THE USE OF REAL-TIME FEEDBACK TECHNOLOGIES IN 3X3 WOMEN'S BASKETBALL TRAINING

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Abstract: *Basketball 3x3, considered an urban team sport, relies on quick and efficient decision-making during gameplay. Developing decision-making behavior is crucial due to the complexity of team dynamics. This aspect can be further investigated and improved with the help of neuroscience and digital technologies. Research hypotheses include integrating virtual reality as well as utilizing feedback technologies in training. The proposed research methodology involves analyzing data from multiple sources, pedagogical experiments, and sociological research. The aim is to identify patterns and trends in decision-making behavior, and furthermore to evaluate the effectiveness of training methods. The estimated results target enhancing knowledge about decision-making behavior in 3x3 basketball, with an impact on the training and performance of senior athletes.*

Key Words: 3x3 basketball, virtual reality, feedback.

INTRODUCTION

3x3 basketball is considered an urban team sport. Since its official debut at the Youth Olympic Games in Singapore in 2010, FIBA has had an ambitious vision for this game. A crucial aspect in this game is the close interconnection of physical, technical and decision-making preparation. The chosen theme represents a subject of research and development in continuous evolution in the world of sports.

The scientific context for this theme can be defined by approaching concepts and research from the fields of sports psychology, neuroscience, data analysis and digital technologies.

Research has highlighted the importance of making quick and efficient decisions during competitions and the possibility of training these skills [16]. These decisions can have a significant impact on game outcomes [7]. Studies on how athletes make decisions under pressure and in stressful conditions can provide a deeper understanding of the development of decision-making behavior in 3x3 basketball [3,12].

In team sports, the dynamics of decision-making are even more complex. For players on both teams, the game involves selecting the correct action at the right moment and efficiently perfoming those actions, repeatedly during the game [6]. Gréhaigne, Godbout, and Bouthier (1999) speculated that this condition requires players to make both strategic decisions (developing a plan) and tactical decisions (real-time plan adjustments). These strategic and tactical perspectives represent another important aspect of decision-making in sports.

Research in the field of neuroscience has revealed the cognitive processes involved in real-time decision-making [13,15]. Modern data analysis technologies, such as video analysis and sensors worn by athletes, can provide detailed data about decisions made during the game. This data can be used to identify patterns and trends in athletes' decision-making behavior and to develop personalized training strategies [5,8].

Direct athletes' interaction in 3x3 basketball training exercises involves exposing them to authentic game situations, where the decisions made have immediate consequences. These exercises are designed to simulate the pressure and complexity of decisions encountered during real game situations.

Within direct interaction, specific strategies are implemented to develop and improve athletes' decision-making behavior. Among these strategies are critical situation simulations, time-pressure exercises and under pressure and under stress fosusing techniques.

Indirect interaction refers to the impact of exercises on decision-making behavior through the development of related skills. Although exercises do not directly focus on decisions, they contribute to improving aspects such as concentration, anticipation and game context analysis [10,17].

The use of virtual reality and interactive simulations can provide athletes with the opportunity to practice decision-making in a controlled and realistic environment [1,2].

This approach can help rapidly develop decision-making skills in complex game situations.

The motivation for choosing this theme is based on several important considerations.

3x3 basketball has become an official Olympic sport, significantly increasing its popularity and the public's interest globally. Developing specific skills for this type of basketball is essential for athletes and coaches. Decision-making behavior in 3x3 basketball can have a major impact on the game's outcome, as teams are reduced in number of players and the fast pace game. Consequently, developing efficient decision-making behavior can make the difference between wins and losses [14].

Modern technologies, such as video analysis, sensors and interactive simulations, provide remarkable opportunities to investigate and improve athletes' decision-making behavior [9,11]. Hence, more effective training strategies can be developed using these kind of technologies.

We believe that addressing this theme will meet the practical needs of 3x3 basketball athletes and coaches and will open new horizons for research and development in the field of sports, providing significant opportunities to improve athletes' performance and contribute to the evolution of this sport in an era dominated by technology and innovation.

Research objectives

1. Identifying the factors that influence efficient decision-making in 3x3 basketball games.
2. Developing and evaluating innovative training methods to improve decision-making behavior in 3x3 basketball. These methods will include training based on virtual reality and advanced analysis technologies.
3. Identifying patterns and trends in athletes' decision-making behavior in different game situations. This will contribute to the development of specific strategies for various game scenarios.

4. Evaluating the effectiveness of the developed training methods. The progress in athletes' decision-making development will be observed and evaluated in their performance during competitions.

The hypotheses we will start from can serve as a reference point for research in the field of decision-making development in 3x3 basketball and can contribute to a deeper understanding of how modern training techniques can influence this crucial aspect of the game.

Hypothesis 1 - Verifying specialists' opinions in 3x3 basketball regarding their own vision of the current state and methodology of decision-making training can represent a valuable source of information for conducting trainings and competitions. Simultaneously, using a questionnaire, interpretation of results, and drawing conclusions will determine a methodological direction that can be developed nationally at the senior level in 3x3 basketball.

Hypothesis 2 - Integrating virtual reality into 3x3 basketball training can improve players' decision-making behavior, helping them react more quickly and make better decisions in real game situations.

Hypothesis 3 - The use of real-time feedback technologies, such as video analysis and performance monitoring systems, may be more effective in developing decision-making behavior in 3x3 basketball training compared to traditional training methods.

Our study will include preliminary research where we will use interviews and questionnaires to obtain the perspectives of athletes and coaches regarding the process of developing decision-making behavior, and fundamental research where, using of computerized simulations or virtual reality in athletes' training, we will evaluate how they make decisions and how their skills can be improved.

The theoretical framework of the research will synthesize relevant data extracted from studies and paper works by key players in the field of research and sports training, nationally and internationally. Data from specialized literature regarding sports training, specific effort in 3x3 basketball, and physical, motoric and psychological particularities of senior athletes, will be systematized, creating a comprehensive picture of what performance sports entail.

Research Methodology

In order to develop a rigorous and well-structured research methodology, establishing clear and accurate research objectives represents the first aspect in the applied scientific approach.

Through the analysis of specialized literature, we can reach into the depth of knowledge and research, extracting valuable insights and innovations from the specialized literature to enrich and properly guide the development of training methods aimed at optimizing decision-making in this dynamic and challenging field.

The pedagogical experiment will provide us with the opportunity to design a rigorous and relevant research study that will reveal how different methods and strategies can influence the learning and development of the decision-making process, thus contributing to improving the quality of training methods and on-court habits. Data compilation will be conducted from multiple sources, such as video recordings of the games; sensory data through systems like BlazePod, Digital Wall, VR glasses, photoreceptors; performance statistics using field monitoring tools, interviews, and questionnaires. The choice of data compilation techniques will in accordance with the research objectives. The initial and final study will evaluate strength and speed parameters of the senior women's basketball team, CSM Constanța. The tests will also include assessing the strength of the back, abdomen, upper and lower limbs, as well as assessing reaction speed levels.

Elements analyzed in the future research will be represented by video data from real games of the athletes involved in our study. These data will provide solid examples of situations in which athletes make decisions on the court and will be used to analyze decision-making behavior in real competitive contexts.

The use of sensors worn by athletes during the game provides data about their movements, heart rate, stress level, and other physiological aspects. This data will be analyzed in order to recognize how various factors affect athletes' decisions.

Game statistics, such as shooting percentages, rebounds, assists or final scores, will provide important information about athletes' performance in relation to the overall decisions made during the game. Through statistical analysis, these data will help identify correlations and trends.

These elements will be analyzed and evaluated to identify patterns, trends, and influences on athletes' decision-making behavior in 3x3 basketball. Analyzing this data will contribute to the development of more efficient training strategies and a deeper understanding of the decision-making process in this sport.

The comparative method will be used to evaluate the effectiveness of different techniques for developing decision-making behavior in the context of 3x3 basketball training, thus identifying the most suitable and efficient strategies for optimizing athletes' performance. The focus group will include coaches and athletes from 3x3 basketball from different regions of the country, with different experience in competition and coaching.

By using statistical computing programs, we will approach the collected data using statistical-mathematical methods and data processing and interpretation techniques to determine the identification of patterns, correlations, and relevant trends for decision-making behavior.

The method of graphical representation will be used to display and understand the athletes' performance evolution over time, providing a clear visual perspective on how specific techniques for developing decision-making behavior can impact progress in 3x3 basketball.

Sociological research will be used to analyze and interpret the opinions of specialists in the research field regarding the development of decision-making behavior in 3x3 basketball. The goal of this approach is to provide a holistic perspective on trends that may affect how athletes and coaches implement new training techniques, thereby contributing to better adaptation to the specific needs of players.

Relevant conclusions will be drawn in order to provide practical guidance for improving training and decision-making behavior.

The research results will be disseminated in scientific publications, conference presentations and in sports training for the purpose of sharing the acquired knowledge and experiences.

The research methodology will be flexible, allowing us to reassess and adjust the research as we gather new data and information.

Estimated results

As estimated results, we aim to identify critical factors influencing decision-making in 3x3 basketball, develop innovative training techniques and strategies to improve athletes' decision-making behavior, highlight patterns and trends in how athletes make decisions in different game situations, publish the results in scientific journals or present them at conferences, adding new knowledge to the specialized literature on the development of decision-making behavior in 3x3 basketball.

The research results will contribute to a deeper understanding and improvement of decision-making behavior of 3x3 basketball players, impacting training, performance and sports development.

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