

HIERARCHICAL STRUCTURING OF KNOWLEDGE IN BASKETBALL GAME

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Review paper

Abstract

The purpose of this study is to identify and explain hierarchical structure of knowledge in basketball game that can be applied to the entire formal tree model in sport games with the ball. Structural approach was used in the analysis of knowledge in basketball game. Here knowledge is shown as a hierarchical structured binary tree. The basic categories of the tree in this hypothetical model from the hierarchical viewpoint are: strategy, tactics, state of the game, jobs in the game, basic elements and techniques of the game and individual tactics. Furthermore, it is important to emphasize that the central point in this study belongs to jobs in the game, which are defined as an ordered series of game's basics. In top sports, it is necessary to apply the methodology for assessing the knowledge and skills based on theory of time series. On the other hand, basketball as a complex sporting activity was treated as an ordered series of tasks in the game. Here expert coaches should concentrate on evaluation of each type of player compared to the success of doing business in the game. It is believed that hierarchical structure of knowledge in basketball game forms the basis for implementation of research knowledge of structural analysis in other sports games with the ball.

Key words: basketball game, flow of the game, game state, jobs in the game, knowledge

Introduction

Basketball from the viewpoint of expert coaches and players, as well as from the viewpoint of scientist-practitioners, can be regarded as a team - sports game that can be represented as an ordered series of jobs that each player should do with respect to the position and role within a particular model of tactics (Trninić, 1995). The new approach to scientific understanding of professional team-sports games based on the above introduced makes a genuine contribution to the field of kinesiology (Trninić, 1995). Accordingly, in sports games, motor activities and behaviours are reduced to performing, i.e. on realising the target-oriented role in the game. If we analyse the jobs in the game, we will see that basketball is the continuous action game which means that at the same time when one intensive activity finishes another structure begins. Therefore, analysis of the players, "workplace" includes analysis of activities in a certain position and role in the game, which is a methodological assumption of orientation and selection, starting point in programming of the sports' training process focused on the training and development of the players. On the other hand, basketball game has a specific structural and functional characteristics that distinguish it from the other team sports, although it belongs to the same sports games tree (football, handball, hockey, rugby, water polo), and whose cooperation and confrontation is the base. The process of cooperation and co-opposition requires a cognitive component of the game and is treated as a product of an interaction in which teammates cooperate in performing different jobs in the game. Rivals mutually oppose that kind of cooperation with the ultimate aim to outsmart opponents by the gained knowledge.

In accordance with the above, basketball game can be seen in layers. The layers of top sport, depending on the position of the observer, can be viewed from the following perspective: players, expert coaches', managers and scientists (Trninić, Jelaska & Papić, 2009a; 2009b). In this study basketball is monitored as a set of knowledge composed of several layers called a corpus of basketball knowledge (Trninić, 1995). We could say that basketball is a team sports game where the practical and conceptual knowledge of individual players and entire teams are "tested" at any time. The functional approach in analyzing the game allows the parsing of interaction and interdependence within the parameters of the game's structure, as well as the functional analysis of the relationship and connection of the tactical purposes in the offense and defense (Hernandez, 1987). This gives the possibility to mathematical analyzing and formalizing of complex interactions within basketball game. McGarry et al (2002) emphasize the importance of the research and suggest a research of complex interactions in sports competitions. The assumption is that the concepts of jobs in the game, which are defined as an ordered series of technical-tactical activities, most precisely depict the knowledge in basketball game. Thus, performing the jobs in the game means successful use of the technical and tactical skills, meaning that each player adjusts his individual techniques and tactics with the teammates through the collective teams' tactics, and all in order to achieve individual and common aims. There are infinitely many jobs in the game, which are necessary classified into groups so that the structure of work, due to the similarities and closeness, form a relatively homogeneous unit.

Based on this idea a precise hypothetical model of attributed jobs for players in all positions within a team has been made. Accordingly, it is stated that sports games can be described and defined from the perspective of an ordered series of jobs in the game, while the whole performance of an individual player and/or a team in the game can be described as a result of the performed jobs of individual players in the game but within their prescribed roles (Trninić, Dizdar & Dežman, 2000). Furthermore, players, in each stage of the game, should know what they can, must and must not do as an individual, a group or a team as a whole as to accomplish the game's tactic model that produces competitive success. It is assumed that the competitive success can be reached only if the players successfully perform their jobs in the game. Thus, within the process of sports training based on the athlete's individual and team performance knowledge of the game should be continually evaluated (Trninić, Perica & Dizdar, 1999; Trninić & Dizdar, 2000; Trninić, Dežman & Dizdar, 2000). According to the above, in the rational sports management preparation process if we want to achieve an effective operational forecasting in the high-level sports' field it is necessary to predict, within a certain period of time, the actual athletes' and teams' quality level (Dizdar, 1997; 2002).

Researches in this domain

Analysis of the previous researches in the area of knowledge in basketball game is based on the available theoretical contributions and scientific researches. The concept of jobs or tasks in the game, according to some authors (Harris, 1993, Walker & Donohue, 1988) as ones of the holders of basketball knowledge, appears in various forms (eng. *job, task, assignment, duty*). On the other hand, Hernandez (1987) claims that the technique is an essential part of the game upon which a system that allows concerted action, called the tactics, is based on. Starting from the dichotomy technology-tactics, he elaborates the systems and the models of the games.

Individual offensive techniques, individual offensive tactics, individual defensive techniques, individual defensive tactics, techniques of collective offense, the tactics of collective offense, techniques of collective defense and tactics of collective defense are the sets of component elements of basketball game that are the result of such considerations. In addition, Hernandez (1987) specifically analyzes the action of the game from the viewpoint of cooperation - opposition. He also states that the development of the game's action is the outcome of circumstances of motor interaction between the opponents, in which the teammates cooperate and the opponents oppose the said cooperation. The aim of his research was dual: it included a theoretical model analysis of the action of the game, and the study of methodology that allows the registration of all parameters that affect basketball game directly. These parameters that work in the action game are defined.

And they can be recognised as: technical action, rules of the game, space of the game and motor communication and motor strategy. Trninić (1995) has established an original approach and has developed methodological instruments for collecting data on objective analysis of knowledge in basketball game that is based on an expert assessment. For this purpose, using the structural approach, the author has constructed and valued the new instrument for measuring as a paradigm for collecting an input data or for objective registration of knowledge that can, with some minor modifications, be applied to other team sports with a ball. The corpus of knowledge in basketball game was determined through a list of 79 jobs. The entities - jobs in the game have been described by the help of 15 primary and 16 specific attributes of the game, and their relationship was analyzed with the help of mathematical algorithms and statistical multivariate analysis (factor analysis, the Ward's method clustering and canonical discriminative analysis).

Furthermore, the latent structure of attributes and group activities has been interpreted. Modern tendencies of structure and development of basketball games can explain the obtained results. Thus, in this way, a new insight into the knowledge of basketball game has been achieved. Here the knowledge was represented as a hierarchical structured binary tree. From the hierarchical point of view the basic categories of tree, in this hypothetical model, are: strategy, tactics, states of the game, jobs in the game, basics and elements of basketball techniques and individual tactics.

The central place in this study belongs to jobs in the game that are defined as the games ordered series of basics. Based on the received opinions of the experts, by transferring the responses to the binary and ordinal scale, the quantification of knowledge in the game was performed. In the process of validation questionnaires, the basic and specific variable's analysis of latent structure was performed. The results have confirmed the set hypothesis in which the knowledge in basketball is structured. It has been shown that jobs in the game present a category comprising enough information needed for analysing and verifying the formal hypothetical model - knowledge in basketball game. On the basis of hierarchical classification jobs, in the space of basic attributes of the game, four relatively homogeneous groups of jobs have been determined. While Group A consists of jobs performed by inside players (power forward and center) in A and B zones in both transition and set offence; Group B consists of jobs performed by inside players in A and B zones in the backcourt in both transition and set defence; Group C consists of jobs performed by outside players on the whole court, frontcourt and backcourt, in both transition and set defence; Group D consists of jobs performed by outside players on the whole court, frontcourt and backcourt, in both transition and set offence. Hierarchical cluster analysis was used in the area of specific attributes.

It has produced three relatively homogeneous groups of jobs defined as group A, B and C. Group A consists of jobs requiring a high energy component, low socio-motor interaction and low information component. Group B consists of jobs requiring a superior information component, a somewhat lower energy component and inferior socio-motor interaction. Group C consists of jobs requiring a high level of socio-motor interaction, low energy component and medium information component.

Hypothetical model of hierarchical knowledge in basketball game

Trninić (1995) states that jobs in the game individually group motor activity and behaviour of individual players respect to the position and role of the team within the game's tactics model. This primarily refers to the specific requirements that include: informational- motor (technical-tactical) component, energetic and socio-motor activity component (cooperation and confrontation), resolution and implementation of certain situations and courses of action within the phases and models of tactics, internal and external pressure set of relevant sports-specific characteristics and situations of each player responsible for the successful performance of jobs in the game. Basketball knowledge will be defined by its content and structure.

Structure is the conceptual abstractions derived from the actual number of relationships. As knowledge is the system that has its own structure, where the structure is a set in which parts are connected by interdependence relations, then knowledge of basketball game forms one structured whole made of elements that have their own association and recognition. This recognition should be systematized, organized and logically distributed according to scientific criteria. Ferrari et al. (1991) believe that there are two types of knowledge: practical and conceptual. Practical knowledge exists in motor programs (schemes of basic movement model), and is contained within motor activity and is not represented in conscious memory. On the other hand, conceptual knowledge contains information about certain events or situations in basketball game in which a certain motor program can be realized or used for practical purposes and is accessible to conscious memory. Such conceptual knowledge, as a part of the motor program, includes the following factors: knowledge of own capabilities and limitations (e.g. a player's shot ranking), knowledge of their own jobs in the game from the viewpoint of solving and implementation of certain situations (e.g. a player at the position of the first guard) and knowledge of jobs in the game from the viewpoint of course of action within the phases and models of tactics (e.g. position defense and transition offense). On the other hand, Anderson (1982; 1983) postulates two types of knowledge essential for effective performance of any task. First of those types is declarative knowledge that refers to knowledge based on facts.

And the other is procedural knowledge related to knowledge of how something is done, which enables the implementation of certain specific action. Stenberg (1998) also states that procedural knowledge refers to "recognition and awareness of how to perform particular tasks, skills, or procedures -"knowing-how", versus those that involve declarative knowledge (a recognition and understanding of factual information - "knowing-that". Also, Shaw, Gorely & Corban (2005) suggest that declarative knowledge (explicit memory) represents what we know about the world and can verbalize, whereas procedural knowledge (implicit memory) refers to one's knowledge how we do things, but that we are not particularly aware of. Thereby they also indicate that this latter type of memory is usually associated with the ability to perform a skill.

Masters (2000), McPherson & French (1991) claim that there is some evidence that suggests that as we progress from the novice to expert our knowledge about the skill relies on procedural rather than declarative knowledge. Furthermore, Shaw, Gorely & Corban (in 2005) indicate that as skills learnt implicitly are less likely to break down under stressful conditions, then coaches should attempt to come up with biomechanical analogies (which encourage implicit learning) for teaching skills (Masters, 2000) or to focus on external sources of feedback in the learning process (Wulf et al., 2002). Accordingly, knowledge about how to do something is associated with procedural memory, i.e. with knowledge about codes of practice and procedures, as well as with the operational knowledge (Chabot & Chabot, 2009). On the other hand, Kolb & Whishaw (1996) suggest that procedural memory operates independently of the declarative. It is important to emphasize that the accurate procedural knowledge is positively related to team performance (Banks & Millward, 2007). It should be noted that from the viewpoint of theory of sports games declarative knowledge refers to the "knowledge about the game", while procedural knowledge refers to "knowledge in the game". On the other hand, conditional knowledge in the team sports requires the understanding of when, why and where to use certain forms of declarative and procedural knowledge. Trninić (1995) states that knowledge, from a scientific viewpoint, can be defined a set of connected and systematized data that are logically arranged and decorated according to established scientific standards, resulting in professional and scientific research procedures. Devine & Kozlowski (1995) suggest that knowledge of the subject has long been recognized as a major component of effective decision making. Thereby, they indicate that researchers in solving the problem, judgement and decision making, learning, artificial intelligence, and cognitive psychology are all concerned in some way with how the amount and organization of existing knowledge affects performance on various cognitive tasks. Moreover, knowledge of basketball can be seen from several different aspects, meaning - four aspects in this case.

A knowledge of basketball game - a theoretical, abstract or non-applicable knowledge; knowledge into basketball game - specific, usable and applicable knowledge that is realized by jobs in the; knowledge of how to, with a particular methodology, acquire and apply the available basketball knowledge and knowledge of how to use the available knowledge of basketball (Trninić, 1995). In doing so he suggests that the knowledge of basketball play is achieved by performing jobs in the game at various stages of game's development: position defense, in transition offense, position offense and in transition defense. Trninić (1995) states that in a top team sport player's ability to perform jobs successfully in the game on a single or multiple positions is the most important, and that it is the only important criterion for expert coaches from the viewpoint of competitive success. On the other hand, Auerbach (according to Hollander, 1981) says that basketball is a simple game where, at any time, basics of the game are tested. If we define basketball knowledge by its content and structure, then we will approach the concept of knowledge in basketball game.

The concept of knowledge in basketball game helps us to define precisely the way in which division of that knowledge is defined, as well as to determine, explicitly, their internal structure. Theory and practice of basketball game point out the existence of a number of concepts such as: strategy, tactics, state of the game, jobs in the game, fundamental game skills, technique elements and individual tactics, details and finesse. These concepts have their own scope and content and can be the basis for introducing a certain order, and can provide an insight into the overall body of basketball knowledge. All of the above concepts, which make up the contents of basketball's knowledge corpus, can be brought into relationship. If we consider these relations, we will notice their hierarchical structure bottom-up, i.e. the elements of basketball technique and individual tactics and strategies (Trninić, 1995). Hierarchical structures top-down contains hierarchical continuity in which the higher levels determine the "Programs" for lower (Figure 1). To simplify the presentation of the hierarchical arrangement, we have introduced the term tree.

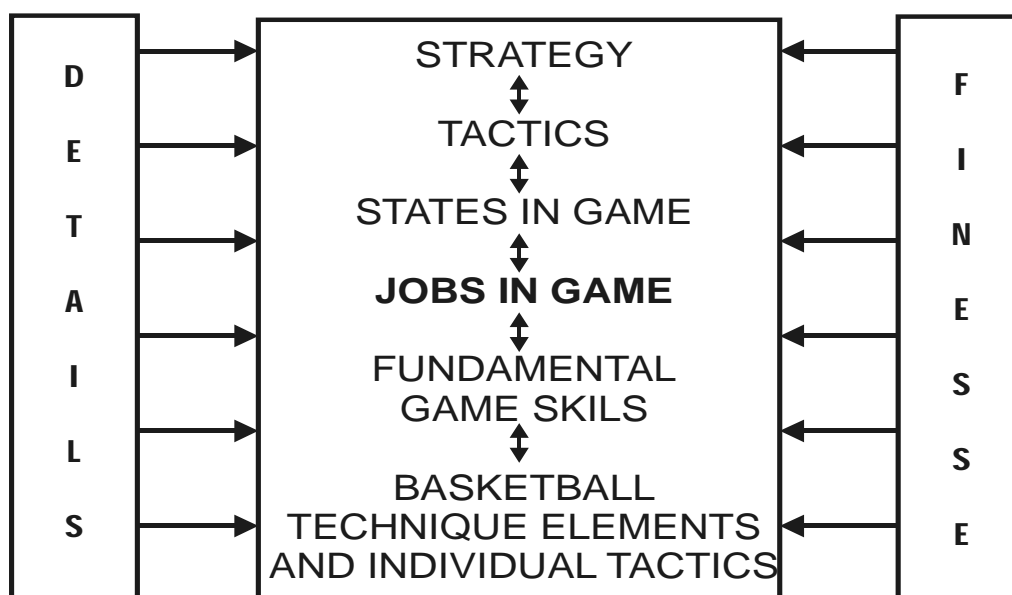


Figure 1: Hypothetical model of hierarchical structure of knowledge in basketball game (Trninić, 1995)

At the lowest level of the tree (Fig. 1) there are elements of basketball techniques and of individual tactics. At the next level, these elements are included in branches of trees that represent the basics of the game. They are, however, at the next level, connected into branches that represent jobs in the game, and that generate different states of the game (Trninić et al., 1994). Tactics, which represents a specific form of individuals, groups and entire team (Trninić & Dizdar, 2000) are near the top of the tree. A strategy which is defined as a way of achieving the goal, i.e., the totality of all possible responses and actions in a series of sporting events is at the very top of the tree. Relationships between basketball tree constituents are not directional, but changes of the lower layers affects the upper ones and vice versa.

The elements of basketball techniques and individual tactics are essential/ represent the root of the basketball game knowledge. In the theoretical approach, the basketball game elements can be considered as a closed set. Names of certain groups of basic basketball technique elements, individual and group tactics (game 1 on 1, 2 on 2 and 3 on 3 in the set and transitional game, as well as the *handicap* situations) and edited number of interrelated technical and tactical elements (edited number of technical and tactical skills, scheme or motor programs) represent the basics of the game in this context. Jobs in the game, made of arranged set of game's basics, are a central category of basketball. Across these categories the overall structure of knowledge in basketball game is reflected.

The term jobs in the game stands for a specified motor activity and behaviour of individual players according to their place and role within a particular model of tactics. From this it is evident that each tactics' model can be described as an ordered series of jobs in the game, which must be specific and precise for individual players, as well as for all positions and roles in the team. Jobs in the game are theoretically and practically subordinated to tactics. Player's success in performance of jobs in the game is determined by a number and level of tactical action programs, as well as by a degree of technical and tactical knowledge adoption which is reflected in the player's and team's situational effectiveness (Trninić, 1995). Hughes & Bartlett (2002), by using the different structural definitions of the game, make general recommendations about the use and application of performance indicators.

Situational efficiency indicators are mutually and functionally inseparably linked. For that certain facts cannot be adequately explained if we consider only the situational efficiency indicators, and ignore the interactions during basketball game. Therefore, it is necessary to include, in the interpretation of situational efficiency indicators, our own and the opposing team's strategy and tactics. Perception of indivisibility of basketball game should be a constant reminder since the offense phase already begins in the defense phase and defense in the offense phase. Therefore, interactive contribution of some variables of situational efficiency in the defense and offense should be observed interactively. It is considered that the level of performance in carrying out general and specific jobs that every player should do, with respect to its position and role in the team, is the indicator of situational efficiency in basketball game, as well as the state of the game. That is why in sports games the most successful player is the one who, in the interaction with other teammates, achieves the maximum impact in the game. On the other hand, it can easily be determined that having knowledge of the area elements of basketball techniques, individual tactics and the basics of the game is crucial for carrying out the jobs during the game.

Knight & Newell (1986; 1988), interpret basketball as a continuous action game in which, when you finish a job, another one starts immediately. Fundamentals and jobs in basketball game are the root of individual and team game. This is so because jobs in the game, from the viewpoint of concrete structures, arrange series of game's basics. From this it is evident that the basic content of basketball game is not just the "basketball technique", but also 1 on 1, 1 on 2, 2 on 1, 2 on 2, 2 on 3, 3 on 2 and 3 on 3 game, that structure the game's basics (Nikolić, 1993). So, the basics of basketball game contain one open set of elements that is applicable in situational game's terms. States of the game are the repetitive parts of the game. If a flow of the game is viewed as a sequence of typical situations in the game, then it can be defined as passing through different states of the game.

As a consequence the flow of the game can be more accurately expressed through identification and tracking of different states of the game. State of the game, from the viewpoint of kinematic description, can be seen as a time-ordered set of images. State of the game at a certain time, i.e. t , is a set of all information about the location of the ball and about all of the ten players, as well as of the flow rate of the ball and player's movement (Trninić, Perica & Pavičić, 1994). Tactics represents the system of individual's and team's planned actions and decisions resulting in efficiently performed jobs in the game. Tactical behaviour requires adaptation of action and decisions of unforeseen events during the game, as well as harmonization of individual models and team tactics. It is possible to observe tactic's game model, and thus the jobs in the game due to the development of the game, form four basic phases of the game: position defense, transition offense, position offense and transition defense (Trninić, Perica & Dizdar, 1999; Trninić & Dizdar, 2000; Trninić, Dežman & Dizdar, 2000). Thus, tactics, based on the whole team's planned game, can accurately be defined in terms of engagement in the game, where each player, primarily from individual aspect, should know, at any time, what jobs he must carry out during the game (Trninić, 1995). Also, we can define tactics as detailed directions and instructions with control movements or manoeuvres designed to achieve an aim (Kent, 1998). Strategy is a controlled system of planned actions and choice-making including variables from the sporting context in sense of achieving the set goals. Development of a strategy requires a precise analysis of the purposive variables and their interrelationships, as well as the setting realistic aims. Kent (1998) states that the strategy in sport can be defined primarily as a game plan of coaches and managers. Furthermore, each level of basketball tree contains its own details and finesse. Also, each element of basketball technique has its technical and tactical aspects that are characterized by details and finesses. Details are the elements or parts of larger units (for example, the structure of motion), while the finesse's nuances are subtle differences in individual and team competition during the game. Understanding the importance of details and finesses and of their purpose and importance for development represents the basic assumption of basketball's development. If details are elements or small parts of a larger whole, then finesses are sophisticated and subtle part of knowledge by which we win the opponent. Sagan (1993) states that the basketball is a game of finesses. From the pragmatic aspect we should distinguish individual finesses containing tricks, deceptions of individual players, and collective finesses appearing in the strategy and tactics. Bearing in mind the basketball tree, we notice that individual finesses permeate the lower part of the tree, and the upper part of the collective finesse. Thus, at the very top of the basketball tree are the finesses in the field of strategy. Those finesses represent a way of achieving goals in series determined by common ingenious tricks and skills.

Collective fitnesses, in the area of collective tactics, are primarily related to the team's chemistry, based on special knowledge and sensibilities of players and coaches. These fitnesses ingeniously join tactical actions of all players in the team during a match. Collective fitnesses during the game include a variety of transitions from one tempo game to another, from one style and system of play to another, and include a special feature that differentiates them from any other of the applicable knowledge in basketball game. In basketball practice, it is necessary to achieve a synthesis of individual and collective fitnesses, individual and team play, individual and collective responsibility, and individual and team aims. This is because basketball is both individual and collective game which makes the range of individual and collective jobs in the game. Unlike fitnesses, entering into details of database, detailing the importance of basketball at all levels of the tree represents the sealing parts of the mosaic of individual and team play that are primarily related to the manner of carrying out motor activities (how to achieve successful individual and team play). In addition to category how something is done (procedural knowledge), coaches "detailers" are preoccupied with the category when, where and why to apply specific details, i.e. tactical aspect of performance (Trninić, 1995), while in the senior selections greater attention has been focused on the tactical aspects of performance (Trninić, 2006). We won't discuss details and nuances as separate categories of basketball tree for they have a specific status as categories that permeate all levels and branches of basketball tree. Therefore, details and fitnesses make diffused set that cover the entire basketball tree. Trninić (2006) states that certain levels of basketball training must include the different layers of knowledge that are focused on learning to understand the game and "playing" basketball, where the principle of simplicity is the most important basis of learning efficiency in competitive conditions. This would provide expert coaches reduction in number of individual and team errors since basketball game is improved by learning in the process of sports training.

Conclusion

This study explains and shows hypothetical model of the hierarchical structure of knowledge that is supported by the above scientific research. Knowledge in basketball game is shown as a hierarchically structured binary tree with main categories: strategy, tactics, state of the game,

jobs in the game, basic elements and techniques of the game, as well as individual tactics that permeate at all levels of details and fitnesses categories in the game. It turned out that jobs in the game are the category that has been carrying sufficient information for analysis and confirmation of hypothetical model-tree. In this jobs group motor activity and behaviour of individual players with regard to the role and place in the team within the operational tactics. Furthermore, if we qualitatively explain the idea of basketball tree (inner parts of the tree are connected by a dependent) we will see that "basketball tree" has its hierarchy, levels and branches and its internal components that are connected by relations of dependence. Significant position in the tree belongs to details and nuances as to non-specifically located distinctive individual, group and collective modalities in the game emphasizing, at the same time, the importance of these categories. On the other hand, roles and division of individual players within the model tactics tactic reflects the tactics. Jobs in the game, in this paper, are interpreted as an ordered basic game series that involve application of technical and tactical knowledge with which each player's individual techniques and tactics are consistent with teammates through collective tactics, all for achieving a common goal-winning. Expert coaches, in the process of sports training, continually evaluate knowledge of the game based on individual and team sports performance. So, the methodology of assessing the quality of performance of technical-tactical activities in competitive conditions based on the theory of time series should be used in top sports.

By using that methodology we could handle the data about an athlete and/or team repeated measurements collected during certain period of time, based on which athlete's overall performance and potential success of the team would be predicted. Without predicting the actual quality of athletes and teams at a given time there is no successful forecasting in top sport. Therefore, we believe that it would be appropriate to use certain techniques such as nonlinear regression models. Such techniques in kinesiology of sport would give the instruments that could be extremely useful to expert coaches. That would be modern techniques that could process data on overall changes in the level of technical-tactical skills and the ranking of each player in their team compared to the other players who play the same position, team's quality game, improvement in sports fitness and competition results in some points in time.

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HIJERARHIJSKO STRUKTURIRANJE ZNANJA U KOŠARKAŠKOJ IGRI

Sažetak

Cilj ovog rada je utvrditi i objasniti hijerarhijsku strukturu znanja u košarkaškoj igri koja se može aplicirati na cjelokupni formalni model stabla sportskih igara sa loptom. U analizi znanja u košarkaškoj igri uporabljen je strukturalistički pristup. Pritom je znanje prikazano kao hijerarhijsko strukturirano binarno stablo. Osnovne kategorije stabla u ovom hipotetskom modelu hijerarhijski gledano su: strategija, taktika, stanja igre, poslovi u igri, osnove igre i elementi košarkaške tehnike i individualna taktika. Nadalje je važno je istaknuti da središnje mjesto u ovom radu pripada poslovima u igri koji su definirani kao uređen niz osnova igre. U vrhunskom sportu, neophodno je primjeniti metodologiju za ocjenu znanja i vještina temeljenu na teoriji vremenskih serija. S druge strane, košarkaška igra u ovom članku tretirana je kao uređen niz poslova. U tom smislu se ekspertni treneri trebaju usredotočiti na vrednovanje svakog pojedinog tipa igrača u odnosu na uspješnost poslova u igri. Smatra se da hijerarhijska strukturiranost znanja u kompleksnim sportskim aktivnostima čini temelj za realizaciju istraživanja strukturne analize znanja u drugim sportskim igrama s loptom.

Ključne riječi: košarkaška igra, znanje, poslovi u igri, stanje igre, tijek igre, pozicija-tranzicija

Received: January 15, 2010.

Accepted: May 15, 2010.

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