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IMPROVING COORDINATIVE ABILITIES IN JUNIOR BASKETBALL PLAYERS THROUGH THE IMPLEMENTATION OF SPECIFIC EXERCISE PROGRAMS UTILIZING FITLIGHT TECHNOLOGY

SUMMARY

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ARGUMENTATION FOR THE CHOICE OF THE TOPIC

Having played basketball since the age of 7 until 2022, I have competed at both amateur and professional levels, being a member of Romania's national junior and senior teams. I have always had a passion and an extra interest in innovative aspects of sports training and the technologies used in basketball. With this passion for basketball and modern technologies, which I believe will revolutionize the training of high-performance athletes in the future, I decided to research the impact on coordinative capacity of an experimental training program that incorporates Fitlight technology in basketball. The main ideas that led to the choice of this research topic were:

- An interest in how modern technologies can influence the evolution of basketball and how this can affect players, coaches, and spectators alike;
- The desire to conduct original research that brings new information to the field and contributes to the development of knowledge regarding modern technologies in basketball;
- One of the main ideas in choosing this topic was the desire to better understand how modern technologies can influence the improvement of basketball players' performances;
- Another essential argument was the desire to help coaches make better decisions regarding the use of modern technologies in player training. By understanding how these technologies

can influence the coordinative capacity and technical skills of players, coaches could use this information to provide their players with the best chances of success.

CONCLUSIONS OF PART I. - CONCEPTUAL AND METHODOLOGICAL FOUNDATION OF THE TOPIC

According to the specialized studies mentioned in Part I, coordinative abilities play an essential role in the success of basketball players, having a direct association with their technical skills and conditional qualities. The ability to coordinate complex movements and respond quickly and efficiently to the dynamics of the game represents a significant advantage. The studies mentioned and detailed in this section highlight how improved coordination can positively influence the technical execution of

players, allowing them to perform with greater precision under pressure and in varied game situations.

The importance of a well-structured training program is essential for the development of technical skills, which, in turn, contribute to the overall improvement of basketball players' coordination. The studies analyzed in this section demonstrate that training focused on developing technical skills, through repetition and continuous correction, leads to a significant improvement in coordination. This type of training not only perfects individual techniques but also optimizes the way players integrate these techniques within the context of the game and enhances their coordination abilities.

In modern basketball, the use of advanced technologies is indispensable for testing and developing players' coordination and technical skills. The Fitlight equipment was specifically selected for this thesis due to its ability to provide instant feedback and precise performance measurements. This technology not only allows for a detailed evaluation of reaction time and movement accuracy but also serves as a valuable tool in the training program, contributing to the development of coordination through personalized exercises tailored to the specific needs of each player.

Fitlight technology, implemented in the training program, is essential for the assessment and development of certain components of basketball-specific coodinative ability and execution technique. These components include: balance, reaction, spatial orientation, agility, hand-eye coordination and the ability to combine movements. Each of these aspects contributes to superior performance on the court and effective execution during the game. Balance is vital for maintaining body control during rapid movement or sudden changes of direction. Quick reaction allows players to respond instantly to opponents' actions or unexpected changes in play. Spatial orientation, on the other hand, helps to understand and exploit spaces on the pitch, essential for effective field positioning and anticipating opponents' movements. Agility emphasizes the ability to execute quick and precise movements, which are essential in the movements of attacking and defending players with or without the ball. Hand-eye coordination is essential for ball control and accurate shooting. Finally, the ability to combine movements involves the fluidity and effectiveness with which players can switch between different technical actions, a key skill in creating and exploiting playing opportunities.

We therefore recommend the design of a set of tests targeting the above-mentioned components of coordinative ability, involving the use of Fitlight technology to validate these innovative testing methods. These tests will allow not only the accurate assessment of individual player's abilities, but also the possibility to implement a training program incorporating Fitlight technology that will lead to the improvement of the coordinative ability of basketball players.

PART II. - PRELIMINARY STUDY OF THE EFFECTIVENESS OF THE PROGRAM FOR THE DEVELOPMENT OF COORDINATIVE SKILLS THROUGH FITLIGHT TECHNOLOGY FOR U14 PLAYERS

CHAPTER IV. PRELIMINARY RESEARCH METHODOLOGY AND ITS ORGANIZATION

IV.1. Preliminary research premises

Basketball is characterized by fast and energic movements in various directions, rapid decelerations and changes of direction, along with jumps and complex ball control techniques (Hassan et. al 2023, Silvestri et. al 2023, Badau et. al 2022). During each phase of the game, athletes execute various technical and tactical executions that are significantly influenced by a number of coordination components (Bădău et. al 2023, Hassan et. al 2022). The technique of the basketball game is in continuous development, interconnected with the development of motor skills, with technical skills and with the level of development of the players' coordinative abilities.

Modern basketball is influenced by the contribution of modern technologies and the diversification of technological equipment adapted to the specifics of sports training, monitoring, and evaluation processes. The study conducted by Badau & Epure (2020) shows that including a specific training program in basketball practices leads to significant improvements in the development of players' coordination. These results also emphasize the essential role that modern technologies such as Fitlight play in testing and developing coordinative abilities in basketball. Due to the specialization of information technologies and intelligent sensors designed to the characteristics of sports, the training and performance monitoring process has been modernized, leading to the emergence of new concepts such as reactive coordination capacities. Reactive coordinative capacity aims to adapt the components of coordinative capacity to predominantly visual stimuli provided by specific technologies like Fitlight, characterized by the versatility of light intensity, color, duration, and frequency of the light stimulus.

Specialization trends of players require basketball specialists to modernize training methodologies in all its components with a focus on physical, technical and tactical training. Technologies have proven their contribution to improving the physical potential of athletes, and the fact that the trend of innovation of technologies specialized in sports activity has also focused on the game of basketball facilitates the optimization of sports training. Basketball-specific technology implemented as part of the sports training process makes it possible to monitor the motor, functional and technical parameters of players and teams and to evaluate sports performance. Information technologies allow real-time data analysis and storage of information for comparative and longitudinal analysis.

The permanent modernization of the training to the specifics of the basketball game and according to the characteristics of the technologies facilitates the adaptation of the contents to the performance objectives and to the characteristics of the players and teams. The dynamic and innovative trends in the modernization of sports training benefit from the implementation of information technologies, which increases the efficiency and attractiveness of training and, consequently, the sporting success of basketball players.

We believe that the present study will contribute to the understanding of how basketball training can be optimized by adapting the exercises to the characteristics of Fitlight technology, as well as to the age characteristics and level of training of junior players. The present preliminary study aims to implement a program of exercises for the development of coordinative and reactive skills in basketball specific technical conditions using Fitlight technologies. The innovative aspects of the preliminary study were the adaptation of specific training contents to Fitlight technology and the development of tests for the evaluation of reactive coordinative abilities.

IV.2. Aim of the preliminary research

The main aim of the preliminary research was to implement a preliminary experimental program of exercises using Fitlight technology to improve coodinative abilities and to validate the test instruments specifically designed for this study and applied to U14 male basketball players.

IV.3. Objectives of the preliminary research

The main objective of the preliminary research was to evaluate the effectiveness of the preliminary experimental program using Fitlight technology and the validation of instruments for testing the coordinative abilities of U14 male basketball players.

Specific objectives:

- implementation of the preliminary experimental program in order to assess the impact on the development of coordinative abilities;
- validation of test methods for balance assessment;
- validation of test methods for the assessment of spatial orientation under standardized and reactivity conditions;
- validation of test methods for the assessment of reaction time under standardized and reactivity conditions;
- validation of test methods for the assessment of agility under standardized and reactivity conditions;
- validation of test methods for the assessment of hand-eye coordination under standardized and reactivity conditions;
- validation of test methods for assessing the ability to combine movements under standardized and reactivity conditions;
- validation of Fitlight equipment in the process of training and testing the coordinative abilities of basketball players.

IV.4. Preliminary research tasks

1. Initial assessment: Perform anthropometric measurements and coordination tests at the beginning of the research to obtain a solid baseline.
2. Training program design and implementation: creating a specific training program that includes exercises with Fitlight technology to improve the players' coordinative abilities.
3. Design and application of evaluation tools specific to the preliminary research.

4. Statistical analysis of the preliminary research data: comparing the results of the initial and final tests in order to evaluate the development and improvement of the players' coordinative abilities.
5. Interpretation and reporting of results: detailed write-up including initial and final data, their analysis, players' development, etc..
6. Drawing preliminary research conclusions:

These tasks will help to draw solid conclusions and provide valuable information for optimizing the training and performance of basketball players.

IV.5. Preliminary research hypothesis

1. Main Hypothesis: starting from the assumption that the design and implementation of a preliminary experimental program using Fitlight technology will contribute to the improvement of the coordinative ability of U14 basketball players.
2. Specific Hypothesis:

- H1. We assume that the implementation of the preliminary experimental program using Fitlight technology will lead to improvements in the components of coodinative abilities: spatial orientation, balance, responsiveness, hand-eye coordination and movement combination ability of U14, male basketball players;
- H2.We assume that the application of tests to assess coordinative ability, some of which standardized and others adapted to the reactivity conditions specifically designed for this study, will highlight the effectiveness of the preliminary experimental program on the improvement of the coordinative abilities of U14, male basketball players.

IV.6. Research methods

- Bibliographic study methods
- Observation methods
- Tests and measurements method
- Experimental method
- Statistical-mathematical method

IV.7. Organization and conduct of preliminary research

The preliminary research was conducted over a period of 8 weeks, starting with the initial testing that took place on April 13-14, 2023, followed by a training program (preliminary experimental program) of 8 weeks and ending with the final evaluation June 12-13, 2023. The research subjects were represented by a sample of 19 players from the Târgu Mureș High School with Sports Program (LPS).

During the 8 weeks, the participants were subjected to training sessions that integrated cutting-edge technologies such as Fitlight, used in the development of their technique in the basketball game. The specific basketball technique development drills used in the training program were structured in 3 parts: on the spot, on the move and opponent drills with oponents. The aim of these sessions was to improve and optimize the coordination skills of the players, given their importance in the context of sports performance.

The certificate attesting to the implementation of the pilot program at "LPS Targu Mures" is attached in Appendix 3.

IV.8. Equipment used

In the preliminary research, Fitlight equipment was used in both the testing and training part. These cone-shaped instruments, equipped with the FITLIGHT system's RGB LEDs, serve as targets that the user has to turn off in order to complete specific training exercises. These distinctive training lights can be attached to walls, poles and other training tools or positioned anywhere for sport-specific training exercises.

The Fitlight® smartphone app is used to set each light. Users can set the lights during setup by selecting one of the simple and fun built-in programs. Users can also modify programs or design their own special exercises using the app.

With a range of 50 meters and lights that are visible in almost any lighting conditions, this portable device allows training almost anywhere, especially in challenging confined space environments. Basketball training can incorporate Fitlight technology relatively easily. It complements training, rather than replacing it, by providing a visual stimulus with which to provide quick feedback to track players' progress. This equipment has been described in subchapter III.7 (Wireless Equipment with LED Devices) of Chapter III (Conceptual and Methodological Implications of Modern Technologies in Basketball).

IV.9. Tests and measurements applied in preliminary research

Measured anthropometric parameters:

- height,
- weight,
- length right upper limb,
- length upper left upper limb,
- length lower right limb,
- length left lower limb,

Motor tests applied in preliminary research:

- right foot Y balance test on the right foot with leading foot forward,
- balance test Y on the right foot with the foot leading to the left,
- right foot Y balance test with the right foot leading to the right,
- left foot Y balance test with the left foot leading forward,
- left foot Y balance test with the left foot leading to the left,
- left foot Y balance test with the left foot leading to the right,
- reactive Y test on the right foot,
- left foot reactive Y test,
- spatial orientation test,
- upper limb reaction test,
- upper limb choice reaction test,
- lower limbs reaction test,
- agility test T,

- agility test T with ball,
- Ilinois agility test,
- agility test Ilinois with ball,
- hand-eye coordination test,
- test of ability to combine movements.

CONCLUSIONS AND RECOMMENDATIONS FROM THE PRELIMINARY STUDY OF THE EFFECTIVENESS OF THE PROGRAM FOR THE DEVELOPMENT OF COORDINATIVE SKILLS THROUGH FITLIGHT TECHNOLOGY FOR U14 BASKETBALL PLAYERS

The results of the preliminary research contribute to the confirmation of the main hypothesis by demonstrating that the design and implementation of a preliminary experimental program using Fitlight technology will contribute to the improvement of the coordinative ability of U14 basketball players.

Based on the results, the first specific hypothesis (H1) is also confirmed demonstrating that the implementation of the preliminary experimental program using Fitlight technology leads to the improvement of the components of coordinative abilities: spatial orientation, balance, reaction-time, hand-eye coordination and movement combination ability of U14, male basketball players. Also, the second specific hypothesis (H2) was confirmed by highlighting that the application of tests to evaluate the coordinative ability, some standardized and others adapted to the reactivity conditions specially designed for this study, revealed the effectiveness of the preliminary experimental program on the improvement of the coordinative abilities of U14, male basketball players.

The confirmation of the specific hypotheses and validation of the motor tests emphasize their effectiveness in measuring the coordination ability required in performance basketball. This validation is essential, as it allows researchers and coaches to rely on the use of scientifically tested technologies in the process of sports training and performance evaluation of athletes. The use of these validated tests ensures an objective assessment of each player's progress.

The results of the Student -T test showed statistically significant improvements with $p<0.05$, and with moderate and large Cohen's size effects in all tests of coordinative abilities.

The progress in the the balance tests was moderate to high ($d > 0.5$). In the reaction tests the highest progress was observed in the choice reaction test of the lower limbs ($d = 1.524$), a result that highlights the effectiveness of the training program where by implementing visual stimuli in the training we improved the complex reaction ability of basketball players.

Within the agility tests targeted in the preliminary research we found very high progress ($d>1$) except for the Ilinois agility test where moderate progress was observed ($d=0.541$).

The hand-eye coordination improved significantly ($d= 1.461$) and in the test of the ability to combine movements we observed a high progress ($d= 1.737$) was observed.

We also recommend the use of a control group to observe the differences between the progress of the players who applied the Fitlight technology training program and those who continued with the classical training program. It is recommended to perform this comparison using the independent t-test to highlight the level of training of the coordinative ability of the control group compared to the experimental group in both the initial and final tests.

In addition, to maximize the relevance and applicability of the results obtained from the coordination tests, we recommend evaluating players under conditions that mimic the real match context. This would involve conducting official basketball game statistics during training sessions, which would be conducted at the beginning, during and at the end of the training program. The collection of this data will provide a more complete picture of how coordinative skills translate into actual performance on the court and will allow direct assessment of the impact of the training program on performance under competitive conditions.

Based on the relevant results of the preliminary research we decided to keep all the motor tests for the final research and to extend the experimental training program by adding new exercises and extending the implementation period. We also consider it appropriate to add control groups and to extend the sports age category to allow comparison with the results of the experimental groups, which will facilitate to highlight the effectiveness of the implementation of the final experimental program using fitlight technology.

PART III. - EXPERIMENTAL STUDY OF THE EFFECTIVENESS OF THE PROGRAM FOR THE DEVELOPMENT OF COORDINATIVE SKILLS THROUGH FITLIGHT TECHNOLOGY FOR U14-16 PLAYERS

CHAPTER VI. METHODOLOGY OF EXPERIMENTAL RESEARCH

VI.1. Experimental research premises

Based on sport and professional experience, we believe that by implementing an 18-week training program using Fitlight technology, we can positively influence the coordinative ability and technicality level of U14-U16 male basketball players. Official match statistics have been used before to determine the progress of basketball players (Sampaio et. al 2004, Kubatko et. al 2007, García et. al 2022), but the approach of using official statistics during structured training in the form of matches, where players have the same opponents, is a novel concept. It provides a novel perspective on the real impact of the training program on game performance. Through this methodology, a deeper understanding of how training influences the level of players under competitive conditions can be obtained, thus facilitating more precise and effective adjustments of the training program.

In the current context of modernization of physical and technical training methodology, the current study focused on the development of coordinative capacity using the Fitlight system. The implementation of digital technologies represents an effective and interactive way to improve the smoothness and efficiency of movements and the ability to respond to external stimuli in real time. Studies highlighting how training programs using Fitlight can contribute to the development of coordinative ability are relatively limited and not particularized to the game of basketball. In this

context we believe that our study will contribute to the understanding of how the implementation of a specific training program using Fitlight technology will contribute to the improvement of the coordinative ability of junior basketball players. For this study, we selected and adapted a system of assessment tests, and due to the fact that we used Fitlight technology we targeted the reactive aspects of coordinative ability.

We also believe that the use of statistics from training under match conditions, keeping the same opponents, together with the comprehensive assessment of coordination ability will highlight the progress of players not only in the components of coordination ability but also the practical impact of this progress during matches.

VI.2. Argumentation for experimental research topic

The scientific and practical implications in accordance with the relevant results of the final experimental research will focus on training methodologies using different digital and informational technologies; the possibility of real-time adaptation of exercises in relation to the data collected by the technologists; the variety of components of physical and technical capacity that can be improved and monitored, etc. We believe that our research contributes to the expansion of knowledge on how fitlight technology can be adapted to optimize different physical and technical skills. The coordinative ability is an essential component in the training of basketball players, and the improvement of its components can be realized in a varied and attractive way through the implementation of digital technologies adapted to the game of basketball.

Although Fitlight technology has been explored in various studies for testing and training basketball players (Bădău et. al 2022, Hassan et. al 2023), these researches have not fully addressed the comprehensive assessment of coordinative ability. It is essential to develop a comprehensive and detailed training program, given the lack of programs with scientifically proven impact that use Fitlight technology to improve coordination and technique in basketball. This need is reflected in the fact that current programs (Silvestri et. al 2023, Bădău et. al 2023, Hassan et. al 2022) do not cover in depth all aspects necessary to effectively develop these essential qualities in the game of basketball. Official game statistics have also been used to determine the progress of basketball players (Sampaio et. al 2004, Kubatko et. al 2007, García et. al 2022), but the approach of using official statistics during training sessions structured in the form of matches , where players have the same opponents, represents a new concept. This provides a unique insight into the actual impact of the training program on in-game performance. Through this methodology, a deeper understanding of how training influences the level of players in competitive conditions can be obtained, thus facilitating more precise and effective adjustments to the training program. All this led to the choice of the topic of the effectiveness of a program for developing coordination capabilities through Fitlight technology in U14 and U16 basketball players.

Based on the preliminary experiment we agreed to implement the same evaluation tests in the present final research. Also, the experimental program will be completed and expanded in terms of content and duration of implementation. For the scientific relevance of the research, we introduced a larger number of subjects in the final research, including two experimental groups and two control

groups by expanding the inclusion criteria regarding the age of the subjects and the sports classification level, namely to U14 and U16, male.

VI.3. Aim of the experimental research

The main purpose of this final research is to demonstrate the importance of implementing a final experimental training program using Fitlight technology in order to develop the coordination ability and basketball game technique of U14 and U16 male players. We also aimed at the impact of this training and development of coordinative capacities, on the official statistics during training in match conditions.

VI.4. Objectives of experimental research

The *general objective* of the research is to improve the coordination ability of U14 and U16 male basketball players by implementing an experimental 18-week training program that integrates Fitlight technology with an impact on player performance statistics during matches.

Specific objectives:

1. the initial assessment by: carrying out a complete assessment of the initial coordination capacities of the players, using anthropometric and assessment tests of the coordination capacity to determine the coordination level of the players;

2. designing and implementing the final experimental 18-week training program, which includes specific basketball exercises with the contribution of using Fitlight technology to optimize technical skills and coordination skills;

3. progress assessment: monitoring and recording the players' progress at the completion of the training program, focusing on the improvement of coordination ability;

4. evaluation of progress through the statistics made in the matches organized in the final research;

5. comparing the results of the motor tests: comparing the initial results with those obtained after the training program to highlight the evolution and improvement of the players' skills;

6. comparing the results of the research groups: comparing the results between the experimental and control groups to highlight the effectiveness of the final experimental training program;

7. performance optimization: using data from this research to prepare players for competitive basketball, creating the foundations of athletic training for increased performance in the context of competitive basketball play.

VI.5. Experimental research hypothesis

The hypotheses of the experimental research for the evaluation of the coordination capacities of basketball players, using modern technologies, started from the assumption that: The main hypothesis (H0) started from the assumption that by designing and implementing an experimental program of specific exercises using Fitlight technology, the coordinative capacities of U14 and U16

basketball players can be improved with a positive effect on the performance of the players during training organized in the form of matches .

Specific hypotheses, it started from the following assumptions:

- H1. players practicing the final experimental training program using Fitlight technology will achieve significant improvements in coordination abilities compared to control groups who practiced the pre-established program without the use of technology.
- H2. players who practice the final experimental program with the help of Fitlight technology will improve their playing technique to higher parameters compared to the technical level of the control groups.
- H3. players who participate in the final experimental training program will show significant improvements in technical performance in training organized under match conditions (more points scored, assists, rebounds, etc.) compared to the period before participating in the program.

These hypotheses can be tested and evaluated in the final experiment based on the data collected during the initial and final evaluations of the coordination abilities of the basketball players in the experimental and control groups, respectively.

VI.6. Experimental research sample

The research included 70 active players in youth basketball competitions in Romania, specifically the participants in the National Junior Championships. The age groups included in the study were under 14 (U14) and under 16 (U16).

The structuring of the samples consisted of two experimental groups and two control groups, each with an identical number of players: 18 in the U14 category and 17 in the U16 category. The selection of participants was carried out rigorously, guided by specific criteria to ensure the uniformity and validity of the research results.

The minimum inclusion criteria set for this study were as follows: participants had to meet the basic age-related requirements and be actively involved in competitions, also having a substantial sporting experience of at least 2–4 years. These criteria were essential to ensure a comparable level of competence and experience among participants, which is vital to the validity of the research. The health of the players was also an important factor; participants were required to be injury-free in the six months prior to the study, ensuring they were at their optimal performance capacity. In addition, their constant participation in the established training programs was mandatory.

A number of 14 subjects from the U14 experimental group, respectively 15 subjects from the U16 experimental group, participated in the training in match conditions, this testing took place only once per month and for personal reasons certain players could not participate in this part of the study.

The certificate of implementation of the experimental research training program from the ACS Lucky Dragons club can be found in Appendix 4, respectively the control group test certificate from the LPS Targu Mureș club can be found in the Appendices section.

VI.7. Measurements, motor tests, match statistics and materials used in experimental research

In the final research we used the same anthropometric measurements and motor tests as in the preliminary experiment. The novelty of the final research regarding the evaluation consisted in making statistics of the technical performance of the players in the experimental groups during trainings organized under match conditions.

Anthropometric measurements:

- height (cm)
- weight of research subjects (kg)
- length of upper limbs (cm)
- length of lower limbs (cm).

The motor tests applied in the final experiment were:

- Y balance test on the right leg with the left leg forward
- Y balance test on the right leg with the left leg leading to the left
- Y balance test on the right leg with the left leg moving to the right
- Y balance test on the left leg with the right leg forward
- Y balance test on the left leg with the right leg leading to the left
- Y balance test on the left leg with the right leg moving to the right
- reactive Y test on the right leg
- reactive Y test on the left leg
- spatial orientation test
- upper limb reaction test
- upper limb choice reaction test
- lower limb reaction test
- lower limb choice reaction test
- T agility test
- T reactive agility test
- T agility test with ball
- T reactive agility test with ball
- Illinois agility test
- Illinois agility test with a ball
- hand-eye coordination test
- ability to combine movements test

Quantified statistical data during training-matches:

- points
- turnovers
- interceptions
- blocks
- efficiency

VI.8. Location of experimental research

The locations of the experiment coincided with the training locations of the participating teams. Thus, the U14 age groups, both experimental and control, performed their tests in the gym of the Electromureș Technological High School in Târgu Mureș. The U16 experimental group did the training and testing in the Prodcomplex gym, while the U16 control group trained in the gym of the Sports Program High School (LPS) Târgu Mureș. This distribution facilitated testing in an environment familiar to the athletes, contributing to their comfort and performance during testing.

VI.9. The experimental research design

The research was carried out according to the following plan:

- initial testing took place between 7 and 11 August 2023,
- implementation program for a duration of 18 weeks,
- final tests between December 18 and 22, 2023.

The core of the implementation program included exercises designed to improve players' technique and coordination using Fitlight technology. These exercises were performed three times a week, providing a focused approach to developing coordination through the innovative application of technology. This structured phasing allowed for a comprehensive assessment of the impact of the program over the specified period. In addition to these tests of coordination abilities, we evaluated the progress of the players during training statistics under match conditions. They took place on September 15, October 16, November 15 and December 15, 2023 for both the U14 and U16 groups. Participants in this study participated voluntarily with informed consent. In addition, throughout the implementation program, special attention was paid to the continuous monitoring of the progress of each participant and the necessary adjustments of the program to ensure alignment with the established objectives. Before the start of the program, clear evaluation criteria were established to measure developments in the athletes' performance, and these criteria were applied consistently in both initial and final testing to ensure comparability and objectivity of results.

Tabel 1. The experimental research design

Initial testing	Practice in game conditions 1	Practice in game conditions 2	Practice in game conditions 3	Practice in game conditions 4	Final testing
7-11 August 2023	18 week training programme 14 August - 15 December 2023				18-22 December 2023
	15 September 2023	16 October 2023	15 November 2023	15 December 2023	

CONCLUSIONS OF THE EXPERIMENTAL RESEARCH ON THE EFFECTIVENESS OF THE FINAL EXPERIMENTAL PROGRAM FOR THE DEVELOPMENT OF COORDINATIVE SKILLS THROUGH FITLIGHT TECHNOLOGY FOR U14 AND U16 PLAYERS

The main conclusion of the final research, based on the relevant results recorded by the experimental groups, the main hypothesis (H0) is confirmed, proving that by designing and implementing an experimental program of specific exercises using Fitlight technology, the coordination capabilities of U14 basketball players have improved and U16 with a positive effect on the performance of the players in training sessions organized in the form of matches.

The results of the final research confirmed the specific hypotheses, namely:

- H1. players who practiced the final experimental training program using Fitlight technology achieved significant improvements in coordination abilities compared to control groups who practiced the program established by the coach without the use of technology.

- H2. players who practiced the final experimental program with the help of Fitlight technology improved their playing technique to higher parameters compared to the technical level of the control groups.
- H3. players who participated in the final experimental training program recorded significant improvements in technical performance in training organized under match conditions (more points scored, assists, rebounds, etc.) compared to the period before participating in the program.

Detailed analysis of progress in the six essential components of coordinative capacity in basketball—balance, spatial orientation, reaction time, agility, hand-eye coordination, and movement combination capacity - showed significant statistical improvements ($p<0.05$) between initial and final tests. These improvements are not only statistically significant but are also supported by the analysis of the Cohen's d parameter, indicating a medium to large effect in most cases analyzed.

In balance tests, only large improvements ($d>1$) were recorded within the experimental group, with the best results observed in the Y-balance test on the right leg forward in both the U14 category ($d=2.54$) and the U16 category ($d=2.62$).

For the spatial orientation test, significant progress was identified in the experimental group in both the U14 category ($d=2.27$) and the U16 category ($d=1.83$).

The analysis and interpretation of the experimental groups' results in reaction motor tests showed the greatest progress in simple and choice lower limb reactions with $d > 3$ in both the U14 and U16 categories.

The reactive T-agility test with the ball in the U14 category demonstrated the most considerable progress with a Cohen's d indicator ($d=2.16$) among the agility tests. This indicates progress not only in ball control but also in reactive ball control following the implemented training program.

In both the U14 and U16 experimental groups, significant progress was recorded in hand-eye coordination tests ($d>2$) as well as in movement combination ability tests ($d>0.8$). These results not only highlight the obvious progress of the players in these components but also the effectiveness of the final experimental training program that utilized Fitlight technology.

Moreover, this research contributes to the enrichment of specialized literature by providing concrete evidence of the impact of advanced technology in sports training, particularly in sports that require exceptional coordination and reactivity, such as basketball. The results suggest that coaches and physical trainers should consider integrating technologies like Fitlight into sports training to maximize the development of young players' skills and improve their performance effectively.

In addition to the improvements observed in the players' coordinative capacities, the positive results of using Fitlight technology were remarkably evident in the context of match conditions. In these controlled scenarios, which mimic the pressure and intensity of a real match, standardized statistics were collected, providing a clear and quantifiable picture of the players' progress. These rigorously collected training statistics showed significant improvements in player effectiveness. The importance of these advances is considerable as they reflect not only the improvement of individual

skills but also the players' ability to apply them effectively in real game scenarios. This demonstrates that Fitlight technology not only develops the physical and technical skills of players but also prepares them for performance under pressure, an important aspect in basketball competitions.

Thus, the results obtained in this study underscore the potential of Fitlight technology to revolutionize training in team sports, providing not only equipment for enhancing physical skills but also an efficient environment for developing tactical abilities.

In conclusion, the results of this research make a valuable contribution to the field of sports training, underlining the important role of technological innovations in the development of coordinative capacities and in improving the technique of U14 and U16 basketball players. This study paves the way for new research and practical applications in the field of sports training, highlighting the importance of adaptation and continuous evolution of training methodologies and evaluation of sports performance.

CHAPTER VIII NOVEL ASPECTS OF THE STUDY, FUTURE RESEARCH DIRECTIONS, LIMITATIONS OF THE STUDY AND DISSEMINATION OF THE RESEARCH

VIII.1. Novel aspects of the study

Innovative approach to the training program

- This research marks a significant step in sports training by implementing an innovative training program that integrates Fitlight technology focused on improving the components of the coordinative capacities and the technique of U14, U16, male players. This program was designed to optimize the development of players' coordination and technique, being adapted to the specific characteristics of young basketball players.
- We believe that the described exercises can constitute a good practice guide for basketball specialists and players, through their variety and structuring on the components of coordinative capacities in technical conditions specific to sports training.
- The creative adaptation of the exercises according to the characteristics and versatility of the Fitlight technology facilitated the diversification of the training with a positive effect on the progress recorded on the motor and technical parameters of the basketball players in the experimental groups U14, U16.

Advanced methods of testing coordination ability

- The introduction of Fitlight technology in the evaluation of players' performances represents an innovation in testing methods. This allowed for a more precise and detailed analysis of the different aspects of the players' performance regarding the level of development of coordinative capacities.
- The adaptation of some standardized tests for the assessment of coordinative capacities under conditions of reactivity specific to the use of Fitlight technologies.
- The use of fitlight technologies allowed the precise quantification of the results, which positively influenced the reliability of the study.
- Complex evaluation of coordinative capacities
- The research adopted a holistic approach in the assessment of coordination capabilities, analyzing a wide spectrum of skills and how they are influenced by the training program and the specifics of basketball training. This provided a complete picture of the impact of training on athlete development.

Analysis of training performance under match conditions

- A distinctive element of the study was the use of standardized statistics during training in match conditions through the use of software validated by FIBA.

- This analysis provided a realistic assessment of how progress from the final research following the implementation of the final experimental program translates into actual improvements in physical and technical performance in matches, providing valuable insight into the practical applicability of the training program.

These novel aspects emphasize the progressive and methodical approach of the study, reflecting a deep commitment to innovation and continuous improvement in the field of sports training.

VIII.2. Future research directions

1. Extending the research to the female gender: An important research direction would be to apply and evaluate the impact of the Fitlight technology and training program on female basketball players. This would provide a broader perspective on the effectiveness and applicability of these methods among female athletes.

2. Testing the program in different age groups: It would be valuable to evaluate the impact of the training program with Fitlight technology on different age groups, including younger as well as senior categories, in order to assess its adaptability and effectiveness in different categories of age.

3. Comparison with other training programs involving other modern technologies: Another relevant direction is to compare the effects of the training program based on Fitlight with programs using other modern technologies. This could provide a better understanding of how different technologies can be used to maximize sports development.

4. Comparing the effectiveness of the program in different sports: It would also be interesting to explore the applicability and effectiveness of this type of training in other sports that require coordination, such as football, tennis or gymnastics. This could reveal new insights into the adaptability of Fitlight and other technologies in monitoring and evaluating individual or team parameters specific to sports training and competition.

VIII.3. Limitations of the study

1. Limited demographic group: The fact that the study only included male basketball players in the U14 and U16 age categories we believe it is the main limitation with effects on the generalization of the conclusions to other sports classification groups. It is necessary to expand the research to include female athletes in order to highlight the progress made by them through the implementation of the proposed experimental program and allow a comparative study to be carried out to highlight the differences in progress according to gender and sports age categories.

2. No post-program follow-up of athletic performance: Although significant improvements were observed at the end of the 18-week training program, a limitation of the study is the uncertainty as to whether these improvements would continue if the program were extended. It would be important to assess whether these improvements represent the

maximum potential reached by the players or whether there is further room for continued growth with continued application of the program.

3. Exclusive focus on basketball: An important limitation of the study is that it only focused on basketball players. Although the results are relevant to this sport, the applicability and effectiveness of the Fitlight technology and training methods could vary significantly in other sports. Further research would be needed to assess the impact of these approaches in different sporting contexts, such as football, tennis or gymnastics.

4. The use of a single technology: in our research we only used the Fitlight technology and we believe that the use of other technologies and smart sensors would have allowed the monitoring and evaluation of other parameters relevant to sports activity.

BIBLIOGRAPHY

1. Abalaşei, B., Manolache, G., (2014) Study on the education of coordinative *abilities, Scientific Journal of Education, Sports, and Health*, No. 1, Vol. XV /2014, p.1-3
2. Abdelkrim, N. B., El Fazaa, S., El Ati, J. (2007) Time–motion analysis and physiological data of elite under-19-year-old basketball players during competition. *British journal of sports medicine*, 41(2), p.69-75.
3. Ackerman, P. (1988) Determinants of individual diff erences during skill acquisition: cognitive abilities and information processing, *Journal of Experimental Psychology: General*, 117 , p.288 - 318
4. Afrilliyan, A., Pramono, H., Soenyoto, T. (2018) The Effects of Exercise and Agility on Dribble (Skills) of Basketball Extracurricular Participants in SMPN 10 Bengkulu, *Journal of Physical Education and Sports*, 7(1), p.83-87
5. Alexe, N. (1993) Antrenamentul sportiv modern. Bucureşti, *Editis*
6. Arede, J., Fernandes, J., Moran, J., Norris, J., Leite, N. (2021) Maturity timing and performance in a youth national basketball team: Do early-maturing players dominate*?, International Journal of Sports Science & Coaching*, 16(3), p.722-730
7. Bădău, D. (2012) Teoria și Metodica Educației Fizice și Sportului, Suport de Curs, UMF Targu Mures, *Editura University Press*

8. Bădău, D., Bădău, A. (2022) Optimizing reaction time in relation to manual and foot laterality in children using the fitlight technological systems, *Sensors*, 22(22), 8785
9. Bădău, D., Bădău, A., Ene-Voiculescu, C., Larion, A., Ene-Voiculescu, V., Mihaila, I., Fleancu, J.L., Virgil, T., Tifrea, C., Cotovanu S.A., Abramiuc, A. (2022) The Impact of Implementing an Exergame Program on the Level of Reaction Time Optimization in Handball, Volleyball, and Basketball Players, *International Journal of Environmental Research and Public Health*, 19(9), 5598
10. Bădău, D., Bădău, A., Joksimović, M., Manescu, C.O., Manescu, D.C., Dinciu, C.C., Margarit, I.R., Virgil I., Mujea A.M., Neofit, A., Teodor, D.F. (2024) Identifying the Level of Symmetrization of Reaction Time According to Manual Lateralization between Team Sports Athletes, Individual Sports Athletes, and Non-Athletes, *Symmetry*, 16(1), 28
11. Bădău, D., Baydil, B., Badau, A. (2018) Differences among Three Measures of Reaction Time Based on Hand Laterality in Individual Sports, *Sports* (Basel, Switzerland), 6(2), 45
12. Bădău, D., Stoica, A. M., Litoi, M. F., Bădău, A., Duta, D., Hantau, C. G.,Sabau, A.M., Oancea, B.M., Ciocan, C.V., Fleancu, J.L., Gozu, B. (2023) The Impact of Peripheral Vision on Manual Reaction Time Using Fitlight Technology for Handball, Basketball and Volleyball Players, *Bioengineering*, 10(6), 697
13. Baige, K., Noé, F., Paillard, T. (2020) Wearing compression garments differently affects monopodal postural balance in high-level athletes, *Scientific Reports*, 10(1), 15331.
14. Balciuuas, M., Stonkus, S., Abrantes, C., and Sampaio, J., (2006) Long term effects of different training modalities on power, speed, skill and anaerobic capacity in young male basketball players, *J Sports Sci Med 5*: 163–170
15. Bartlett, J. D., O'Connor, F., Pitchford, N., Torres-Ronda, L., Robertson, S. J. (2017). Relationships between internal and external training load in team-sport athletes: evidence for an individualized approach. *International journal of sports physiology and performance,* 12(2), 230-234.
16. Bădescu, D., Zaharie, N., Stoian, I., Bădescu, M., Stanciu, C. (2022) A narrative review of the link between sport and technology, *Sustainability*, 14(23), 16265.
17. Berceanu, D., Moan ă, A., (2007) Concep ia de joc şi de pregătire pe nivele formative, *Editura Printech*, Bucureşti
18. Bieć, E., Kuczyński, M. (2010) Postural control in 13-year-old soccer players, *European journal of applied physiology*, 110, 703-708.
19. Blume, D.D.(1981) Kennzeichnung koordinativer Fähigkeiten und Möglichkeiten ihrer Herausbildung im Trainingsprozeß, *Wissenschaftliche Zeitschrift der DHfK*, 3, 17.
20. Bompa T., Buzzichelli C.A., (2015) Periodization training for sports, Thrird Edition, *Human Kinetics*, USA, Champaign
21. Bota, A., Șerbănoiu, S. (2000) Teoria Educației fizice și sportului. București: *Cartea Școlii*
22. Bouteraa, I., Negra, Y., Shephard, R. J., Chelly, M. S. (2020) Effects of combined balance and plyometric training on athletic performance in female basketball players, *The Journal of Strength & Conditioning Research*, 34(7), 1967-1973.

23. Brachman, A., Kamieniarz, A., Michalska, J., Pawłowski, M., Słomka, K. J., Juras, G. (2017) Balance training programs in athletes–A systematic review, *Journal of human kinetics*, 58(1), 45-64.
24. Bressel, E., Yonker, J. C., Kras, J., Heath, E. M. (2007) Comparison of static and dynamic balance in female collegiate soccer, basketball, and gymnastics athletes, *Journal of Athletic Training*, 42(1), 42
25. Cabarkapa, D., Cabarkapa, D. V., Philipp, N. M., Myers, C. A., Whiting, S. M., Jones, G. T., Fry, A. C. (2023) Kinematic differences based on shooting proficiency and distance in female basketball players, *Journal of Functional Morphology and Kinesiology*, 8(3), 129.
26. Çağın, M., Polat, S. Ç., Orhan, Ö., Çetin, E., Abdioğlu, M., Yarım, İ., Cicioğlu, H. İ. (2024). Reliability and Validity of ÇAĞIN Hand and Foot Reaction Tests Protocol, *Journal of Education and Future*, (25), 59-74
27. Candra, O. (2020). The contribution of eye-hand coordination to basketball lay up shoot skills. In 1st Progress in Social Science, *Humanities and Education Research Symposium* (PSSHERS 2019) (pp. 864-869). *Atlantis Press*
28. Carbonell-Carrera, C., Saorin, J.L. (2018) Virtual learning environments to enhance spatial orientation, *EURASIA J. Math. Sci. Technol. Educ.*
29. Carstea, G. (2000), Teoria şi metodica educa iei fizice şi sportului, *Editura AN-DA Bucureşti*
30. Cattuzzo, M.T.; Dos Santos Henrique, R.; Re, A.H.; de Oliveira, I.S.; Melo, B.M.; de Sousa Moura, M.; de Araujo, R.C.; Stodden, D. (2014) Motor competence and health related physical fitness in youth: A systematic review, *J. Sci. Med. Sport*, 19(2):123-9
31. Čaušević, D.; Čović, N.; Abazović, E.; Rani, B.; Manolache, G.M.; Ciocan, C.V.; Zaharia, G.; Alexe, D.I. (2023) Predictors of Speed and Agility in Youth Male Basketball Players, *Appl. Sci.*, 13, 7796
32. Cavaggioni, L., Trecroci, A., Formenti, D., Courtney, R., Dascanio, G., Scurati, R., Ongaro, L., Alberti, G. (2021) Effects of a nasal breathing protocol on physical fitness and pulmonary function in young basketball players, *The Journal of Sports Medicine and Physical Fitness*, 62(10), 1368-1374
33. Chatzopoulos, D., Galazoulas, C., Patikas, D., Kotzamanidis, C. (2014) Acute effects of static and dynamic stretching on balance, agility, reaction time and movement time, *Journal of sports science & medicine*, 13(2), 403
34. Chaves, R., Baxter-Jones, A., Gomes, T., Souza, M., Pereira, S., Maia, J. (2015). Effects of individual and school-level characteristics on a child's gross motor coordination development. *International journal of environmental research and public health*, 12(8), 8883-8896.
35. Chaves, R.N.D.; Tani, G.; Souza, M.C.D.; Santos, D.; Maia, J. (2012) Variabilidade na coordenação motora: Uma abordagem centrada no delineamento gemelar, *Rev. Bras. Educ. Fís. Esporte.*, 26, 301–311. (In portugheză)
36. Chen, W.-J., Jhou, M.-J., Lee, T.S., Lu, C.-J. (2021) Hybrid Basketball Game Outcome Prediction Model by Integrating Data Mining Methods for the National Basketball Association, *Entropy*, 23(4), 477

37. Cheng, Y., Liang, X., Xu, Y., Kuang, X. (2022) Artificial intelligence technology in basketball training action recognition, *Frontiers in Neurorobotics*, 16, 819784
38. Chi, Y., Li, J. (2022) Concrete Application of Computer Virtual Image Technology in Modern Sports Training, *Computational intelligence and neuroscience*, 6807106
39. Condello, G., Khemtong, C., Lee, Y. H., Chen, C. H., Mandorino, M., Santoro, E.,Liu, C., Tessitore, A. (2020) Validity and reliability of a photoelectric cells system for the evaluation of change of direction and lateral jumping abilities in collegiate basketball athletes, *Journal of functional morphology and kinesiology*, 5(3), 55.
40. Cui, Y., Liu, F., Bao, D., Liu, H., Zhang, S., Gómez, M. Á. (2019) Key anthropometric and physical determinants for different playing positions during National Basketball Association draft combine test, *Frontiers in psychology*, 10, 2359.
41. Čvorović, A. (2012) The Influence of Basketball on the Asymmetry in the Use of Limbs, *Montenegrin Journal of Sports Science & Medicine*, 1(1).
42. de Souza, W. J. F., Clemente, F. M., de Oliveira Goulart, K. N., Costa, G. D. C. T., Cunha, P. E. S., Figueiredo, L. S., Laporta L.L., Reverdito S.R., Leonardi T.J., Castro, O.H. (2024). Tactical and Technical Performance in Basketball Small-Sided Games: A Systematic Review, *Retos: nuevas tendencias en educación física, deporte y recreación*, (56), 554-566.
43. Delextrat A, Grosgeorge B, Bieuzen F. (2015) Determinants of performance in a new test of planned agility for young elite basketball players, *Int J Sports Physiol Perform.* Mar;10(2):160-5
44. Deng, J. (2017) Ship remote sensing image analysis technology based on image segmentation and target extraction, *Ship Science and Technology*, 39(24), 140-142.
45. Dobovičnik, L., Jakovljević, S., Zovko, V., Erčulj, F. (2015) Determination of the optimal certain kinematic parameters in basketball three-point shooting using the 94Fifty technology, *Fizička kultura*, 69(1), 5-13.
46. Dogan, I., Ersoz, Y. (2019) The important game-related statistics for qualifying next rounds in Euroleague, *Montenegrin Journal of Sports Science and Medicine*, 8(1), 43-50
47. Dragnea, A., Bota, A., Teodorescu, S., Stănescu, M., Serbănoiu, S., Virgil T., (2006) Educație Fizică și Sport – Teorie și didactică – Bucuresti , *Fest*
48. Drinkwater, E.J. , Pyne, D.B., Mckenna, M.J., (2008) Design and interpretation of anthropometric and fitness testing of basketball players, *Sports Medicine*, 38(7), p.565-578
49. Duda, H. (2020), Shaping motor activities of young football players in comprehensive training using the Fitlight system, *Journal of Kinesiology and Exercise Sciences*, 30(91), 43-51
50. Epure, M., Bădău, D. (2021), Study on improving coordination skills in women's basketball game, *Discobolul-Physical Education, Sport & Kinetotherapy Journal*, 60(2)
51. Erickson, G. B. (2020), Sports vision: vision care for the enhancement of sports performance. *Elsevier Health Sciences*, p.422 - 423
52. Ervilha, U.F., Fernandes, F.D.M., Souza, C.C.D., Hamill, J. (2020) Reaction time and muscle activation patterns in elite and novice athletes performing a taekwondo kick, *Sports biomechanics*, 19(5), p.665-677.

53. Espasa-Labrador, J., Fort-Vanmeerhaeghe, A., Montalvo, A. M., Carrasco-Marginet, M., Irurtia, A., Calleja-González, J. (2023) Monitoring internal load in women's basketball via subjective and device-based methods. A systematic review, *Sensors*, 23(9), 4447.
54. Ezhov, A., Zakharova, A., Kachalov, D. (2021) Modern Light Sport Training Systems: Critical Analysis of Their Construction and Performance Features. *In icSPORTS,* p. 123-129
55. Fleancu, J.L. (2004). Pregătirea specifică diferențiată a baschetbaliștilor pivoți, vârsta 15-15 ani, în cadrul ciclului anual de antrenament sportiv: *Teza de doctorat nepublicată. Institutul Național de Educație Fizică și Sport*, Republica Moldova.
56. Fort-Vanmeerhaeghe, A., Montalvo, A., Latinjak, A., Unnithan, V. (2016) Physical characteristics of elite adolescent female basketball players and their relationship to match performance, *Journal of human kinetics*, 53(1), 167-178
57. França, C., Gomes, B. B., Gouveia, É. R., Ihle, A., Coelho-E-Silva, M. J. (2021) The jump shot performance in youth basketball: a systematic review, *International Journal of Environmental Research and Public Health*, 18(6), 3283
58. Gallahue, D.; Ozmun, J.; Goodway, J. (2011) Understanding Motor Development: Infants, Children, Adolescents, Adults; *McGraw-Hill Education: São Paulo, Brazil*
59. Gao, K., Tang, L., Lu, J. (2022) An Analysis of Sports News in the Era of Big Data-Visual Data News with NBA Coverage as an Example, *In 2022 3rd International Conference on Big Data and Social Sciences (ICBDSS 2022) Atlantis Press*, p. 90-98
60. García, F., Fernández, D., Martín, L. (2022) Relationship between game load and player's performance in professional basketball, *International Journal of Sports Physiology and Performance*, 17(10), p.1473-1479.
61. Germanova, A.A., Rogozhnikov, M.A., Safonova, O.A., Dementiev, K.N., (2019) Multimedia technologies to facilitate precise self-defense skills mastering process, *Teoriya i praktika fiz. Kultury.* No. 3. pp. 35-37
62. Ghislieri, M., Gastaldi, L., Pastorelli, S., Tadano, S., Agostini, V. (2019) Wearable inertial sensors to assess standing balance: A systematic review, *Sensors*, 19(19), 4075.
63. Ghi escu, I. G., & Moan ă, A. D. (2008). Bazele jocului de baschet. *Matrix Rom.*
64. Ghuntla, T. P., Mehta, H. B., Gokhale, P. A., Shah, C. J. (2014) A comparison and importance of auditory and visual reaction time in basketball players, *Saudi Journal of Sports Medicine*, 14(1), 35-38
65. Ghuntla, T.P., Mehta, H.B., Gokhale, P.A., Shah, C.J., (2012) A Comparative Study of Visual Reaction Time in Basketball Players and Healthy Controls, *National Journal of Integrated Research in Medicine*, Vol. 3 Issue 1, p49-51
66. Glasgow, P., Bleakley, C. M., Phillips, N. (2013) Being able to adapt to variable stimuli: the key driver in injury and illness prevention? *British journal of sports medicine*, 47(2), 64-65
67. Gonzalo-Skok, O., Dos' Santos, T., Bishop, C. (2023) Assessing limb dominance and Interlimb asymmetries over multiple angles during change of direction speed tests in basketball players, *The Journal of Strength & Conditioning Research*, 37(12), 2423-2430.
68. Grushko, A., Bochaver, K., Kasatkin, V. (2015). Multiple object tracking in sport: attention and efficacy, *14th European Congress of Sport Psychology* p. 14-19

69. Guimarães, E., Baxter-Jones, A. D., Williams, A. M., Tavares, F., Janeira, M. A., Maia, J. (2021) Tracking technical skill development in young basketball players: The inex study, *International Journal of Environmental Research and Public Health*, 18(8), 4094.
70. Hadi, P., Doewes, M., Riyadi, S. (2020) The influence of low intensity-high intensity plyometric training and hand-eye coordination on jump shoot ability in basketball players of bhinneka solo club: Randomized control trial, *Budapest Int. Res. Crit. Linguist Educ. J.*, 3(1), 514-22
71. Hadlow, S. M., Panchuk, D., Mann, D. L., Portus, M. R., Abernethy, B. (2018) Modified perceptual training in sport: a new classification framework, *Journal of Science and Medicine in Sport*, 21(9), 950-958
72. Hassan, A. K., Alhumaid, M. M., Hamad, B. E. (2022) The effect of using reactive agility exercises with the FITLIGHT training system on the speed of visual reaction time and dribbling skill of basketball players, *Sports*, 10(11), 176.
73. Hassan, A. K., Alibrahim, M. S., Sayed Ahmed, Y. A. R. (2023) The effect of small-sided games using the FIT LIGHT training system on some harmonic abilities and some basic skills of basketball players, *Frontiers in Sports and Active Living*, 5, 1080526.
74. Hastürk, G., Akyıldız Munusturlar, M. (2022) The effects of exergames on physical and psychological health in young adults, *Games for Health Journal*, 11(6), 425-434.
75. Heidarnia, E., Letafatkar, A., Khaleghi-Tazji, M., Grooms, D. R. (2022) Comparing the effect of a simulated defender and dual-task on lower limb coordination and variability during a side-cut in basketball players with and without anterior cruciate ligament injury, *Journal of Biomechanics*, 133, 110965.
76. Henry, G., Dawson, B., Lay, B., Young, W. (2011) Validity of a reactive agility test for Australian football, *International journal of sports physiology and performance*, 6(4), p.534-545.
77. Herdiawan, S., Galina, G., Asmawi, M., Hanif, A. S. (2020) The effect of current power, arm strength and coordination on jump shoot skill basketball skills, *International Journal of Physical Education, Sports and Health*, 7(1): p.11-15
78. Hidayat, R., Nur, S., Hasanuddin, M. I. (2023) Affecting Factors of Shooting Ability In Basketball Games: Coordination And Concentration, *JUARA: Jurnal Olahraga*, 8(1), p.10-17.
79. Hijazi, M.M.K. (2013) Attention, visual perception and their relationship to sport performance in fencing, *Journal of Human Kinetics* 39(1):p.195-201
80. Hirtz P. (1980) Beitrage zur Mathodik des Sportunterrients. *Greifswald*
81. Hoffman, J. R. (2020) Evaluation of a reactive agility assessment device in youth football players, *The Journal of Strength & Conditioning Research*, 34(12): p.3311-3315.
82. Hojka, V.; Stastny, P.; Rehak, T.; Goła´s, A.; Mostowik, A.; Zawart, M.; Musálek, M. A (2016) systematic review of the main factors that determine agility in sport using structural equation modeling, *J. Hum. Kinet.* 52, p.115–123
83. Holfelder, B.; Schott, N. (2014) Relationship of fundamental movement skills and physical activity in children and adolescents: A systematic review, *Psychol. Sport Exerc.* 15, p.382–391.
84. Horicka, P., Simonek, J. (2021) Age-related changes of reactive agility in football, *Physical Activity Review*, 1(9), p.16-23.

85. Horička, P., Šimonek, J., Paška, Ľ. (2020) Relationship between reactive agility, cognitive abilities, and intelligence in adolescents, *Journal of Physical Education and Sport*, 20, p.2263-2268.
86. Horníková, H.; Zemková, E. (2022) Determinants of Y-Shaped Agility Test in Basketball Players, *Appl. Sci.*, 12, 1865
87. Hrysomallis, C. (2011) Balance ability and athletic performance, *Sports Medicine*, 41(3), p.221-232
88. Hu, Z. (2021) Research on American Professional Basketball League based on big data technology, *In 2021 International Conference on Health Big Data and Smart Sports (HBDSS) p. 5-8*
89. Irawan, F.A., Prastiwi, T.A.S. (2022) Biomechanical analysis of the three-point shoot in basketball: Shooting performance, *Journal of Physical Education and Sport*, 22(12), p.3003-3008.
90. Jakovljević, S., Karalejić, M., Ivanović, J., Štrumbelj, E., Erčulj, F. (2017) Efficiency of speed and agilty dribbling of young basketball players, *Kinesiologia Slovenica*, 23(2), p.22-32.
91. Jami S, Irandoust K. (2022) Improving Agility Performance Among Athletes by Jami Agility Table (JAT), *Int. J. Sport Stud. Health, 5*(1):p.1-5
92. Jin, P., Li, X., Ma, B., Guo, H., Zhang, Z., Mao, L. (2020) Dynamic visual attention characteristics and their relationship to match performance in skilled basketball players. *PeerJ, 8, e9803*.
93. Kalen, A., Lundkvist, E., Ivarsson, A., Rey, E., Pérez-Ferreirós, A. (2021) The influence of initial selection age, relative age effect and country long-term performance on the reselection process in European basketball youth national teams, *Journal of sports sciences*, 39(4), p.388-394.
94. Kamandulis, S., Venckūnas, T., Masiulis, N., Matulaitis, K., Balčiūnas, M., Peters, D., Skurvydas, A. (2013) Relationship between general and specific coordination in 8-to 17-year-old male basketball players, *Perceptual and motor skills*, 117(3), p.821-836.
95. Katanić, B., Ilić, P., Stojmenović, A., Vitasović, M. (2020) The application of Fitlight trainer system in sports, *Fizička kultura*, 74(2), p.115-126.
96. Keiner, M., Kadlubowski, B., Wirth, K., Klusemann, M. (2021) The Influence of Linearsprint and Jump Performance on Change-of-Direction Performance in Male and Female State-Representative Youth Basketball Players, *Int J Sports Exerc Med*, 7:186
97. Kelly, A. L., Jiménez Sáiz, S. L., Lorenzo Calvo, A., de la Rubia, A., Jackson, D. T., Jeffreys, M. A., Ford, C., Owen, D., Santos, S. D. L. D. (2021) Relative age effects in basketball: exploring the selection into and successful transition out of a national talent pathway, *Sports*, 9(7), 101
98. Kim, J. H., Park, J. W., Tae, W. S. (2022) Cerebral cortex changes in basketball players, *Journal of Korean medical science*, 37(11)
99. Kim, M., Park, J. M. (2017) Factors affecting cognitive function according to gender in community-dwelling elderly individuals, *Epidemiology and health*, 39, e2017054
100. Kioumourtzoglou, E. , Derri, V. , Tzetzis, G. , Theodorakis, Y. (1998) Cognitive, perceptual, and motor abilities in skilled basketball performance, *Perceptual & Motor Skills* , 86 , p.771 - 786

101. Kirschen, D.G., Laby, D.L. (2011) The role of sports vision in eye care today, *Eye & contact lens*; 37(3): p.127-130
102. Klostermann, A., Vater, C., Kredel, R., Hossner, E. J. (2020) Perception and action in sports. On the functionality of foveal and peripheral vision, *Frontiers in sports and active living*, 1, 66
103. Knjaz, D.A.M.I.R., Rupcic, T., Antekolovis, L. (2016) Application of modern technology in teaching and training with special emphasis on basketball contents, *Phys. Educ. New Technol*, 2, p.112-122
104. Kosasih. D (2007) Fundamental Basktball. *Jakarta: Karmedia*
105. Kramer, A. F., Hahn, S., McAuley, E., Cohen, N. J., Banish, M. T., Harrison, C., Chason, J., Boileau, R. A., Bardell, L., Colcombe, A., Vakil, E. (2001) Exercise, Aging, and Cognition: Healthy Body, Healthy Mind? In A.D. Fisk & W. Rogers (Eds.), *Human Factor Interventions for the Health Care of Older Adults*, p.91-120
106. Krause, J. V., Nelson, C. (2019) Basketball skills & drills. *Human Kinetics*
107. Kubatko, J., Oliver, D., Pelton, K., Rosenbaum, D. T. (2007) A starting point for analyzing basketball statistics, *Journal of quantitative analysis in sports*, 3(3)
108. Latorre, E. C., Zuniga, M. D., Arriaza, E., Moya, F., Nikulin, C. (2020) Automatic registration of footsteps in contact regions for reactive agility training in sports, *Sensors*, 20(6), 1709
109. Lima, R., Rico-González, M., Pereira, J., Caleiro, F., Clemente, F. (2021) Reliability of a reactive agility test for youth volleyball players, *Polish Journal of Sport and Tourism*, 28(1),p.8-12
110. Liu Y. (2020) The realization of machine vision for finding basketball based on LabVIEW. *Electronic production*, vol. 396, no. 10, pp. 41-43
111. Liu, Y. (2022) A Study on the Importance of Core Strength and Coordination Balance during Basketball Based on Biomechanics, *Molecular & Cellular Biomechanics*, 19(3)
112. Lockie, R.G.; Jeffriess, M.D.; McGann, T.S.; Callaghan, S.J.; Schultz, A.B. (2014) Planned and reactive agility performance in semiprofessional and amateur basketball players, *Int. J. Sports Physiol. Perform.*, 9, p.766–771.
113. Malina, R.M.; Bouchard, C.; Bar-Or, O. (2004) Growth, Maturation, and Physical Activity; *Human Kinetics*: Champaign, IL, USA, p.712
114. Mangine, G. T., Hoffman, J. R., Wells, A. J., Gonzalez, A. M., Rogowski, J. P., Townsend, J. R., Jajtner, A.R., Beyer, K.S., Bohner, J.D., Pruna, G.J., Fragala, M.S., Stout, J. R. (2014) Visual tracking speed is related to basketball-specific measures of performance in NBA players, *The Journal of Strength & Conditioning Research*, 28(9), p.2406-2414.
115. Marta, I. A., Neldi, H. (2023) Hand Eye Coordination and Explosive Power of Limb Muscles for Under Ring Ability in playing Basketball. Halaman Olahraga Nusantara: *Jurnal Ilmu Keolahragaan*, 6(1), p.1-14
116. Martín, A., Sfer, A.M., D'Urso-Villar, M.A., Barraza, J.F., (2017) Position affects performance in multiple-object tracking in rugby union players, *Frontiers in Psychology* 8:1494

117. Mathisen, G.; Pettersen, S.A. (2015) Anthropometric factors related to sprint and agility performance in young male soccer players, *Open Access J. Sports Med.*, 6, p.337–342
118. McNeil, D. G., Spittle, M., Mesagno, C. (2021) Imagery training for reactive agility: Performance improvements for decision time but not overall reactive agility, *International Journal of Sport and Exercise Psychology,* 19(3), p.429-445
119. Meckel, Y., Casorla, T., Eliakim, A. (2009) The Influence of Basketball Dribbling on Repeated Sprints, *International Journal of Coaching Science*, 3(2)
120. Memmert, D., Simons, D.J., Grimme, T. (2009) The relationship between visual attention and expertise in sports, *Psychology of Sport and Exercise* 10(1):p.146-151
121. Meyerhoff, H.S., Papenmeier, F., Huff, M., (2017) Studying visual attention using the multiple object tracking paradigm: a tutorial review, *Attention, Perception, & Psychophysics* 79(5):p.1255-1274
122. Mishyn, M., Kamaiev, O., Mulyk, V., Taran, L., Grashchenkova, Z., Tarasevich, O., Hradusov, V., Mulyk, K., Pomeshchikova, I. (2018) Problems and features of technique in the development of coordination abilities of players specializing in wheelchair basketball, *Journal of Physical Education and Sport*, p.1016-1020
123. Mitra, G., Mogoş, A. (1977) Dezvoltarea calită ilor motrice. Bucureşti: *Sport- Turism,*
124. Moanță, A. D. (2005). Baschet: Metodică [Basketball: Methodology]. Buzău: *Alpha*.
125. Mocanu, G. D. (2015) Teoria educa iei fizice şi sportului, *Editura Funda iei Universitare „Dunărea de Jos"*
126. Mori, S, Ohtani, Y, Imanaka, K. (2002) Reaction times and anticipatory skills of karate athletes, *Human Movement Science*, 21(2): p.213-230
127. Myers, L. R., Toonstra, J. L., Cripps, A. E. (2022) The test–retest reliability and minimal detectable change of the Fitlight Trainer™, *International Journal of Athletic Therapy and Training*, 28(2), p.84-88
128. Naik, B. T., Hashmi, M. F. (2023). LSTM-BEND: predicting the trajectories of basketball, *IEEE Sensors Letters*, 7(4), p.1-4
129. Narazaki, K., Berg, K., Stergiou, N., Chen, B. (2009). Physiological demands of competitive basketball, *Medicine & Science in Sports*, 19(3), p.425-432
130. Netolitzchi, M. (2010) Sisteme de acționare din atletism, gimnastică, baschet şi fotbal pentru pregătirea fizică în învățământul universitar, Bucureşti: *Editura Printech*
131. Nicu A. (1993) Antrenamentul sportiv modern, Bucuresti: *Editis*
132. Nikolaos, K., Evangelos, B., Nikolaos, A., Emmanouil, K., Panagiotis, K. (2012) The effect of a balance and proprioception training program on amateur basketball players' passing skills, *Journal of Physical Education and Sport,* 12(3), p.316-323
133. Oancea, B. M., Bondoc-Ionescu, D. (2015). The influence of a specialized methodology in order to develop free throws in u14-u15 basketball competitive yield*. Anualele Universității din Oradea, Fascicula Educație Fizică și Sport,* 25, 16-26.
134. Oliver, J. A. (2004) Basketball fundamentals. *Human Kinetic*
135. Oliver, J.L.; Meyers, R.W. (2009) Reliability and generality of measures of acceleration, planned agility, and reactive agility, *Int. J. Sports Physiol. Perform.*, 4, p.345–354.

136. Olteanu, M., Oancea, B. M., Badau, D. (2023). Improving Effectiveness of Basketball Free Throws through the Implementation of Technologies in the Technical Training Process, *Applied Sciences*, 13(4), 2650
137. Örs, B. S., Cantas, F., Gungor, E. O., Sımsek, D. (2019). Assessment and comparison of visual skills among athletes, *Spor ve Performans Araştırmaları Dergisi*, 10(3), p.231-241.
138. Páder, J. (1981), Kosarlabdázás, *Franklin Nyomda*, Budapest
139. Paraschiv, F. (2007) Teoria și metodica educației fizice și sportului, Ediția a II-a, Brașov, *Editura Omnia Uni S.A.S.T.*
140. Park, S., Yoon, S. (2018). The Effect of Types of Initial Drive-in Steps on Technical Factors in Basketball, *Korean Journal of Sport Biomechanics*, 28(3), p.181–185
141. Paşcan, A., Paşcan, I. (2014). Exercises for the improvement of accuracy and position orientation and body movement in space through means specific for the basketball game, *Studia Universitatis Babes-Bolyai, Educatio Artis Gymnasticae*, 59(2), p.79
142. Petan, P., Marcu, V., (2005) Cercetari privind evaluarea capacitatilor mortice coordinative, *Editura Universității din Oradea*
143. Platonov, V. N. (1984) Theory and methodology of sport training. Kiev: *Vishal School*
144. Popescu F., (2012) Baschet-Curs în tehnologie IFR, *Editura Funda iei România de Mâine*
145. Popowczak, M., Cichy, I., Rokita, A., Domaradzki, J. (2021). The relationship between reactive agility and change of direction speed in professional female basketball and handball players, *Frontiers in psychology*, 12, 708771.
146. Pramudya, A.R., Hidayah, T., (2015) Pengaruh Latihan Ballhandlingterhadap Kemampuan Dribble pada Tim Bola Basket Putri SMAN 1Pati, *Journal of Sport Sciences and Fitness*, 4(3)
147. Purnomo, A. A. (2015) Hubungan koordinasi mata tangan, power lengan, keseimbangan badan backhand drive petenis putera. Active: *Journal of Physical Education, Sport, Health and Recreation*, 4(2), p.1574-1581
148. Pylyshyn, Z.W., Storm, R.W. (1988) Tracking multiple independent targets: evidence for a parallel tracking mechanism, *Spatial Vision* 3(3):p.179-197
149. Rahayu, P., Rahayu,T., Rifai,A. (2017) Pengaruh Gaya Mengajar Latihan Koordinasi Mata dan Tangan terhadap Hasil Pembelajaran Dribbling Bola Basket, *Journal of Physical Education and Sports*, 6(2) p.186-192
150. Ra ă, G., Ra ă, B. C. (2006) Aptitudinile în activitatea motrică. Bacău: *EduSoft*
151. Reza, M. N., Rahman, M. H., Islam, M. S., Gayen, A. (2023). An Examination of Audio-Visual Simple Reaction Times in Selected Court Games, *Australian Journal of Basic and Applied Sciences*, 17(1), p.9-14
152. Rinaldo, N., Toselli, S., Gualdi-Russo, E., Zedda, N., Zaccagni, L. (2020). Effects of anthropometric growth and basketball experience on physical performance in pre-adolescent male players, *International journal of environmental research and public health*, 17(7), 2196
153. Rogozhnikov, M.A., Baturin, A.E., Yakoylev, Yu.V., Kuritsyna, A.E. (2020) Fitlight' training system benefits for neuromuscular control training in basketball, St. Petersburg Academy of

the Investigative Committee of the Russian Federation, *St. Petersburg, Theory and Practice of Physical Culture*, p10-12

154. Rupčić, T., Antekolović, L., Knjaz, D., Matković, B., Cigrovski, V. (2016) Reliability analysis of the 94 fifty smart sensor basketball. *In 10th International Conference on Kinanthropology* p.432-438
155. Rupčić, T., Feng, L., Matković, B. R., Knjaz, D., Dukarić, V., Baković, M.,Matkovic, A., Svoboda, I., Vavacek, M., Garafolić, H. (2020) The impact of progressive physiological loads on angular velocities during shooting in basketball-case study. *Acta kinesiologica*, 14(2), p.102-109.
156. Rupčić, T., Knjaz, D., Baković, M., Borović, I., Zekić, R. (2016) Differences in certain kinematic parameters between jump shots from different distances in basketball. Summer School for Croatian Kinesiologists, Suppl 1, p.57-68
157. Russell, J. L., McLean, B. D., Impellizzeri, F. M., Strack, D. S., Coutts, A. J. (2021) Measuring physical demands in basketball: an explorative systematic review of practices. *Sports Medicine*, 51, p.81-112.
158. Rutkowski, S., Adamczyk, M., Pastuła, A., Gos, E., Luque-Moreno, C., Rutkowska, A. (2021) Training using a commercial immersive virtual reality system on hand–eye coordination and reaction time in young musicians: A pilot study, *International journal of environmental research and public health*, 18(3), 1297.
159. Saavedra, J.M., Þorgeirsson, S., Kristjansdottir, H., Halldorsson, K., Guðmundsdottir, M.L., Einarsson, I.Þ. (2018) Comparison of training volumes in different elite sportspersons according to sex, age, and sport practised, *Montenegrin Journal of Sports Science and Medicine*, 7(2), p.37-42
160. Sadowski, J., Wolosz, P., Zielinski, J., Niznikowski, T., Buszta, M. (2014) Structure of coordination motor abilities in male basketball players at different levels of competition, *Polish Journal of Sport and Tourism*, 21(4), p.234-239
161. Sampaio, J., Godoy, S. I., Feu, S. (2004) Discriminative power of basketball game-related statistics by level of competition and sex, *Perceptual and motor Skills*, 99(3_suppl), p.1231-1238
162. Sampaio, J., Godoy, S. I., Feu, S. (2004) Discriminative power of basketball game-related statistics by level of competition and sex, *Perceptual and motor Skills*, 99(3_suppl), p.1231-1238
163. Sandor, I. (2015), Tehnici și Metode de dezvoltare a calităților motrice, *Suport de curs, UBB Cluj Napoca*
164. Scanlan, A., Humphries, B., Tucker, P. S., Dalbo, V. (2014). The influence of physical and cognitive factors on reactive agility performance in men basketball players, *Journal of sports sciences*, 32(4), p.367-374
165. Schumacher, N., Schmidt, M., Reer, R., Braumann, K. M. (2019) Peripheral vision tests in sports: Training effects and reliability of peripheral perception test, *International Journal of Environmental Research and Public Health*, 16(24), 5001

166. See, L. C., Liu, Y. H., Lim, A. Y., Chen, W. M., Lee, J. S. (2021) Development, reliability, and validity of a new protocol for measuring visuomotor response among athletes and non-athletes, *Medicina dello Sport*, 74(4), p.642-656

167. Seidl, T., Cherukumudi, A., Hartnett, A., Carr, P., Lucey, P. (2018). Bhostgusters: Realtime interactive play sketching with synthesized NBA defenses. *In Proceeding of the 12th MIT Sloan Sports Analytics Conference*, Boston, MA. Boston: MIT

168. Sekulic, D., Krolo, A., Spasic, M., Uljevic, O., Peric, M. (2014) The development of a new stop'n'go reactive-agility test, *J Strength Cond Res.*, 28(11):p.3306-3312

169. Sekulic, D., Pehar, M., Krolo, A., Spasic, M., Uljevic, O., Calleja-González, J., Sattler, T. (2017). Evaluation of basketball-specific agility: applicability of preplanned and nonplanned agility performances for differentiating playing positions and playing levels, *The Journal of Strength & Conditioning Research*, 31(8), p.2278-2288

170. Sheppard, J. M., Young, W. B., Doyle, T. L. A., Sheppard, T. A., Newton, R. U. (2006) An evaluation of a new test of reactive agility and its relationship to sprint speed and change of direction speed, *Journal of science and medicine in sport*, 9(4), p.342-349.

171. Silvestri, F., Campanella, M., Bertollo, M., Albuquerque, M. R., Bonavolontà, V., Perroni, F., Baldari, C., Guidetti, L., Curzi, D. (2023) Acute effects of Fitlight training on cognitive-motor processes in young basketball players, *International Journal of Environmental Research and Public Health*, 20(1), 817

172. Singh, H., Saini, A. (2017) Relationship of coordinative ability with the skills of basketball. İnternational Journal of Yoga, *Physiotheraphy and Physical Education*, 2(3), p.56-59

173. Singh, R. (2020) Analysis of reaction time and speed in basketball players. Age (years), *International Journal of Physiology, Nutrition and Physical Education*; 5(1): p.174-176

174. Sirnik, M., Erčulj, F., Rošker, J. (2022) Research of visual attention in basketball shooting: A systematic review with meta-analysis, *International Journal of Sports Science & Coaching*, 17(5), p.1195-1210

175. Spaniol F., Powell, J. (2014) The relationship between visual skills and reactive agility of NCAA division I male basketball players, *National Strength and Conditioning Association National Conference At: Las Vegas, NV*

176. Spiteri, T., Newton, R.U., Binetti, M., Hart, N.H., Sheppard, J.M., Nimphius, S. (2015) Mechanical determinants of faster change of direction and agility performance in female basketball athletes, *J. Strength Cond. Res.* 29, p.2205–2214

177. Steff, N., Bădău, D. (2024). A pilot study regarding the development of reaction time through the implementation of Fitlight technology in the training of basketball players aged 13-14 years. Health, Sports & Rehabilitation Medicine, 25(1)

178. Steff[1], N., Badau D., Badau A. (2024). "Improving Agility and Reactive Agility in Basketball Players U14 and U16 by Implementing Fitlight Technology in the Sports Training Process" Applied Sciences 14, no. 9: 3597

179. Steff[2] N., Badau D., Badau A., (2024) Study on the Impact of Implementing an Exercise Program Using Fitlight Technology for the Development of Upper Limb Coordinative Abilities in Basketball Players, *Sensors*, 24(11), 3482

180. Stoica, M. (2000) Capacitățile motrice în atletism. București: *Printech*

181. Stojanovic, E., Aksovic, N., Stojiljkovic, N., Stankovic, R., Scanlan, A.T., Milanovic, Z. (2019). Reliability, usefulness, and factorial validity of change-of-direction speed tests in adolescent basketball players, *J. Strength Cond. Res.* 33, p.3162–3173

182. Stothart, C., Boot, W., Simons, D., Beyko, A., (2014) Action video game experience does not predict multiple object tracking performance. *Psychology* 14(10):p.353

183. Suryadi, D., Suganda, M.A., Samodra, Y.T.J., Wati, I.D.P., Rubiyatno, R., Haïdara, Y., Wahyudi, I., Saputra, E. (2023) Eye-hand coordination and agility with basketball lay-up skills: A correlation study in students. *JUMORA: Jurnal Moderasi Olahraga*, 3(1), p.60-71

184. Sutter, K., Oostwoud Wijdenes, L., van Beers, R. J., Medendorp, W. P. (2021) Movement preparation time determines movement variability, *Journal of Neurophysiology*, 125(6), p.2375-2383

185. Svoboda, I., Knjaz, D., Baković, M., Matković, B., Prlenda, N. (2016). Differences in certain kinematic parameters between jump shots from the 6,25 m three-point line and the 6,75 m three-point line in U16 basketball players. 9th International Scientific Conference On Kinesiology, p.136-139

186. Tataracan, C.A., Branișteș, G. (2022) Aprecierea nivelului dezvoltării capacităților coordinative la fotbaliștii juniori în funcție de postul de joc, *Sport. Olimpism. Sănătate: Ediția 7*, p.306-314

187. Teodorescu, L. (1975). Probleme de teorie și metodică a jocurilor sportive. București: *Editura Sport-Turism*

188. Tokolyi, K., Elshakankiri, M. (2021) Internet of things in the game of basketball, *Springer International Publishing In IoT as a Service: 6th EAI International Conference*, Proceedings 6 p.421-435

189. Tudor V. (2001) Capacitatile conditionale, coordinative si intermediare. Componente ale capacitatii motrice, *Editura:RAI*

190. Tymoshenko, O., Arefiev, V., Domina, Z., Malechko, T., Bondar, T., Tymchyk, M., Pliushchakova, O., Riabchenko, V., Griban, G., Prontenko, K. (2021) Exercise machines in speed and coordination development among students playing basketball*, International Journal of Human Movement and Sports Sciences*, 9(2), p.347-355

191. Vater, C., Strasburger, H. (2021) The Top Five Peripheral Vision Tools in Sport. *Optometry and Vision Science*, 98(7), p.704-722

192. Versic, S., Pehar, M., Modric, T., Pavlinovic, V., Spasic, M., Uljevic, O., Corluka, M., Sattler T., Sekulic, D. (2021) Bilateral symmetry of jumping and agility in professional basketball players: Differentiating performance levels and playing positions, *Symmetry*, 13(8), 1316

193. Vickers, J.N. (2009) Advances in coupling perception and action: The quiet eye as a bidirectional link between gaze, attention, and action, *Progress in Brain Research*, 174: p.279-288

194. Voss, M.W., Kramer, A.F., Basak, C., Prakash, R.S., Roberts, B.W., (2010) Are expert athletes 'expert' in the cognitive laboratory? A meta-analytic review of cognition and sport expertise, *Applied Cognitive Psychology* 24(6), p.812-826
195. Vukasevic, V., Mitrovic, M., Masanovic, B. (2020) A comparative study of motor ability between elite basketball players from different regions, *Sport Mont*, 18(1), p.3-7
196. Wang, Y., Sun, M., Liu, L. (2021) Basketball shooting angle calculation and analysis by deeply-learned vision model, *Future Generation Computer Systems*, 125, p.949-953
197. Wright, D. J., Frank, C., & Bruton, A. M. (2022). Recommendations for combining action observation and motor imagery interventions in sport. *Journal of Sport pSychology in action*, 13(3), 155-167;
198. Young, W.B., Dawson, B., Henry, G.J. (2015) Agility and change-of-direction speed are independent skills: Implications for training for agility in invasion sports, *International Journal of Sports Science & Coaching*, 10(1), p.159-169
199. Zacharakis, E.D., Bourdas, D.I., Kotsifa, M.I., Bekris, E.M., Velentza, E.T., Kostopoulos, N.I. (2020) Effect of balance and proprioceptive training on balancing and technical skills in 13-14-year-old youth basketball players, *Journal of Physical Education and Sport*, 20(5), p.2487-2500
200. Zakharova, A., Mekhdieva, K., Krasilnikov, V., Timokhina, V. (2019). Soccer players' agility: Complex laboratory testing for differential training, *Proceedings of the 7th International Conference on Sport Sciences Research and Technology Support icSPORTS* - Volume 1, p.90-96
201. Zarić I, Dopsaj M, Marković M. (2018) Match performance in young female basketball players: relationship with laboratory and field tests, *International Journal of Performance Analysis in Sport* 18(1) p.90-103
202. Zhidong L. (2017) Comparison of mean value of finger length ratio between college basketball players and ordinary college students, *Journal of Physical Education*, vol. 24, no. 2, p.135-139
203. Zou, L. (2016) Relationship between functional movement screening and skill-related fitness in college students. Age, 20, International Journal of Sports Science 2016, 6(1), p.11-18
204. Zwierko, T., Lesiakowski, P., Florkiewicz, B. (2005) Selected aspects of motor coordination in young basketball players, *Human Movement*, 6(2), p.124 – 128

Web Bibliography

1. FIBA, Official Basketball Rules (2022), https://www.fiba.basketball/documents (6 Iunie 2023)
2. https://wabc.fiba.com/manual/level-2/l2-player/3-physical-preparation/3-1-strength-and-conditioning/3-1-9-basic-off-season-preparation/ (25 Iunie 2023)
3. https://altex.ro/senzor-ritm-cardiac-polar-oh1/cpd/BRTOH1/ (15 Mai 2024)
4. https://training.microgate.it/en/products/optojump-next (10 Iunie 2024)
5. https://www.livescience.com/43410-94fifty-smart-sensor-basketball-review.html (1 Iunie 2024)
6. https://www.cnbc.com/2019/04/17/how-artificial-intelligence-is-making-better-basketball-shooters-with-just-your-iphone.html (13 Mai 2024)

7. https://www.statsperform.com/team-performance/basketball/advanced-player-data (15 lanuarie 2024)