent to which they reach their objectives or (c) their perceptions about the training process. Like Trudel and Gilbert (2006), we believe that to be credible and valid, this evaluation must be done in the field, in the real training context. Therefore, it would be interesting for future research to combine the use of systematic observation of training sessions designed by coaches who participated in the workshops with the analysis of their training plans, and perhaps add interviews with the persons involved in the training to help answer these questions. Conducting interviews using technical devices such as video recordings that help access the context of the coaches' interventions (*stimulated recall, etc.)* (Roy, Beaudoin, Perreault, Turcotte, & Spallanzani, 2010; Tochon, 1996) could also be used to explore the rationale underlying the implementation of training plans and actual knowledge on the subject. With all these research methodologies, it may be possible to answer the following questions: Do the training methods favoured by the coaches allow athletes to reach their training goals? Are the methods relevant to the participants' level and profile? The use of mixed-methods approaches (Cresswell, 2014) would make it possible to determine the degree of concordance between (a) the coaches' knowledge, (b) the training plans, and (c) the training conditions offered *(e.g., goals pursued, exercises or drills implemented, training loads, etc.)*.

The purpose of this case study was not to evaluate the quality of the workshops. It seemed however that the workshops had - at various levels - achieved their previously stated goals. For instance, all coaches discussed the fact that the training process must take into account the competitions and important events of the sport season. As well, in their interviews, several coaches referred to the content included in the material that was provided during the workshop, but they did not identify exactly what they picked up from the documents. Some people remembered that the information that was presented in the document tables was complex and that a revision of these would be necessary. Other coaches discussed some of the challenges in their coaching context, including their lack of preparation prior to starting competitions and their lack of competition. It remained to be seen whether these coaches would propose solutions to these problems in the future. The answers of several coaches seemed to suggest that they knew what the training goals and priorities were, in accordance with the different training periods, and coaches were able to schedule workouts, and identify priorities and goals for these workouts. Almost all the documents handed-in by the coaches were session plans. Therefore, the question is whether long-term

planning of training *(seasonal plans or an annual plan)* is relevant for those coaches who work in often uncompetitive contexts. Long-term planning of training can be a time-consuming job (Abraham et al., 2015) and it is questionable whether these volunteer coaches, who - for the most part - spend little time in training, have enough time to spend on this task. Regardless of the type of planning taught, coaches should be aware of the iterative nature of planning, based on monitoring.

Finally, it is important to remember that the conclusions of this research came from coaches who worked in part-time capacities with young, developing athletes. The results may have been different if different profiles of coaches had participated in the study. To have a better understanding of the outcomes of coaches' education programs or learning situations, related to planning training, more research is needed, with different coach's profiles and using various methods. The next section will address different strategies for coaches' education, particularly on the topic of planning and monitoring training.

Conclusions

Reflection on How to Teach Planning and Monitoring Training to Coaches. Despite the content's importance, the format used to teach the planning and monitoring of sports training is an extremely important matter. This may beg the question: what are the most relevant strategies, or learning situations, to teach planning and monitoring training? It must be kept in mind that these coaching tasks are complex (Abraham et al, 2015) because preparing to reach performance involves the integration of many variables, such as the physiological, psychological, technical, and tactical requirements of the sport (Smith, 2003); the specific particularities of the training context such as the athletes' profiles and level of development; and the resources available (Côté, Salmela, Trudel, Baria, & Russell, 1995). The reflection needed to integrate all these variables into a plan may justify why planning and monitoring training is important. However, what is the best way to facilitate this reflection, to acquire meaningful learning? To what extent can large-scale training programs contribute to improvement in planning training? It will depend on the objectives pursued by these learning situations and the profile of the candidates who participate in the workshop. The previous sections have demonstrated the benefits of a large-scale education program on planning training, which targeted mainly part-time coaches who worked with young athletes in development. Essentially, the findings of the work summarized above revealed that this type of program can certainly be useful in the initial stages of coaches' education to (a) emphasize the importance of planning and monitoring training,

(b) introduce new materials, such as training principles, (c) validate some of their knowledge, (d) transform and enrich their understanding of the concepts taught (Hayes, 2010) that are applicable to several contexts and (e) for some coaches, to change their practice related to planning. However, the consequences were somewhat limited and less significant because the information conveyed did not necessarily meet their specific needs, which may have made them less prone to question their practice. Thus, it is necessary to question the motivation level of coaches when they attend activities of a large-scale education program. Coaches may be motivated to attend because the course is mandatory, and they may receive certification which would improve their professional status. The main challenges for large-scale learning situations are (a) to bring coaches with similar profiles or needs together, and (b) to present well-targeted content to meet the needs of these coaches. As noted and mentioned in the literature, these learning situations should continue to allow coaches to interact with each other because they can possibly share useful and relevant knowledge. It remains to be seen whether if in such groupings, coaches would be inclined to share their knowledge with potential rivals (Culver & Trudel, 2008). It could then affect their chances of success, if it were determined by competitive criteria, such as win-loss record.

The learning of planning and monitoring training that leads to a higher level of competence would benefit from learning situations that are grounded in the coaches' contextual reality and rely on coaches taking their own initiative. Non-formal situations - training situations essentially offered from the perspective of ongoing education in the form of clinics or short-term workshops, where participation is based on a voluntary basis, without any prior requirements - and informal situations - situations outside the coaching system, such as interaction with colleagues, search for information on the internet, etc. – have proved to be potentially significant learning situations (Trudel, Gilbert, & Werthner, 2010). Coaching education on planning and monitoring training should not be limited to a better understanding of the concepts taught. Learning situations should lead the coach to (a) use the new knowledge and understandings developed through experiences to respond more effectively to new challenges, (b) create something new from the learning situation, (c) step out of their comfort zone and explore new pathways to move beyond their actual practice, and (d) innovate, to experiment, to adapt, to reflect and to build their own training plans and monitoring systems (Hayes, 2010; Lyle, 2002).

The most promising avenue to teach coaches planning and monitoring of sports training should be part of a constructivist approach (Trudel, Culver, & Werthner, 2013) where coaches "build" their knowledge

as a result of doing, thinking and feeling (Jarvis, 2006) - starting from their actual knowledge base and previous conceptions (Vienneau, 2017). This knowledge can be (a) declarative *(knowing the theory, planning models, training principles, etc.),* (b) procedural *(knowing how to design a plan, based on theoretical knowledge)* or (c) contextual *(knowing when to prescribe various trainings, to whom, when, etc.)* (Tardif, 1997; Tochon, 2002). Moreover, learning will be part of the socio-constructivist approach (Vienneau, 2017) when learning is built by the coach, but this time, through socio-cognitive interaction with significant persons such as training specialists, mentors (Bloom, 2013), or with other competent coaches who are willing to share their knowledge and experience.

Who can play the role of learning facilitator (LF) or mentor? What characteristics, knowledge and skills should the LF possess? Note that this role can be played by more than one person to make learning situations more meaningful, and more conducive to learning. The LF must be a credible person in the eyes of the coach. He/she is ideally a recognized expert in the field of coaching, so that a climate of trust can be established between the two parties. Hopefully in one-on-one situations, the interaction between the LF and the coach should facilitate openness to learning and motivation to change his or her cognitive structure (Rodrigue, He, & Trudel, 2016; Trudel, 2008). The LF has to be someone who knows the subject matter *(planning and monitoring)* and its practical challenges, so that they can share their knowledge and experience that is relevant to the needs of the coach in training. Finally, the LF has to be someone who understands the requirements of the sport discipline in terms of physical, technical, tactical, strategic, and psychological factors, in order to guide the coach in the methodology of training (*e.g, what, when, and how to train?*).

Just as important as training and sport knowledge, the LF benefits from having pedagogical knowledge (Shulman, 1987). The process should be part of an experiential process (Nelson, Groom, & Potrac, 2016). Practical experience is necessary but must be complemented by LF teaching skills. Along with this "lived experience", there must be the continued use of a reflexive process (Bourassa, Serre, & Ross, 2007). Reflection leading to learning must be systematic and well-coached. The LF and the coach both have major roles in this process. The LF must guide the coach's reflection and develop his or her skills and competencies by proposing relevant problems, and exposing challenging situations taking into account his or her previous experiences and biography (Jarvis, 2006). The LF must avoid providing coaches with someone else's "recipes". Rather, the LF should be supporting coaches to (a) solve relevant problems through feedback and questions to stimulate thinking, (b) develop functional tools for specific

training contexts, and (c) solve problems and bring the coach out of their comfort zone to explore new pathways (Hayes, 2010). The coach must apply the LF lessons to their contextual reality. He/she must also solve problems, think, and analyze their actual practice to (a) break habits, (b) create knowledge, (c) conceptualize and structure his or her practice and (d) transform his experience into knowledge through affective and cognitive transactions within the training context (Day & Newton, 2016, Nash, 2016).

Different models can inspire both the learning process and the understanding of reflective practice, including Kolb's (1984) four-step cyclic experiential learning model. Table 1 illustrates the four stages of his model and potential questions related to this topic in order to guide reflective practices of the coach. As mentioned earlier, planning training is an iterative process, hence the importance of monitoring training. The questions proposed in Table 1 imply the use of data collected by the coach during the training process (*monitoring*).

The data collected would then help the coach to achieve his or her goals, by making adjustments to his or her plan, but would also contribute to his or her learning.

Table 1

Reflection on planning and monitoring of training, based on Kolb (1984) cycle of experiential learning

Stages	Possible questions
Concrete experience - the coach performs a task, lives a coaching experience and mobilizes her/his knowledge. Possible emergence of a problem to be solved.	▪ What are the objectives pursued? ▪ What is the problem? ▪ Why is this a problem? ▪ What factors explain this situation?
Reflective observation - the coach observes, interprets, reflects on the lived experience, its meaning and analyze her/his experience.	▪ What did / did not work? ▪ Why?
Abstract conceptualization - the coach conceptualizes, structure and builds his knowledge, resulting from his experience.	▪ What are the indicators (resulting from the monitoring) which allow you to answer this? ▪ What concepts, what principles of training are at stake?
Active experimentation - the coach confronts her/his knowledge with reality, deduces hypotheses of action, verifies his conceptions by active experimentation (problem solving).	▪ What solutions (exercises, methods, loads, etc.) are envisaged? ▪ What to do? What not to do? ▪ What will be your plan for next time?

The model of Gilbert and Trudel (2001) also proposes an interesting and complementary approach to better understand the reflexive approach, through a reflexive conversation. The authors explain that the coach is confronted with one or more problems that he must solve, in light of his frame of reference. The coach starts off by identifying the problem, alone or

with the help of colleagues. He/she follows-up with a strategy or solution to solve his/her problem either by (a) creating it, (b) finding an answer with the knowledge he/she has or (c) consulting various resources. The coach then implements the strategy or solution in the "*real*" or "*virtual*" world. He/she then evaluates it, and according to his/her analysis, decides if it can be integrated into his/her repertoire of solutions or knowledge. In addition to making the coach competent in planning and monitoring training, the reflexive approach can ultimately lead the coach to develop an important competency that should become a priority in any coaching education situation: critical thinking (Gilbert & Trudel, 2013; Hickson, 2011; Trudel & Gilbert, 2013; Willingham, 2008). It is defined as an evaluative practice based on a reflexive, self-critical, or even self-correcting approach. It involves the use of different resources (*knowledge, thinking skills, attitudes, people, information, material*) to determine what is reasonable to believe (*epistemological conceptions*) or to do (*methodological and ethical interventions*) by carefully considering the criteria to choose and contextual diversities (Gagnon, 2010). Getting information on the impact of training plans is a priority. However, the coach must know how to analyze and use information carefully when it comes to planning and monitoring training. It is a particularly important competency in the present era where information is circulating rapidly and where coaches are looking for immediate solutions, without always rigorously analyzing the rationale behind the proposed potential solutions. The solutions adopted are often dependent on the reputation of the authors. Many coaches only replicate their colleagues' practice, embedded in their sport culture or what they have done previously as athletes (Trudel & Gilbert, 2006). Being competent in planning and monitoring training coupled with critical thinking requires, beyond a knowledge of the different models presented above: (a) patience and resilience, because training plans are often a "work in progress", constantly adjusted and nuanced experiences, (b) humility, as there is no guarantee that the plan will achieve the desired results, even if the same plan has worked well in the past, in similar or different contexts - training applies to the human being with all its complexity and (c) open-mindedness to new emerging elements of solution. Once the coach has developed this critical thinking skill, then perhaps one could hope for a transformative learning experience with regards to planning and monitoring training: "The process by which we transform problematic frames of references (*mindsets, habits of mind, meaning perspectives*) – sets of assumptions and expectations – to make them more inclusive, discriminating, open, reflective and emotionally able to change" (Mezirow, 2009, p. 92).

The researchers of this study wanted to let the reader determine if the proposed solutions to coaches' education on planning and monitoring training are relevant and if they could be applied in their own context. While the researchers emphasize their awareness of the idea that large-scale education programs allow for the teaching of many coaches, more individualized learning situations that emphasize reflective practice, are likely to be more relevant for a limited number of coaches who aim to pursue full-time or high level coaching. However, this is with recognition that an individualized approach may require more time and resources (*e.g., access and availability of learning facilitators, etc.*). The proposed solutions in this paper to develop coaches' learnings on planning and monitoring training, could be applied to many sport coaching tasks, beyond planning and monitoring training**.**

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