

Scientific review

## METHODOLOGICAL APPROACH TO THE DEVELOPMENT OF SAQ MOVEMENT SKILLS IN BASKETBALL

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**Abstract:** This paper explains the significance of the development of SAQ skills for young basketball players. Apart from this, the paper offers an overview of characteristics of training, main principles and methodological notes for the triangle training of speed, agility and quickness. The tendencies of anthropological development of children are completely compatible with the goals of developing SAQ skills, which is proved by the overview of sensitive periods of development and principles which refer to the long-term programme of their implementation in the training technology. The verification of the significance of the development of these characteristics for young basketball players has also been highlighted, as the basis for qualitative fitness, technical, tactical and situational detection in the years when the highest sports achievements are expected. Therefore, an overview of the main characteristics of the training of speed, agility and quickness has been given as an example of optimal training of young basketball players.

**Keywords:** *speed, agility, quickness, basketball*

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### INTRODUCTION

Three motor skills are included in speed and quickness characteristics. Those are speed, agility and quickness (SAQ). These skills represent the basis

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of most sports and they are responsible for the success in sports games, martial arts, gymnastics, athletics, etc.

Basketball is an extremely complex activity, which means that actions during the game can only be taken along with a range of locomotion and anthropometric characteristics. Having in mind the complexity of motor structures of moving in basketball, it can be assumed that there is a range of situational-motor skills which enable the qualitative game of basketball. The connection between these skills in synthesis with psychological characteristics of basketball players certainly determines the successful game of basketball. The result achieved by a basketball player during a game depends on various factors which affect his/ her efficiency (Trunić & Mladenović, 2014a).

All factors cannot have equal influence on the result, or be separately analyzed without adequate correlation with other factors. On the other hand, one factor does not have the same correlation coefficient as other factors, but it varies. Main characteristics of basketball activities are fast changes of direction and intensity of movement in motoric structures with and without the ball. The ability to start activities quickly, to reorganize the stereotypes of movement and precise movements in small area in space and time limits are all characteristics of basketball players and are directly connected with the ability to express speed and quickness skills qualitatively. Speed, quickness and agility are the skills of analogue ways of expression, which is why their connection with the same context of training of young basketball players is possible.

Speed, agility and quickness training has become an extremely efficient way of training for basketball players. This type of training is based on eccentric and concentric contraction of muscles and it decreases the gap between traditional weight training and functional-specific movements.

This training achieves:

- Improvement in muscle strength for movements in all directions and levels,
- Improvement in efficiency regarding reception and processing of brain signals, kinesthetic and spatial reception,
- Development of all motor skills and
- Improvement in quick reaction.

Speed, agility and quickness training can cover a wide range of training intensity, which is why it is used from the youngest competition categories up to supreme athletes. By conducting this type of training, it is possible to completely satisfy the principles of individualization and rationalization of training, having in mind that there is no special preparation needed for the beginning of implementation of this type of training (with adequately chosen content and intensity of activities, of course).

The process of learning and improvement in agility is possible when quickness and speed are developed as a prerequisite for the development of balance and coordination. Agility is mostly determined by the quality of motoric skills or the level of these skills, i.e. it is mostly limited by bad-irrational, wrong-dysfunctional motoric skills. In the chain of movements, one badly automated movement usually negates the previous well done movements, or the following movements. Therefore, the agility training should be a fight for 'perfecting' those tiny details in movements, which is why agility should be practised every day throughout the whole season in a way which provokes instinctive reaction. The players in this process have to perform specific moves up to the level when they will start performing them without thinking (movement automatization). The programming of agility training includes 'breaking' skills into their components and processing these components in areas separate from the aspects of the game.

All three skills innervate the nervous system in a similar way, they use the same energy resources and have mutual factors that affect the level of a certain skill. These skills not only provide fast movements, but it is also considered that athletes with more expressed quickness characteristics control their bodies in extreme training and competing situations easily, which also helps the prevention of injuries (Graham, 2000).

Before we present the main aspects of training methods and principles regarding speed, agility and quickness, it is necessary to highlight main characteristics of training preparation for this content. Basic principles of training preparation have to be based on the activities which include the whole body, i.e. massive muscle groups, in order to increase body temperature, blood circulation through muscles and tendons and to prepare the body for higher intensity activities. After general warm-up, the following phase should be specific warm-up which is directly conditioned by the choice of contents in the main part of the training and which can include same exercises, but with low intensity. In this way, apart from physiological, conditions for neuro-muscular adaptation for the following loads of technical and tactical characteristics are created.

Having in mind the nature of these three skills, it is important to conduct each of these programmes progressively. In the beginning, one should start with programmes for knees, hips, back and ankle joint strengthening. So, before the implementation of intense and coordination-demanding exercises, stabilizer muscles have to be strengthened in all ankles in order to implement the prevention programme before the beginning of the developmental stage of the training (Mladenović & Trunić, 2014). These factors also need to be taken into consideration, with necessary following of main didactic principles in the training process:

- Frequency of exercises and training units,
- Training intensity,

- Training goal and volume,
- Specificity in exercises compared to sports specificity,
- Qualitative level of athletes,
- Part of the season.

Apart from the above-mentioned, main notes for injury prevention should be followed:

- Load progression during training,
- Doing one or more series of preparation of locomotor and nervous system without any or with very few weights,
- All exercises should be performed with full amplitude of movement,
- Adequate equipment and footwear need to be worn,
- All equipment and props have to be checked before exercise.

## **1. THE BENEFITS OF SPEED, AGILITY AND QUICKNESS TRAINING IN BASKETBALL**

Before starting with the programme of developing quickness skills of basketball players, it is necessary to recognize, define and understand the significance of such an approach to training. Having in mind that there are three different but complementary skills, the content of work for developing each of them and the approach to solving mutual problems in the training technology have to be determined precisely.

A basketball player with developed quickness skills has the following highlighted qualities:

- speed of recognizing and making a decision in various situations of a game,
- speed of reaction by body movements,
- quick start, initial acceleration and the ability to stop the speed of movement,
- quick changes of rhythm and control of the body during great movement speed,
- skillful runs in front of the opponent and avoiding contact,
- stopping before the opponent and skillful avoiding of 'dangerous' situations,
- quickness and precise placement and movement of the body in the conditions of time and space limits.

The analysis of content of working on the development of quickness skills shows that the following goals need to be accomplished in the training technology:

### **1. Quickness:**

- Maximum running speed and stopping in game-like conditions,

- All types of jumps,
- Maximum speed of reaction,
- Learning fast contractions (extension- flexion) and relaxation,
- Learning quick movements of arms,
- Learning body pivots and movements of arms,
- Learning how to move arms and and feet,
- Learning the running techniques,
- Proprioception and balance,
- Neuromuscular innervation.

## **2. Agility:**

- Dynamic flexibility,
- Learning how to balance body trunk and ankle joints,
- Learning reactive reflexes in three directions (forward, backward and sideways),
- Learning how to run with the change of direction with and without the ball,
- Running from various starting positions with and without the ball,
- Learning how to endure contact and
- Acrobatics.

## **3. Quickness:**

- The strength of ankle joint, hips, knees, body trunk,
- Fast recognition of and reaction on visual auditory stimulations,
- Neuromuscular transmission,
- Proprioception consciousness,
- Biomechanic angles,
- Learning how to position hips.

In order to achieve success, the programme of the development of agility needs to be divided into four phases with defined goals in each phase (Table 1). As agility is based on strength, basic-strength training should come before the agility training. Special attention needs to be paid to the strength of body trunk.

In this introduction part, attention should also be paid to the analysis and evaluation of the area, i.e. good or bad performance of players in these areas. Once solid strength of body trunk and stability of ankle joint and knee are established, real agility training can be started in phases.

**Table 1.** *Phases of SAQ development programme*

PHASE	SPEED	AGILITY	QUICKNESS
I	Working on strength by isometric and concentric contraction	Increasing sensitivity to extrinsic stimulations and injury prevention	Increasing sensitivity to extrinsic stimulations and injury prevention

PHASE	SPEED	AGILITY	QUICKNESS
II	Introducing eccentric contraction and improving exercises by coordination demands	Preprogramming of agility Improving coordination Introducing strength in agility exercises	Transformation of strength into quick contraction by introducing new coordination movements (arms and feet, pivots)
III	Maximum intensity Introducing plyometric contractions Combinations of all contractions	Increasing intensity from well known patterns Programmed agility	Learning fast complex movements in controlled speed Jumps
IV	Joining the parts of quickness movements or complete movements	Satisfying the demands of situational agility	Maximum running speed and movement during competitions and tests

The programme demands that a player goes into a higher phase only when he/she achieves a high level of performing the content and skills in each area, as this is the quality on which the ability to accomplish goals of a higher phase is built. A well programmed training will ensure the improvement of players if the following principles are regarded:

- The training should be programmed only for a player who is concentrated and motivated for precise performance (a player must not simply go through with the training, but be devoted to details and continue further only when performance is precise).
- The training includes those contents for the development of those skills which are weak and which are key problems for better agility.
- Methodological series should be followed in phases.
- Depending on the timeframe for the agility training, part of the training can be shortened or prolonged, while the content may be adjusted to the training goals (additional part of the training encompassing specific technical and tactical lasting from 20 to 30 minutes, supplementary training lasting from 30 to 45 minutes, physical preparation training lasting from 60 to 90 minutes).
- Exercises should be done regularly every day, depending on the needs and opportunities.
- Coordination complexity and intensity of exercises should be increased every week in order to achieve the highest goal.
- Consistency; all exercises should be done carefully and conscientiously and all principles should be obeyed with no changes.
- Combinations; enrich and supplement each next training with exercises planned for that phase.
- Hard day-easy day; during easy days, muscles accept what was done in the previous hard day by following the technique.

## **2. SENSITIVE PERIODS OF DEVELOPMENT OF SAQ SKILLS**

Some periods in the development of kids and young basketball players are especially suitable for the development of SAQ skills and those are called sensitive periods. The sensitive period of the development of SAQ for girls is between 7-11 years, and this development lasts till the age of 14, but it can stagnate in case a girl stops playing sports. The dynamics of SAQ development for girls and boys is quite similar till the age of 14. Boys go through the intense period from the age 7-9, they follow the same scheme of development as girls, but after the age of 14, with suitable trainings, boys continue their development till the age of 18. When it comes to development of various elements of SAQ, the experts advise working on the speed of reaction at the age of 6-10, on the speed of alternative movements (frequencies) at the age of 8-13, on agility before and after the phase of intensive growth and development, and they say that the training of speed and persistence should be done mostly in the adolescence period (from the age of 15) (Drabik, 1996).

It could be said that SAQ skills depend on the early stage, and the most suitable sensitive periods for development are the years before puberty and the years to come after the phase of accelerated growth and development. These characteristics can also greatly be developed in the final phases of growth and development (in cadet and junior age), as tendons and ligaments are quite developed by then. Besides, this period also includes the beginning of domination of specific preparation, and in basketball, where speed and quickness are important, technical and tactical structures of movements are the most important stimuli for their development. It is also important to mention that the early beginning of SAQ development is a crucial prerequisite for high level in later phases of long-term sports development (Trunić, 1997).

## **3. METHODOLOGY OF SAQ TRAINING FOR BASKETBALL PLAYERS**

The basis of SAQ methodology includes learning the walking and running techniques, change of direction, jump and landing. Those are main characteristics of movement which are necessary for successful activity in any sport, and in basketball as well. The better movement technique, the more efficient a basketball player in competitions, and training performance for development of any skill will be even better. It is never too early to learn basic movement technique. It is desirable to use props which will make the training more interesting, and exercises more complex. That is why

ladder, hurdles of various sizes, ropes, reaction balls etc. are often used. It is very important to adjust the complexity of exercises to the needs and skills of kids and young basketball players. SAQ skills could be developed by the usage of analytical and synthetical method (Jukić & Šimek, 2003). The analytical approach implies mutually separated development of these skills, while the synthetical approach is based on specific and situational loads which are simultaneously used to affect more skills that fall under SAQ characteristics.

Methodological series of skills demand the usage of analytical method in the early phases, and synthetical methods in later phases of long-term preparation. In order to conduct intensive physical fitness training of these skills after the phase of accelerated growth and development, it is necessary to provide prerequisites in the previous phases of sports development, such as the development of muscular and connective tissue, flexibility and proprioception system. A satisfying level of strength has a positive effect on acceleration and achieving maximum speed of movement (Murphy & Forney, 1997). When the movements need to be not only quick, but need to be repetitive as well, it takes a certain level of speed endurance. Good flexibility provides a wider range of movements, better elasticity and faster muscular relaxation, which is an important condition for SAQ manifestation. However, the most important determinant for intensive physical fitness training in later phases of sports preparation is connected with coordination, i.e. movement techniques. Therefore, it is important to follow the rules of methodological series based on progressive learning and perfecting the correct performance of all elements of technique and tactics of basketball (Vestergren & Marcello, 2001). The same principles apply to learning the technique of main movements and to learning fitness exercises (e.g. exercises with weights), or technical and tactical exercises (e.g. control of the ball, tactical principles...).

Methodological series of activities in SAQ training:

1. Learning the movement technique in low-speed.
2. Progressive increase of the speed of movement- it is necessary to increase performance speed, but not to let basketball players go to higher speed if the low-speed technique is not perfected (respect the principle of correct performance, number of repetitions and speed of performance).
3. Progressive increase of exercises complexity- structures of new exercises are progressively getting closer to movement structures in basketball.
4. Speed, agility and quickness improvements in specific conditions- specific SAQ exercises integrate the basketball technique and the SAQ development.



5. SAQ improvement in situational conditions- situational exercises include basketball tactics and agility in conditions of cooperation and conflict (from semi-active to completely active opponent).

SAQ training wears out neuro-muscular system, which needs a certain time to recover. That is why SAQ exercises need to be done in the mere beginning of the main part of the training (after the introduction-preparation part), when organism of an athlete is fresh and ready for quick and fast performance. The training should consist of short intervals of intensive work (3-10 seconds) and appropriate intervals of rest, for sufficient recovery for the next stimulus (Jukić et al, 2003). The rest interval should provide the quality and intensity of performance, which is why optimal balance between exercise and rest is 1:3, or even more. When SAQ technique is acquired on a higher level, a basketball player can do exercises in conditions of incomplete rest, assuming that he/she has the satisfying level of speed endurance. Ideal method for SAQ development is the repetition method (shorter exercises, longer rest), and if we want to improve endurance in all skills, interval method is recommended (prolonged exercises, shortened rest). In his own SAQ training system, Pearson (Pearson, 2001) talks about seven phases of a single training.

Each of the following phases need to be considered in the context of individual training, but in the context of long-term improvement of speed and quickness characteristics as well:

1. Development of dynamic flexibility,
2. Development of running qualities (movement technique) in concrete sport,
3. Innervation - improving the speed of feet, agility and body control in specific sport,
4. Accumulation of potential - integration of the previous phases,
5. Quickness - development of quickness and initial speed in various directions,
6. Expression of potential - short competing games with situational transformations of loads and
7. Relaxing the organism at the end of the training.

There are a few ways to implement SAQ exercises in a single training. SAQ characteristics can also be developed in individual training unit whose only goal is SAQ development. This type of training is usually implemented during the preparation period or if such stimulus is needed in competition period (Gambetta & Winckler, 2001). The other way which is more often used in practice is to train SAQ in the beginning of the main part of the training, which is followed by technical and tactical segments of the training.

**Table 2.** *An example of seven days programme of U16 basketball team during competition period*

SEVEN DAYS TRAINING AND COMPETITION PLAN OF U16 BASKETBALL TEAM							
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
a.m.	Individual training (TE-TA) Strength	Individualni trening	Rest	Individual training (TE-TA) Strength	Shooting training	Rest	Rest
p.m.	Prevention 20 min SAQ 20 min TE-TA 50 min	Prevention 10 min TE-TA 80 min	Control game	Prevention 20 min SAQ 20 min TE-TA 50 min	Prevention 10 min TE-TA 80 min	Game	Rest

SAQ–training unit dedicated to the development of speed and quickness characteristics

Prevention- training unit dedicated to injury prevention

TE-TA – training contents from the elements of technique and tactics

This way is suitable for keeping the same level of SAQ throughout the season, but it also has a significant developmental effect in the training of kids and young basketball players. In other words, in the trainings of kids and young basketball players, SAQ stimulus is usually used in this type of training structure as it follows the methodological series, and 'transformation' is done in technical and tactical part of the training.

The third way of SAQ training is called innervation training. This type of training lasts around 30 minutes, and its goal is activating, or 'awakening' the nervous system before the game. The training can be implemented up to 24 hours before the competition, depending on the individual needs of basketball players.

#### 4. LONG-TERM PROGRAMMING OF SAQ TRAINING

An especially important link in the long-term SAQ development are motoric skills (running technique, jumping techniques, changes in the direction of movement, landing) which are responsible for efficient and quick movement of body in space. In order to build an adequate base for SAQ development, certain principles need to be followed, which also have their application place in training contents for strength development (Flisk, 2000):

1. Developing flexibility of ankles (movement stabilizers in all ankles),
2. Developing the strength of tendons first, and then developing muscular strength,
3. Developing the strength of body trunk muscles, and developing extremities afterwards.

This is why it is extremely important to enrich the scope of moving structures in order to enable a basketball player to remember information from motoric memory in extreme competition and training situations. In the mere beginning of sports development, elementary games and more complex natural forms of movement are dominant, while specific and situational processes of SAQ development during the technical and tactical preparation come later. Table 3 shows the connection of specific elements of SAQ training in fitness preparation of kids and young basketball players.

**Table 3.** *Specific elements of SAQ training i fitness training of kids and young basketball players*

	7-10 YEARS	11-14 YEARS	15-18 YEARS
Speed training (analytical)	20	10	5
Agility training (analytical)	0	10	20
Quickness training (analytical)	10	10	5
Prevention programmes	30	30	20
Learning and improving SAQ techniques	40	30	10
Developmental SAQ programmes (synthetical)	0	0	20
Strength training	0	10	20
The connection of basic and specific-situational preparation	80/20	70/30	50/50
The connection of Te-Ta and fitness preparation	30/70	60/40	70/30

It is visible from Table 3 that the technical and tactical preparation is progressively increased in long-term training programme of kids and young basketball players, while fitness preparation is gradually decreased. During fitness preparation, many-sided basic training is gradually decreased, and the amount of specific-situational training is increased, which is quite logical, having in mind the principles of methodological series in the development of physical fitness skills. Learning and acquiring basic movement techniques are an important part of the training of kids aged 14, while more attention is paid to developmental programmes of SAQ later on, if the technique is of a satisfying level (Drabik, 1996). At the age of 15-18, more time is spent on progressive strength development, which will have a positive effect on the SAQ level. Beginners should be presented with heterogeneous trainings as longer as possible, with a vast number of general preparation exercises for the development of quickness characteristics. The usage of elementary and basketball games in SAQ development is also very valuable, especially when it comes to the speed of reaction and initial speed (Brown, Ferrigno & Santana, 2004). It is desirable to delay the usage of specific and competition exercises

for SAQ development (synthetical approach) for young basketball players and to implement analytical approach for the development of these skills. Regarding analytical approach, it is necessary to highlight the development of speed and agility in earlier phases, and the development of quickness in further phases of long-term preparation (Table 3). These principles will create an adequate basis for further structure and future high results.

## CONCLUSION

SAQ skills are very important for success in basketball (Brittenham, 1996). Their field of expression is the triangle of speed, agility and quickness. These skills enable quick performance, but they also have a significant role in injury prevention. SAQ skills are determined by the early beginning, and the most suitable sensitive periods for development are the years before puberty and the years following the phase of accelerated growth and development (Trunić & Mladenović, 2014b). High level of these skills is achieved by long-term, carefully planned training, while following methodological series of development and main principles of sports training. The main goal of fitness trainers of kids and young basketball players is recognizing individual needs and application of suitable programmes of training for SAQ development.

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