

TECHNICAL PREPAREDNESS AND FEASIBILITY OF DIFFERENT LEVELS OF BIOLOGICAL MATURITY FOOTBALL PLAYERS

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ABSTRACT

In football, as in other sports, there is a tendency for athletes, or accelerators, to mature faster. This is a typical trend, as this type of athlete can run faster, jump further, and perform other activities relatively better than their peers. The authors wanted to emphasize the negative trend related to the Latvian football system. It can be seen that coaches pay too much attention to accelerators, although additional attention should be paid to footballers who mature physiologically later. The study's authors want to emphasize the problem that needs to be solved, which is relevant in football and other sports. A similar situation can be observed in other sports. Coaches pay too much attention to a quick result without investing additional work in further development, emphasizing athletes who mature physically a little slower.

The authors conducted a study comparing two groups of respondents – accelerators and retardants. Within the framework of the research, two tasks were performed – purposeful work in improving movement skills for 15 – 16-year-old athletes was emphasized.

Task 2 – to compare the results without and with the ball because the exercise with the ball characterizes the movement skills – the ability to drive the ball, partially reducing the benefits of maturity. The data were obtained from physical tests by combining them with the Microsoft Excel program. In the conclusions, both groups of respondents showed significant progress in technical performance.

Keywords: *football, training methods, physiological maturity, ball management, sports coach*

Introduction

Football is a team sport, and it is the most popular sport in the world (Dvorak et al., 2014). In Latvia, learning to play football in private football clubs and sports schools that implement vocational education programs is possible. The Latvian national football team regularly ranks very low in this ranking (129th place on 30.06.2022), Latvian footballers are not in demand in the European football market, and no player from Latvia plays in the European TOP 5 football leagues (FIFA world..., 2022).

In 2018, UEFA (the Union of European Football Associations) launched a new UEFA League of Nations football tournament, replacing most international friendly matches. The teams were divided according to the ranking of the teams in 4 leagues. The strongest national units played in the A league but the weakest in the D league. Latvia plays in the D league (lowest) in the same group as the dwarf countries Malta, Andorra, and the Faroe Islands. In the highest A league, the teams compete for the Champion of the League of Nations title. Teams also play for promotion to a higher league and are relegated based on results.

Taking into account the facts mentioned above, the question arises – why has the Latvian had such poor results at the international level? Why are the results good at the youth sample level and weak at the adult level? Understandably, Latvia is not a big country, and it is not easy to compete with football powers, but when the authors analyze the correlation – between population and FIFA ranking. Croatia, with 4.2 million and ranking 15th in FIFA (4th place in 2018), brings up many skilled footballers who play in the strongest football leagues, but Latvia has 2.07 million.

In the authors' opinion, the answer can be found in the player training programs methodology and in the environment in which the football player is taught and brought up.

Literature analysis

Considering the sensitive periods of age when teaching technical elements and developing physical properties is essential. The sensitive period is when a trait is best trained because the most significant adaptation takes place, and the training yields the greatest effect. It should be understood that all body systems can be trained at different ages, but the impact (benefit) of training will be very different, so trainers need to know these sensitive periods very well when creating training programs. Notwithstanding these sensitive periods, coaches can harm a child's or young person's body by trying to develop physical characteristics at inappropriate times with inappropriate exercise (Fedowa & Ahn, 2011).

To improve movement skills – technical preparation, athletes need to understand what it is in general and have specialized training. The technical practice of an athlete is understood as a learning-training process in which acquired knowledge, skills, and abilities, as well as perfected what is necessary for the form of sports execution of movements. Movement skills and skills are based on psychomotor processes because they determine the precision of activities along with the development and differentiation of conditioned reflexes formation in brain structures (Alwasif, 2015). The concepts of athletes' abilities and skills are pretty close and complementary.

However, suppose skills are associated with specific activities to realize the level of performance and achieve the desired operational productivity criteria. In that case, performance skills are characterized by the type of performance or element of the specific athlete, the particular performance technique, which is mostly unconscious in the realization of movements – automatic. Developing skills is the basis of an athlete's movement technique (Abele, 2009). So that the coach can successfully teach and improve technical preparation, very it is important to understand what movement skill is, how it is formed and what we train (Krauksts, 2006). Movement skills – such a level of learning movements when the student consciously controls the movements to be performed. They have a low execution speed, resistance to disturbing factors, low memorization stability, excessive stress, and redundant, unnecessary movements (Jansone & Fernāte, 2009). Movement skills – a level of movement learning characterized by a minimum control of consciousness, resilience to distractions, excellent stability, and resilience (automated movement) (Jansone & Fernāte, 2009).

The formation of movement skills is a dynamic process, and scientists divide it into learning.

3 stages:

1. Stage – the beginning stage of understanding movements and learning skills:

- An idea of the course of movements is formed
- Practical performance of the first attempts
- A nerve connection is formed in the CNS
- At the end of the stage, movement skills have been developed 10

2. Stage – the stage of building movement skills

The stage of development of the athlete's technical performance skills, in which many are performed using exact repetitions of the movement being taught. To build movement accuracy, first refines the content and form of movement execution, and then the speed parameters. At this stage, movement:

- Becomes more accurate
- Becomes more energy efficient
- Feelings of movement are formed
- Reduces the muscles included in the activity and not directly related to the activity tension
- The athlete's confidence in the performance of the action increases
- The emotional tension associated with the performance of the activity decreases
- A myelin sheath begins to form on the nerve cords. Stage 3 – the stage of strengthening and improving movement skills. At this stage, motor skills reach a high level of automation and execution

performance. Various application possibilities of skills are formed accordingly to the conditions of the sports situation.

At this stage:

- Movement becomes automatic (dynamic stereotype)
- Spatial and rhythmic accuracy develops
- Even in a state of fatigue, the movement is sufficiently precise
- The athlete is sure of the success of the action
- Flowing, non-tense muscle action
- Variability of movements in different situations
- Stability, resistance to disturbances
- A multi-layered myelin sheath has formed on nerve cords

It should be understood that movement skills can be improved continuously – it is a continuous process because some part of the movement could always be more precise, more effective. Movements are improved by applying various obstacles, for example, operating in different performance conditions, at a fast pace of performance, on fatigue background, with the performance of various additional tasks, in various emotional states (Abele, 2009).

The age of 8–13 years for boys is the “golden age” (sensitive period) in the acquisition of movement skills – in technical readiness. It is necessary to acquire complex movement skills during this time because later, during and after puberty, it will be much more challenging to learn these skills (Bremanis, 2012). The sensitive period of movement skills is followed by a sensitive period of development of endurance and strength, as it is associated with maturation and hormonal changes, mainly considerable increases in testosterone in the blood, which is directly related to the increase in muscle mass and strength (Phelps, 2015).

Scientists emphasize that movement skills are best trained and developed up to 12–14 years of age, or pre-pubertal age, as it has been studied that directly during this age, neuronal bonds and synapses (connections) are formed most rapidly by motor neurons (plasticity). In puberty, this ability decreases rapidly; moreover, the brain must be able to adapt and control the rapidly growing body even more, making it challenging to learn new movement skills. (Balyi et al., 2013).

At 14, someone is still in pre-puberty. For someone, puberty has started, but someone is already in the final stages of puberty. After various studies and experienced trainers’ observations, a prepubescent adolescent at the age of 14 will gain an additional advantage in learning motor skills relative to their peers because he has an “extended” golden age in learning movement skills, while accelerations which puberty is reached already at the age of 10–11 years, this period is shortened (Baur, J., 1987). It is possible to learn new movement skills at the “conditional learning level” at

any time in old age because the CNS maintains certain plasticity throughout life, but various studies prove that it requires about 5–10 times more work and time, and the movements are more likely not to be as accurate and automatic (Williams et al., 2018).

Essential factors that trainers should consider are PHV (Peak Height Velocity) and PWV (Peak Weight Velocity). PHV is reached during puberty. Until puberty, boys grow an average of 4–6 cm per year and gain an average of 2–3 kg per year. In the PHV period, boys grow 8–12 cm. Within 12 months after the PHV period, a period of PWV begins, under the influence of hormonal changes, during which muscle mass increases rapidly and bone matures. Body systems and young people gain an average of 9 kg per year. For athletes, weight gain is not related to weight gain – fat mass (Rogol et al., 2002).

It must be understood that a child who has not yet developed the PHV period will not be able to do the same amount of work, stand out with power and speed on the football field, and will not be able to win dueling with a young person after the PWV period. Coaches often say that he is small and powerless and does not pay enough attention to improving the skills of these children. Emphasis is placed on those children who can achieve the result “today,” but in the range of 16–18 years old, everything can change as the retarders begin to accelerate. At this age, retardants reach an optimal stage of maturity, associated with an improvement in height and performance.

The growth, maturation, and working abilities processes have an integrated status, where genes, hormones, nutrition, and environmental factors interact at a constant level (Brown-Williams, 2018). Growth and maturation are unified processes, but the factors that influence these processes are mutually related and interdependent. Over the past 20 years, extensive research has been carried out to understand more about hormones and the mechanisms of these hormones for growth and maturation processes. Even producing only primary hormones that have a critical effect on growth and maturation processes, parallel to these hormones in other tissues, hormone-like molecules are produced, which have a sufficiently practical effect on growth and maturation processes (Krauksts., 2006).

In other countries, more attention is paid to the degree of maturity of football players and its relationship with their potential development in the future perspective. Analyzing the Belgium Player Training Program “The Belgium Vision the authors of the work “youth development” (Browaeyns, 2013) conclude that much attention is paid to focus on the players’ biological and calendar age.

Methodology

The research was done during the internship, working with the young footballers of Liepaja Football School (LFS), aged 15–16. The individual technical skills of the students were different, but since this is an elite group team, the technical skills were good or very good for everyone.

The practice and training took place in Liepaja, on the football field “Raina Park.” There is a 90 m × 60 m football pitch with a natural lawn. Training took place five times a week.

The research aimed to find out and compare the level of technical training for accelerators and retardants (physical training for accelerators is better due to biological maturity) and whether emphasized and purposeful work to improve any movement skills significantly improves the movement skills of 15–16-year-old students. In task 2, it was essential to compare the results without and with the ball because the exercise characterizes the movement skills – the ability to drive the ball, partially excluding the benefits of maturity.

Accelerated and retardant students were determined together with the team’s head coach by analyzing anthropometric measurements (PHV and PWV) over a long period, as well as evaluating the features on the scale of Professor James M. Tanner, a child development expert. He determines five stages of puberty (Oliva-Lozano et al., 2020). Stage 3 shows the fastest growth. Anthropometric measurements of LFS are performed four times a year. The research consists of 2 tasks: Task 1 – Juggling the ball. Exercise 2 – Skill race “Illinois without and with the ball .” Both tasks were recorded in 2 steps to record the best performance. The results were measured – at the beginning of the internship on September 15 to find out the individual technical skills of the students before the research, on October 11.2021 after focused and purposeful work on improving these skills, and for the third time on October 18.2021 to get more objective results.

Studies confirm that juggling improves brain function. It balances the brain’s two hemispheres, as both legs are employed in the process. Each person has a dominant arm and leg, with which he usually performs various actions. However, practical brain training co-occurs when something is done to both limbs. Juggling increases the plasticity of the brain. Scientists have experimented. Several people who trained to juggle for six weeks were selected. Differences in brain function were observed, with an increase in brain white matter of 5% (Scholz et al., 2009).

Research

The practice of juggling the ball in football is critical because it develops the “feeling of the ball,” reaction time, dexterity of the legs, balance, orientation, and differentiation. Studies confirm that juggling improves brain function and balances both cerebral hemispheres, as both legs are employed in this process. Every person has the dominant arm and leg with which he usually performs various actions. However, excellent brain training occurs when something is done with both limbs simultaneously. Juggling increases brain plasticity.

The principle of randomness was used to select several people who practiced juggling for six weeks. Differences were observed in brain activity – the amount of white matter in the brain had increased by 5% (Scholz et al., 2009). The initial tests were conducted on 15.09.2021 to determine the level of both respondent groups: exercise action – continuous dribbling of the ball without dropping it to the ground.

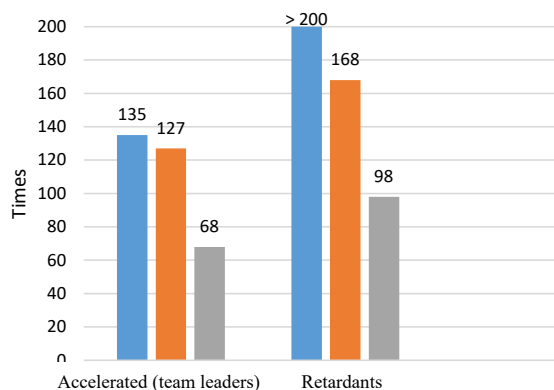


Figure 1. Juggling results 15.09.2021

To more clearly show the differences in technical training, Figure 1. shows the results of juggling comparing the three most technical students accelerated (team leaders) against the three most technical students retardants. Retardants showed better results in this exercise on 15.09.2021, showing a better “ball feeling.”

After about a month of long technical training work in the respective exercise, another test was performed.

As seen in Figure 2, after an emphasis on work and a quality training process, juggling the ball – the feeling of the ball has significantly improved for all students, but the retardants have maintained their advantage over the accelerators.

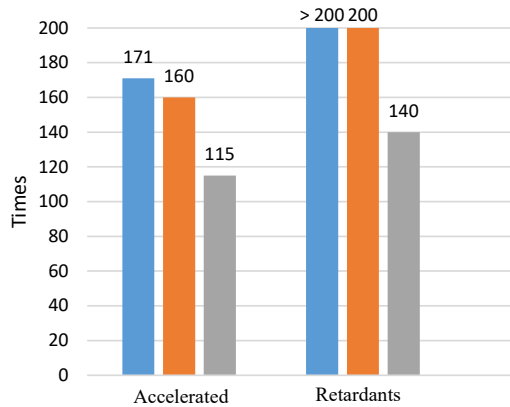


Figure 2. Juggling result 18.10.2021

Task 2 – Illinois.

Illinois is an exercise included in the control standards for training groups in vocational sports education institutions. The Latvian Football Federation has developed them.

TECHNICAL TESTS

Test:

1.

"Illinoisa"

The player takes the ball and leads it zigzagging between the cones from the start to the finish. The players have two runs, the coach records the best result

Figure 3. The structure of test Illinoisa

For 15–16-year-old students (SMP-2 group) in the Illinois exercise determines the following evaluation criteria:

- 5 points 16.00 sec
- 4 points 17.00 sec
- 3 points in 17.80 sec

Control regulations provide for evaluating the exercise by performing it only without the ball, which is incorrect because these results partly allow us to judge the student’s physical fitness, but they are not providing information about students’ technical preparation. The authors believe that

after this exercise, by comparing the results without and with the ball, it is possible to judge the technical skills of the students' preparation – ball management skills. The greater the score difference, the more the ball's significant burden and the relevant movement skills required to guide the ball between the cones. The smaller the score difference, the more technique is learned and the movement skills required to perform the exercise.

Analyzing the obtained results on 13.09.2021, it is concluded that the accelerators show better results in the Illinois exercise without a ball, which can be explained by his degree of maturity. Retardants have slightly worse results.

In the Illinois ball exercise, the retardants show better results, which shows that they have better technical skills in handling the ball.

An essential factor to consider when analyzing these results is the difference between exercise without the ball and exercise with the ball.

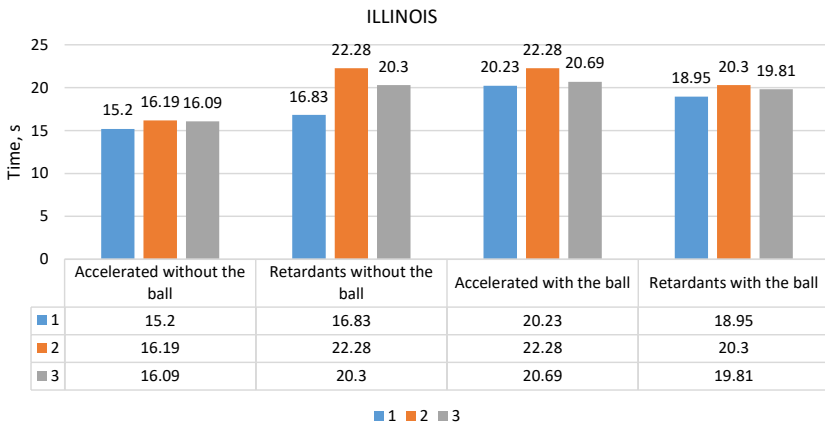


Figure 4. Illinois results 15.09.2021

Similar to the first ball dribbling exercise of the study, two measurements were taken in the Illinois test. The authors wanted to analyze the results presented and their possible progress, regression, or stagnation.

For the best accelerator, the result without the ball is 15.20 sec, but with the ball, 19.15 sec. The difference is 3.95 sec. This is the time that describes how much the ball makes it difficult to perform the exercise. The best retardant with serial no. 16 time difference is only 1.78 sec. Assuming that the student develops a maximum speed of 20–25 km/h during the exercise, which is 5.55–6.94 m/s, then we can imagine the approximate distance to the technically better-prepared student in front of the ball. The most significant time difference is for the accelerator with sequence no. 10–4.94 seconds. This figure describes the relatively poor development of the movement skills required to perform the exercise.

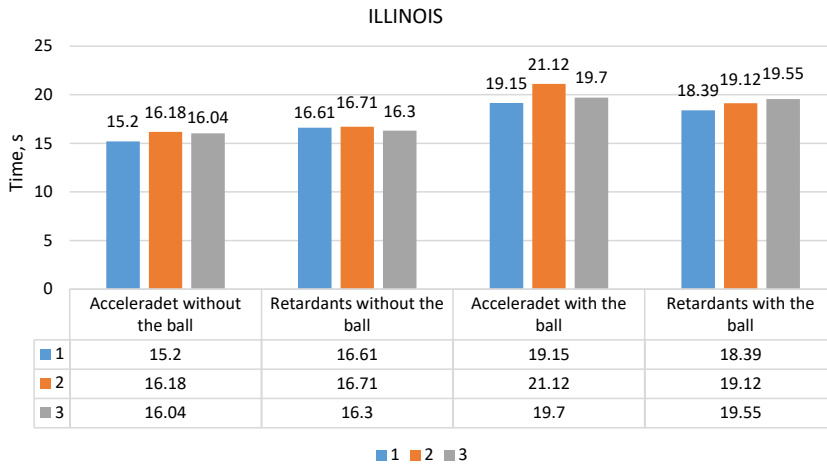


Figure 5. Illinois results 18.10.2021

Analyzing the obtained results on 18.10.2021, which were obtained after a high-quality and accentuated training process for improving ball driving skills, the results improved for all students, which means that growth and improvement of movement skills are also possible at the age of 15–16, if emphasized and paying attention to the details of the exercise.

Conclusion

- Technical training is better for retarders than for team leader accelerators.
- Qualitative and accentuated work can also improve some movement skills growth at the age of 15-16.
- It is essential to pay attention to the details and nuances of technical performance.
- Coaches need to pay more attention to improving technical training.
- Student acceleration does not mean student “talent.” Performance is directly related to a degree of maturity rather than individual mastery. Young retardants have a “golden age” to develop new movement skills, and team leaders are primarily students.
- Analyzing task 1 – juggling the ball, the authors concluded that the “feeling of the ball” is better for students with retardants. Analyzing the 2nd task, the authors concluded that the ball-handling technique is a better retardant.
- The football system in Latvia is designed so that teams primarily strive to achieve results, which in turn facilitates the selection of team coaches in the starting line-up of teams students accelerate.

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