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Streamlining the training process of 12-14-year-old junior footballers using the systemic method

SUMMARY OF THE DOCTORAL THESIS

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Contents

Keywords: Juvenile football, systemic method, game model, training factors, game phases, principles.

Football is a social phenomenon and due to this, the modernist tendencies of society must also be taken into account. We want progress in all areas of quality of life and updating the latest news, starting from phones, cars, smart homes and state-of-the-art technologies, but this principle still faces some reticence in sports.

The emergence of new technologies and new methods of training are perceived with increased reluctance from the point of view of the conservatives, who argue that, through other methods, certain results have been obtained, not taking into account the whole context. From their vision, the profile of the children of recent times that have changed, evolved, are not the same children from two decades ago.

As a result of this generational shift, one can observe the more improved intellectual and physical levels of children today. In this regard, it should be noted that coaches do not prepare them for the football that is being played in 2023, but must anticipate the football that will be played in a decade or at least 6 years when they will come to take the step toward the great performance.

This work is structured in two parts.

Part I represents the theoretical foundation of the chosen topic and includes 4 chapters: 1. Player-centered theories, 2. The systemic method, 3. The game model and 4. Methodological aspects. At the end of the first part there is a chapter with the main conclusions drawn from the literature review in the field.

Part II presents personal research on the systemic method. This part includes chapters: 5. Pilot study on the efficiency of Xampion Insoles sensors, 6. Development of strategies for the use of the systemic method in 12-14-year-old junior footballers, 7. Study on the effectiveness of the systemic method on analytical technique, 8. Study on the effectiveness of the systemic method on physical parameters, 9. Study on the effectiveness of the systemic method in decision-making, 10. Study on the efficiency of Xampions sensors in monitoring of systemically based training. The general conclusions are noted at the end of part II.

As for personal contributions to the topic, we started the research with a preliminary study that set out to test the efficiency of the Xampion Insoles sensors. To do this, we have used Catapult one GPS and observation sheets in parallel to have comparative results in terms of parameters such

as distance, seconds in high tempo, double-shot hits, takeovers and other parameters described in chapter 5.

The preliminary research has helped us draw important conclusions about the peculiarities of the game model of 12-14-year-olds and we can say that the research hypothesis according to which the data recorded by the Xampions Insoles sensors have relevant accuracy and can help us in monitoring, modeling, testing and testing. the evaluation of the means used in the training and the physical and technical parameters of the matches and trainings has been confirmed.

Chapter 6 presents the intervention plan for the control group and the strategies implemented in this group. The chapter includes the offensive and defensive game model, the principles, under the principles and sub-principles implemented in both attack and defense, annual planning, training plan and training structure, all based on the systemic method. At the end of this chapter, a training from a training cycle is also exemplified.

The impact of the systemic method on the analytical technique is analyzed in Chapter 7. In this research topic we started from the assumptions according to: 1. The systemic method can have a positive impact on the analytical technique of 12-14-year-old football players: 2. Using technical exercises in adverse conditions in football players 12 to 14 years old, three times a week can help improve the technical level. The subjects of the two groups were subjected to the following tests and tests: Keeping the ball in the air, driving the ball in the slalom, hitting the ball with the wide in the bench and kicking the goal. Following the interpretation of the statistical data, the two hypotheses were confirmed, the systemic method having a positive impact on the analytical technique of the players.

The effectiveness of the systemic method on physical parameters was discussed in Chapter 8. As an objective, we set out to make an initial, intermediate and final measurement of the research subjects to test the impact of using the systemic method on the physical parameters speed 10m and 20m, agility (Illinois test), length and height jump and mobility (sit&reach test). THE device used THE WITTY-GATE photocells and the timer. The recorded data was then centralized electronically in Excel documents, then analyzed from the perspective of t and MANOVA/Shapiro-Wilk test.

Chapter 9. The study on the effectiveness of the systemic method in decision-making was aimed at conducting a comparative analysis of three tests through the TacticUp Video test platform, which provides relevant data on the decisions made by football players during a match. The subjects of the two groups were tested in 3 moments. A report generated by the TacticUP platform can be found in the annexes, along with the summary tables with the results obtained.

According to the research, experimental group subjects who were subjected to the systemic method showed a significant improvement in game understanding parameters (according to the

TacticUp evaluation) compared to control group subjects. This validates the hypothesis that the systemic method benefits both individual player development and team development.

Chapter 10, the last chapter of the paper, analyzes the efficiency of Xampions sensors in monitoring of training based on the systemic method. One of the objectives of the study was to develop a conceptual model of periodization of football training at the level of children and 12-14-year-olds based on a game model, with means that combine holistic development in a more efficient way. The integration of the new features of modern training, based on systemic methodology, has been evaluated and measured through research aimed at making the training of children and juniors more efficient. The significant increases achieved by the experimental group were highlighted in technical, physical and tactical tests that fulfilled the purpose and objectives of the research.

INTRODUCTION

The great players in team sports seem to have a vision of the game that gives them a strange talent to be in the right place at the right time and also to be in the right place at the right time. they seem to have more time than other players to display their skills and make the right decisions under pressure.

The greatest players in most team sports are usually remembered, not for their superior physical abilities, but for this remarkable vision of the game that functions as an embodied mastery of a dynamic physical environment (Bourdieu, 1986). This intelligent negotiation of dynamic and complex physical environments involves countless decisions made and adopted under extreme time pressure, shaped by *the decision-making context* (Mouchet, 2005), consisting of decisions made by those players based on their positioning against the score, the remaining time, the time, the time, the time, the time, the time, the time, the time, the time, the time, the time, the importance of the game in the season and the agreed strategies.

The perspective of the game that combines decision-making with speed and efficiency could be an evolutionary response to an ever-changing environment, where the lines of perception-decision, mind and body, as well as the environment of the player and game are blurred.

For many coaches, the complexities of making quick decisions in team sports remain a mystery, some even believe that the ability to do so is a divine gift rather than a skill that can be developed through training (Williams & Hodges, 2005). Light & Evans, 2010).

Traditional coaching that focuses exclusively on techniques and provides direct instructions for decision making can worsen the narrow perspective of decision making. On the other hand, player-centered approaches based on the survey method, such as *Game sense – GS* (den Duyn, 1997), *Teaching Games for Understanding – TGfU* (Bunker & Thorpe, 1982) and *Play practice (PP*) (Launder, 2001), may present opportunities to improve decision-making skills by using the game environment to shape and help the learning process.

These approaches recognize the interaction between tactical knowledge, decision-making ability, and effective skill execution, rather than breaking down games into separate components that are taught under non-game conditions.

According to Magill (1998), to flourish, players should have a mixture of tactical culture, tactical-technical skills, physical-psychological-social skills, and most importantly, decision-making skills. When it comes to aggression, goalkeepers are imperative because they act as the eleventh player on the pitch, facilitating play by quietly positioning and skillfully passing the ball.

In order to achieve the best results, the coach must develop rules of play that are synchronized with the actions on the field and suggest training techniques that ensure that his players are aware of the current situation. This involves providing consistent messages that may not always be communicated verbally, but will ultimately help them understand how to act. The main objective is to adjust its automatic response to these messages so that it can process what it needs to do in several ways and maximize its chances in any given match situation (Tamarit, 2009).

Using training as the cornerstone of the process, the various aspects necessary for players can be identified. Through the game scenarios, players can enjoy optimal self-organization.

Within the training sessions of a football club are a number of components designed to improve the player's understanding of their identity on the pitch. These dynamic sessions include brainstorming, interactive ideas and enjoyable content to promote a comprehensive understanding of the game and optimize the different skills of each athlete while improving teamwork with the environment (Delgado Bordonau & Mendez-Villanueva, 2018). Such training techniques encourage the athlete to stay motivated and dedicated to practicing every day.

Passion for play-based exercises and competitive nature are essential qualities for any coach who seeks to succeed in a nonlinear and variable context like football. Also, the coach must have a deep understanding not only of the sport, but also of the athlete's distinct structures and needs (Gaiteiro, 2006).

It is essential to note that the learning process and the skills that come with it depend on the methodology used. As such, the player/team optimization plan must be closely related to the methodology (MacPhail, Kirk & Griffin,(2008). Depending on the desired outcome, there are different ways to approach the learning process. For example, teaching players how to act in game situations contrasts with teaching players how to be adaptable in changing gaming environments.

It is impossible to keep up with the countless decisions made during a football match. Therefore, it is essential to create techniques to optimize the decision-making capacity of players. By educating the unconscious mind in a pragmatic and football-specific way, we can speed up the process of making smarter decisions. During training, the unconscious mind will develop habits based on certain exercises, leading to faster and more agile responses once they become entrenched (Merlau-Ponty, 1962).

Due to the many elements that need to be taken into account, the decision-making process is extremely complicated. When a football match is played, a player's behavior is divided into two distinct moments - the perception of information and the execution of their action plan (Paques, Fruchart, Dru & Mullet, 2005).

It can be concluded that talent should not be reduced to the athlete's ability to undertake an extremely complex activity, nor associated and reduced to a genetic factor. Thus, we try to

contribute to the idea that talent will depend on circumstances in one's life, which offers a different genotype as a result of these life experiences. As a result, it is necessary to design a planning program that includes specific mass-scale practices that allow epigenetics to contribute to the athlete's genotype and optimize their potential. Through planning, the coach will be responsible for creating strategies in which each player's talent can flourish.

Part I
1. Player-centered theories

1.1. Theory of systems and complexity

Although the concept of a system is part of a broader theory, it is not a paradigmatic principle. instead, it uses the principle of holism to seek explanations at the level of totality, which differs from the reductionist approach that concerns explanations of elementary components.

Despite revealing the universality of systems, systems theory did not reveal their origins. Although everything from molecules to stars, from cells to societies, is now viewed in terms of systems (in contrast to the last century's notions of "matter" and "vital substance"), this generality is not, by itself, a form of life, but a form of life. sufficient to determine the epistemological significance of the concept of a system in all its conceptual complexity.

The concept of a system has always been essential in delineating the relations between the constituent parts comprising a larger entity. However, the true revolution of this concept takes place when it replaces the previous definition of an object, body or thing as a composition of form and substance that can be broken down into basic elements and isolated into a neutral space, subject exclusively to the external laws of nature. This marks a distinct departure from the classical ontology of objects, because the concept of a system fundamentally challenges the traditional understanding of an object.

Holism is, according to Günther (1962), a partial, one-dimensional and simplifying vision of the whole, reducing another idea of the system to the idea of the totality, where it should be a matter of confluence. The concept of holism arises as a result of the simplification paradigm, which involves reducing complex ideas to a single concept or a main category.

In his 1995 paper, Pascal highlighted the new paradigm brought about by the idea of the system, stating that it is equally impossible to understand the individual parts without understanding the whole, and to understand the whole without understanding the individual parts. According to the logic of simplification, such a sentence leads to that deadlock which Bateson (quoted in Pascal, 1995) called double-law: The two statements (to know the parts through the whole and to know the whole through the parts) seem to cancel each other out in a vicious circle, without entry or exit. The understanding of Pascal's formula (1995) must go beyond its surface level, emphasizing instead the constructive circularity of the explanation of the whole by the parts and vice versa. This understanding highlights the complementarity of the two explanations, with their competitive and antagonistic characteristics existing in unison through a unifying movement.

In order to consider the problem of maintaining the relations between the whole and the parties, we must also see the complex character of these relations, developed by Morin (2014) as follows:

•The whole is greater than the sum of the parts (a principle that is widely recognized and intuitively recognized at all macroscopic levels), because a macro-unit appears at the level of the whole, along with emerging phenomena, i.e. new qualities or properties;

•The whole is less than the sum of the parts, because some of the qualities or properties of the parts are wholly inhibited or suppressed under the influence of the constraints resulting from the organization of the whole.

•The whole is more than a unitary whole, because the whole as a whole affects the retrograde parts, while the parts in turn retroactively affect the whole (in other words, the whole is more than a global entity – it has a dynamic organization).

The act of organization has the ability to bring structure and coherence by creating its own systemic determinism. However, the organization also has the potential to cause chaos and confusion. According to Beer (1960), the continued existence and generation of disorder, decay, and degeneration is an integral component of any form of organization. Therefore, the concept of organization requires a change in our thinking. Instead of trying to eliminate the disorder or hide the organization, the explanation must recognize the complicated nature of the relationship described in Figure 1.

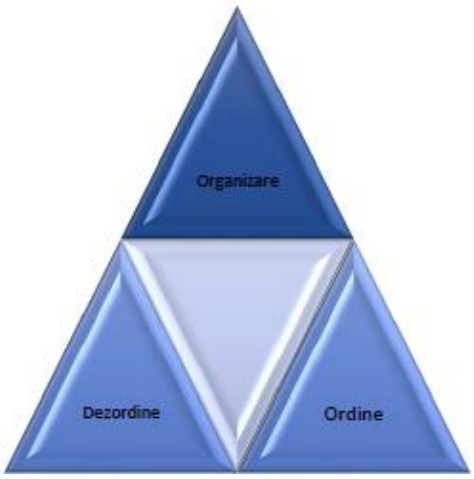


Figure 1. Representation of the relationships between the concepts organization-order-decordine

1.2. Ecological approach

Ecological systems theory is the approach that holds that individuals exist in a variety of situations/levels, starting at the individual level and expanding externally (e.g. family, work, society, etc.).

A key concept of ecological psychology is that of the context, from which there are potential opportunities or invitations to action that athletes are surrounded in a performance environment, becoming aware of it through learning and experience (Withagen, De Poel, Araújo, & Pepping, 2012). These ideas in ecological psychology have been interpreted to suggest that through extensive practice and experience, an individual and a performance environment become increasingly integrated as dynamic, self-organizing systems coupled with information (Araújo, 2006). In these complementary systems, intentional behaviors arise from a process of exploration and learning before being stabilized into functional patterns of action (Warren, 2006).

Brofenbrenner's theory of ecological systems (TSE) (1979) emphasizes the importance of the links between different contexts. Individual development takes place at many levels – from the individual and outwards in environments such as family, work and society. According to Brofenbrenner, development occurs as a result of interactions both within and between these contexts. Many studies believe Brofenbrenner's approach.

There are four systems that establish the model of ecological systems: The exosystem, the macrosystem, the mesosystem and the microsystem (Figure 4).

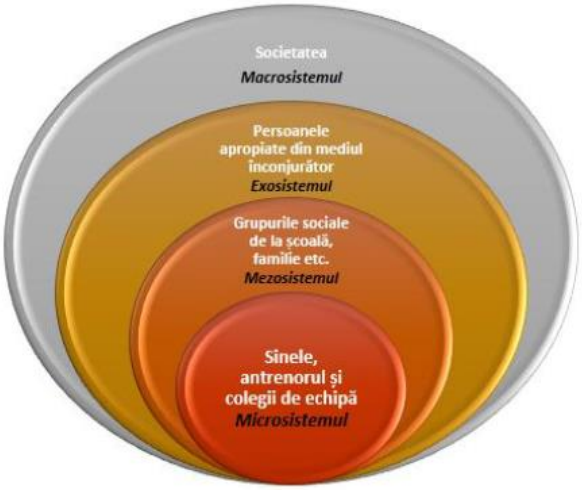


Figure 4.Graphic representation of a system (after Brofenbrennen, 1979)

1.2.1.Micro system

The microsystem is the immediate context of a person, including the associated roles and environmental characteristics. In order to promote the quality of adjustment and positive development in the programs, athletes should take into account all elements of the micro-system program, including individual, inter-individual (e.g. relationship-based), and program characteristics.

1.2.2.Mesosystem

Various influential contexts make up the mesosystem in which individuals regularly attend and their interrelationships. Through a variety of daily activities, such as programs for colleagues, leisure and youth, as well as at home, at school and sometimes at work, young people move. The relationships between these contexts have an impact on the development paths of young people (Lerner, Almerigi, Theokas, & Lerner, 2005). Working with schools and families can greatly expand the influence of coaches and their programs, as Pittman, Divers and Ferber observed (2002).

1.2.3.Exosystem

Part of the exosystem is the context by which uninvolved people can be affected. Hughes & Kwok (2007) demonstrates that even a teacher's connection with a person's parent can influence them. On a child's school performance, the influence of a teacher-parent relationship highlights a prime example (Eccles & Harold, 1993). Athletes' families become an extended sphere of influence for coaches who prioritize relationship building, resulting in a greater ability to have a positive impact on people's lives, as Bocarro and Witt stated in 2005. Naming parents by name when taking their child after a workout is a simple step that can lay the foundation for these relationships.

1.2.4.Macro system

Ultimately, each individual exists in a broader cultural system, the macrosystem, which dictates certain characteristics of all associated systems. The youth policy climate and the public perceptions of the younger generation are part of the macro-system. This broader cultural realm encompasses the wider world around young people.

At critical times in team sports, such as the meeting point between attack and defense, consciousness in action takes the lead, especially when the pressure of time is at its peak. Decisions that are considered "impulsive" are often colored by the player's personal bias, as he reacts to them in real-life situations, based on his own understanding, as a method of interpretation and his own individual reasoning (subjectivity). This subjectivity is often strongly influenced by past experiences.

Considering the importance of the relationship between embodied and conscious thinking in decision-making, Research showing that players may shift from consciousness in action to reflective consciousness during football matches makes an important contribution to understanding the decision-making process "hot" in team games (Mouchet, 2005).

1.3. Game sense

Using games as a learning tool, Game sense (GS) or "Vision of the Game" is a sports pedagogical approach that improves strategic thinking and tactical performance while improving movement skills. This technique has been deepened by several authors in their works, such as Light et al., 2012; Pill, 2012; Thorpe, 1996, 1997; Charlesworth, 1994; Breed & Spittle, 2011 și Den Duyn, 1997. The equation that helps to understand an approach can be understood by Figure 6, where the context of the game refers to elements such as decision making, timing, space, player position, etc. (den Duyn, 1997).

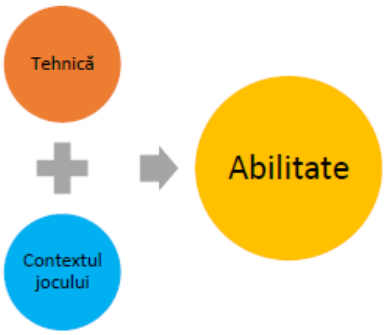


Figure 6. Graphic representation of the concept Game sense (after den Duyn, 1997)

The pedagogy of a Game sense approach can be seen as consisting of five basic elements:

1. Developing representative friendly matches that challenge and progressively motivate players to better understand the strategies and application of the skills necessary to succeed in games;

2. Supporting the development of players' understanding of games by using questions to guide the discovery and understanding of key concepts;

3. Setting challenges to promote an atmosphere of learning and problem-solving;

4. Adapting certain game situations to exaggerate or emphasize certain tactical or skill aspects of the game;

5. Within the four game categories, different rules dictate the organization, but the common principles of the game remain (breed & Spittle, 2011; den Duyn, 1997; Light, 2013; Thomas, 1996; Thorpe, 1996; Pill, 2012, 2013b; Schembri, 2005).

Accordingly, although Game sense practice-based training begins with play and a tactical problem to explore, the practice of specific behaviors results from the need to enhance individual performance. When it comes to skill exercises, their true value lies in applying them to game situations. For example, when a player struggles to hit the ball effectively due to inconsistent ball placement, a well-executed exercise can help him solve this problem.

A vision of the game coaching approach involves an open discussion, where training should be highlighted and aimed at stimulating thought and dialog (Light, 2012; Wright & Forrest, 2007). The coach might opt for a different approach when giving feedback to players. Instead of directly stating that a pass should have been made to an open player, the coach may use questions such as:

•Why do you think it was a good option?

•Did you have other options available?

•Could you have chosen better? And if so, why do you wake up?

•Has anyone seen any other possible options?

This makes players think and engage intellectually, and can be built by encouraging discussion in small groups of the entire team, giving players ownership of tasks and empowering them to make their own decisions on the pitch (den Duyn, 1997).

1.4.Teaching Games for Understanding

Coaches, teachers, and researchers were intrigued by the approach of cognitive games to understanding the game - teaching Games for understanding (TGfU) proposed in 1982 by Bunker and Thorpe (1982), which separates from conventional methods of teaching and learning games oriented to the technique. This approach has gained significant popularity since it was launched, its impact being noted in studies conducted by Rink, French and Tjeerdsma (1996).

The Bunker-Thorpe approach has undergone development thanks to several researchers, including Griffin, Oslin and Mitchell in 1997 and Gréhaigne and Godbout in 1995. However, revisions to the Bunker-Thorpe model have not yet been attempted.

In connection with the development of the cognitive game model for game learning, Bunker and Thorpe (1982) argued that some games have key features determined by their rules and tactics. For example, they suggested games such as the following:

1.Football, rugby, as well as basketball, netball and hockey, can be classified as invasion games, because they share:

•common tactical characteristics of the invading territory to make space in the attack;

•isolation of space in defense;

•use a goal or similar target for scoring.

2. Table tennis, tennis and volleyball are among the net/wall games that have similarities:

•the concept of playing the hit so that opponents cannot return;

•all players must serve and receive the ball;

•the target for scoring is on the playing surface.

3. Hitting/field games such as cricket, baseball and routers share:

•the concept of scoring by hitting a ball in open spaces;

•players are strategically placed to prevent the registration of runes.

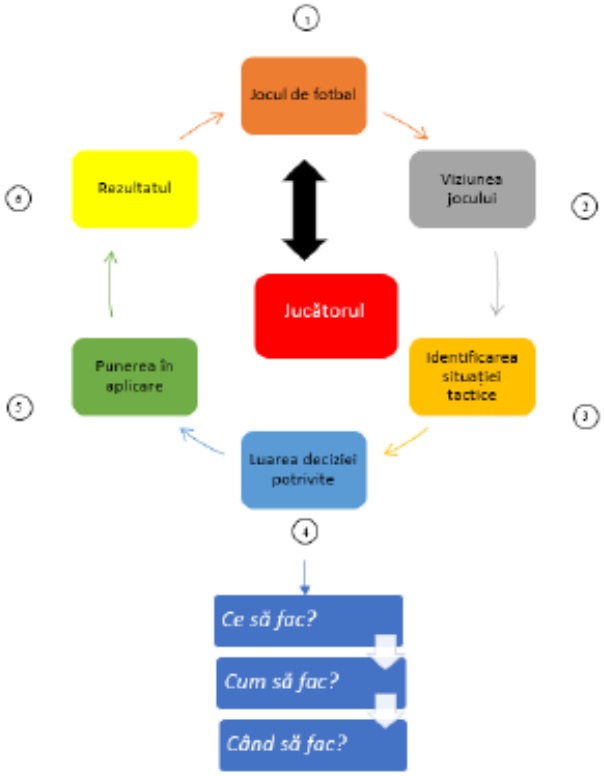


Figure 7. Graphic representation of teaching Games for understanding (adapted from Bunker & Thorpe, 1982)

The evolution of any game follows the pattern shown in Figure 7 (Bunker & Thorpe, 1982). First, players must be able to understand (with guidance) the specific form of play and will be led to recognize the unique problems that need to be solved. At this level, it is important for coaches to think carefully about the size and shape of the playing surface, the number of players in a team and the materials to be used in an attempt to present the players with problems taken from the football game (for example, creating space for attack/closing space for defense).

2. The systemic method

2.1. The systemic method and training typologies

The systemic method or tactical periodization (PT) is an approach to the training of football teams that has its origin in the work of the Portuguese academician and football coach Vitor Fradé. A key element of PT is that training should never separate the physical, tactical, technical, and mental elements of training. In particular, physical or technical training should not be isolated and trained independently, it should integrate with mental and tactical training.

A number of successful football coaches – including Jose Mourinho, Andre Villas-Boas, Jose Peseiro and Carlos Queiroz – have implemented at clubs where they train the systemic method. It has recently emerged that elements of the systemic approach have been adopted for training players, including in other disciplines such as rugby or basketball.

Using the total work, intensity, space/players involved and recovery exercises/sessions, it is recommended that physical trainers provide guidance to football coaches when developing training plans.

By classifying the potential methods of the daily training process (see Figure 8), it can be considered that these include:

1. Traditional/analytical training, where the priority is the development of a single goal or pairs of two (physical, technical, tactical, psycho-social). Learning the tactical elements takes place first on the sides and then, after the player masters them separately as a whole.

2. Integrated training, where physical, technical and tactical goals are developed together. Learning, understanding, and mastering tactical elements are done as a whole.

3. Systemic training (tactical periodization), the game model is a guide in creating a cycle or training. Training is carried out in conditions similar to a game or in the game itself.

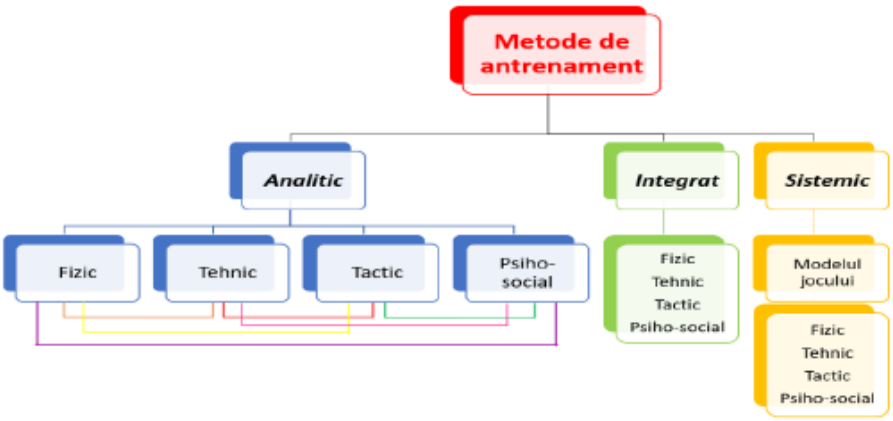


Figure 8. Clasification of the trainings methods

2.2. Principles of the systemic method

In physical activity and sport, complex systems are distinguished: The groups that integrate them (clubs, federations, associations, etc.), the people and athletes who practice their activity and their interaction with opponents, coaches and the environment.

Starting from the principles of complexity, we detail the principles of tactical periodization (Frade, 2004):

1. The principle of the reality of the game;

This can be considered the most important principle of tactical periodization. Specificity occurs when there is a permanent relationship between all the dimensions of the game, and training exercises are specifically representative of the game model (game style). Therefore, the concept of the reality of the game directs and directs the training process.

2. The principle of operational practice; Action models represent the identity of a team and attract them to dynamic behavior, which is why each training exercise must address both the game model and the specifics in order to turn these patterns into practice. These references should be part of everyday work to ensure specific adaptations and tactical knowledge, as designing exercises without considering the style of play can interfere with the acquisition of desired knowledge and can have adverse effects.

3. The principle of disassembly and hierarchical organization of the principles of play;

The principles of the game are complex concepts because they involve several variables that are related, and the systemic method reduces their complexity.

Thus, the principles of the game are subdivided into sub-principles, and they are further fragmented into sub-principles. The goal of the division is to make them easier for players to understand. This process of disassembling the principles of the game must be done carefully, respecting the style of play (the game model) and the plenitude of the game (systemic vision).

4. The principle of physiological alternation;

This principle refers to the need to maintain a regular and fixed weekly model, respecting the alternation in training-recovery requirements (Amieiro, Oliveira, Resende, & Barreto, 2006).

Assuming one team match each week, the three main training days (shown in Figure 11) are arranged in a unique way to incorporate different fitness components. The first day of training is reserved for the enhancement of strength, followed by endurance factors on the second day and ends at speed on the third day.

5. The principle of conditional games/positional games;

To teach or improve a certain principle or sub-principle of a game model, it is best to develop appropriate exercises. Focusing on behaviors related to a particular playing principle is recommended if it generates interest. As such, the requested behavior must occur more frequently

than during positional play, allowing players to create mental images about the desired goal. In order to facilitate the necessary behaviors, which are called conditional games, the conFiguretion of the exercise (for example, the playing area, the number of players, the regulations, the goals) should encourage their appearance. For example, establishing an exercise in which a team's defensive sector is under-loaded and constantly defends itself will cause behaviors related to its defensive organization to emerge. Then there will be many opportunities for coaches and players to "shape" these behaviors.

6. The principle of complex progress;

This principle refers to the hierarchical organization of the principles and sub-principles of the game. Not to be confused with a progression from general to specific, from volume to intensity.

For the systemic method, the concept of progression is built around the purchase of a certain game mode. This evolution occurs at three different levels of complexity: During the season, throughout the week (taking into account the last game and the next) and finally during each training session, thus becoming a complex progression in which each level is related to the others.

7. The principle of performance stabilization;

The concept of conventional performance is normally based on a set of quantitatively oriented criteria based mainly on the physiological dimension.

Planning and periodization in football are vital to the concept of performance stabilization, derived from its long competitive period. Team organization is the central point for both individual and collective performance and must be maintained at all times. The constant presentation of a high-quality game level is ultimately crucial to ensure favorable results, even if there are small variations. And to keep this optimal performance constant, a standard weekly plan is set up and supported to stabilize it.

8. The principle of tactical densities;

Tactical thinking is a key factor in the top performance of football players, required both during games and during training. Focused attention is a mandatory attribute. Developing a tactical attitude involves developing an attitude to think and decide quickly. Mastery of specific techniques and ability to make tactical decisions depends on their suitability to the situation of a game.

This means that high concentration levels from the first to the last minute of the game are essential. Therefore, intensity is not an intangible concept, it is directly related to the principles and sub-principles of the game, which, when trained through well-designed exercises, will guide the future actions and thoughts of a player. The more variables that will be analyzed for players during the execution of training exercises, the more demanding and intense the situation will be

(Frade, 2003). The intensity varies from day to day, as the complexity of training sessions varies (Figure 12).

2.3. Training factors

2.3.1. Technique

Football technique is a mode of movement that solves certain motor tasks. The technique of football refers to the efficient biomechanical execution of structured movements that make up the content of a football game and allow full expression of the potential of motor skill.

Basic principles of technical training for technical learning, certain basic principles are essential. Effective learning of technical elements must be appropriate to the age and skills of the players. Thus, the basic principles of technical training, according to Jozak and Kepcija (2018) are:

- The principle of continuity;
- The whole-party learning principle;
- The principle of complexity;
- The principle of adequacy and rationality;
- The principle of individuality and specificity;

The phases of technical learning elements

In this regard, six phases are distinguished:

1) development of kinesthetic sense – development of the sense of the ball;

2) acquisition – the initial training method in which the emphasis is on developing appropriate coordination, precision and strength in relation to the opponent and space (relieved conditions);

(3) the formation of an appropriate biomechanical movement program, in which the focus is on stabilizing and forming a biomechanical program for a diversity of space-time variations;

4) adaptation to increased adversity – a method of functional and situational training focused on the application of technique and adaptation to an opponent;

5) Automation – automatism of functional technique in situational conditions;

6) implementation – application of automatic football movements and programs in decision-making situations, with the aim of developing the game (Delgado Bordonau & Mendez-Villanueva, 2018).

2.3.2. Tactics

Football tactics is the training and development of specific skills and understanding of typical structural situations that are presented in a game. Having tactical knowledge means knowing what decision to take with or without the ball, depending on the circumstances of space-time, the current movement of the ball, the position of teammates and opponents, and also the possibility of finding suitable solutions, In a situation that coordinates with the concepts of the game in all its stages and with the plan desired by the coach (Delgado Bordonau & Mendez-Villanueva, 2018).

After Sanz (2014), the tactics are organized according to the following principles:

- The principle of continuity;
- The principle of adequacy and rationality;
- The principle of specialization;
- The principle of encouraging creativity;
- The method of ideomotor representation of technical-tactical requirements;

In the tactical sense, several concepts are present simultaneously, including (Jozak & Kepcija, 2018):

•The four moments in a football game and their phases;

•Training conditions for each of the four age group moments;

•Team formations and style of play;

•The main principles of play;

•Specific requirements within these principles.

Respect for the particular physical development of each player is essential during the performance training, the stage of preparation of the players. It is important that physical training sessions do not group all players equally, but rather allow different levels of fitness (Griffin, Oslin & Mitchell, 1997). Metabolism, coordination and psychological strength, in addition to the development of the musculoskeletal system, including bones, cartilage, tendons, ligaments and muscles, All show significant variations between players of the same age (Delgado Bordonau & Mendez-Villanueva, 2018). Planning and programming are already becoming vital at this time, focusing on duration, intensity and recovery. Methods must be adapted for each level of learning. The effort to maintain a balance between isolated and integrated forms of physical training in the early stages of training is essential. At this age, it is also important to work to incorporate technical and tactical aspects into combined and more complex training forms. Training must be adapted to the age and personal level of the players, as well as the content and methods.

The psycho-social factor

Football is no longer just a physical skill, as modern trends have revealed the increasing importance of mental strength among players at elite levels. Even so, sport goes beyond that, serving as a comprehensive "school of life" for individuals (Benson, 2006). While it certainly helps young people become skilled athletes, it also plays a key role in their broader, holistic development.

The second major goal of training in performance education is self-confidence (Easterbrook, 1959). Young people can gain significant self-confidence by learning to play football, regardless of their success on the pitch. The goal of teaching this game is not only focused on results, but rather on stimulating a sense of commitment and dedication in players. Through the effort required to learn the skills necessary for football, individuals can develop a new belief in themselves that transcends the sport itself. Indeed, football offers countless opportunities for such personal growth and achievement. By emphasizing self-confidence at the expense of performance, we can help all young people to embrace their potential and accomplish great things both on and off the field.

To be determined, to take risks, to show aggression, to play together or, alternatively, to let your head fall after each defeat, to have a lack of desire, to have doubts, to be afraid to shoot at the gate, not to have concentration, etc. there are mental attitudes that can be observed in players, either during a match, either in a training session.

2.4. Tactical factor oversizing

According to Morin (1999), there is complexity when the various components that constitute a whole are inseparable and when there is an interdependent, interactive tissue between the parts and the whole, between the whole and the parts. Vriend (quoted in Link and Phelan, 2001) when it says that "a complex system is that which consists of a large number of agents interacting with each other in different forms".

Complex systems or phenomena, in addition to being characterized by the interconnection and interaction of their various parts, as well as the whole with the parties and the parts with the whole, they also consist of a wide range of uncertainties, hazards, etc., which give them even more complexity. This refers to Morin (1999) when it defined the complexity: "not only the amount of units and interactions that cause our calculation possibilities; uncertainties are also taken into account, lack of determination, random phenomena". And he adds that a complex "phenomenon has to do with semi-random systems whose order is inseparable from the hazards related to", referring, in this last sentence, to Chaos Theory.

A fundamental feature that defines the systemic method and that Gaititero brings us closer to (2006) is the understanding that “objectives are, above all, immersed in link networks, which in turn, relates to other networks”, from which we can conclude that there are no parts, but that it is a huge network that houses a lot of other interconnected networks between them, so that their separation becomes inconsistent.

As a last great feature, inside a (system of a team) there are other systems (groups, compartments), with an identical or different degree of complexity.

However, despite the fact that the systemic method is based on globalization, it does not ignore the meaning of singularity, because, as Morin says (quoted in Gomes in 2006), it is “impossible to know the parties without knowing the whole, just as you cannot know the whole without knowing the parts”, thus clearly detaching from the holistic thinking of integrated training, which “neglects the dynamic role of its parts, interrelational interactions of team sectors, individual characteristics and player relationships at different times of the game” (Gomes, 2006), thus attributing, abstract rating.

3. Game model

3.1.General

The game model or style of play is a level of organization that the team achieves in the game as a consequence of the predetermined behaviors that coaches want their players to adopt at every moment of the game and when in different situations (Sanchez & Perdomo, 2016). As a result, it provides more order and predictability to the unpredictable nature of football, so that the team can finally try to influence the outcome of the game. The consistency and frequency of these desired behaviors occurring from one game to another is what determines the identity of the team.

The game model is never a finished product, it is an endless process, constantly evolving and improving through the analysis of the game and the team. After Sanz (2014), there are 3 categories that help structure the game model in an organized way:

1. game moments (game phase),
2. team scales (individual units, separate, interaction units, groups and groups)
3. principles of the game model (intentions).

According to Le Moigne (1990), the models are developed as a result of trying to understand the complicated relationships between the components of a system. These patterns are only an interpretation of reality as perceived by creators. Football, for example, requires understanding certain fundamental principles that will govern player decision-making, thus ensuring that the team operates in accordance with a coherent internal logic. After all, random decisions will not work in this context.

Frade (2003) suggests that the site of the expertise is where the game takes place, but the support of this expertise is improved when team interactions are consciously understood. When building a game model for a football team, it is essential for coaches to understand the microsociation they are dealing with. This team has its own unique language, culture, rules and identity that must be considered from a complex perspective. Therefore, tactical awareness is necessary to synchronize players' thoughts in certain specific contexts, with each factor of equal importance.

3.2. Game phases

3.2.1. Offensive phase

The offensive phase of the football game is characterized by a specific style of play and forms of organization (individual, group, compartment and team) which must result in scoring goals and winning matches (Figure 15).

Types of attack:

1. positional attack;

2. counterattack;

3. rapid attack (Gomes, 2006).

The organization consists of a set of voluntary, free choice, coordinated and closely interdependent movements with the recognition of the game situation, with different movement times and whose observation and interpretation points change depending on the position of each player on the field, the dynamic sequence of the situation and the ball.

Offensive organization is not a recipe that predetermines bird movements and sequences; on the contrary, it is a varied menu of solutions, which can be implemented within the limits of the allowed playing times and spaces (even by the opponent's attitude) and allows each player to decide independently, knowing and applying the rules (how ?, when?, where to move or move ?, who to pass to ?, why) (Seirul · lo, 2017).

Defensive transition

The moment a team loses the ball in front of the opponents, it enters the transition from attack to defense, characterized by the actions of the team immediately after losing possession - the transition from an attitude of attack to a defensive attitude (Jozak & Kepcija, 2018).

Basically at the time of losing the ball depending on the area of the field in which it is located and depending on the model of the game, there is the possibility to form the defensive block or to initiate the pressure. The game model is also defining what will follow. Following the pressure, it can be followed by the pressure and pressure zone or the player who loses the ball puts pressure and the team groups into the defensive block (Figure 16).

3.2.2. Defensive phase

This is the phase of the football game characterized by specific forms of organization, (individual, group, compartment and team) which must result in regaining possession of the ball and avoiding the collection of goals.

The main objective is to quickly regain possession of the ball and to avoid receiving a goal, and as an intermediate objective is to create a crisis of space and time for the opponent, for:

• immediate recapture of the ball and delay of the opponent's attack;

• organized closure of (horizontal-vertical spaces) and dictation / orientation of the adverse attack direction;

• permanent control of emergencies;

• gate defense (Haugen, Tønnessen, Hisdal & Seiler, 2014).

Pressure and pressing types depending on the area of the ground are: high (Z3), middle (Z2), low (Z1) (Frade, 2004). If the pressure and pressure area and pressing cannot be performed,

the shutdown/ restricting spaces between compartments and players in the compartment and orienting and controlling the direction and speed of the opponent's attack. By delay, closing the spaces and orienting-control of the opponents' movements will be obtained a compact defensive block. Sewerage of side effects in the defensive force areas of the team helps both to control their direction and speed, and to recover the possession of the ball. The individual and his defensive technical-tactical actions (1v1 defensive, zonal marking, man-man marking, blocking, translation, defensive return, dubbing, dispossession, interception, anticipation, etc.) contributes to the success of the organization in this phase.Apărarea de urgență este o metodă de a proteja poarta atunci când aceasta este vulnerabilă și când toate celelalte opțiuni defensive au eșuat (Jozak & Kepcija, 2018).

The emergency defense skills of field players are to block and intercept shots, centers and passes forward, defense 1v1, reaction on rejected balls and releases of the ball with or without address. The emergency defense also brings aspects of the other effective defense areas already mentioned: pressure / pressure zone / pressing, return to an organized defensive form, orientation / control/dictating the direction of the opponent's attacks.

Offensive transition

Entering the transition from defense to attack (positive transition) is triggered by winning the ball from opponents, and the priority is then given to the prompt attack actions (Frade, 2003).

During the moment of offensive transition, players must choose whether to secure the ball, trigger the counterattack or enter, as can be seen in Figure 18.

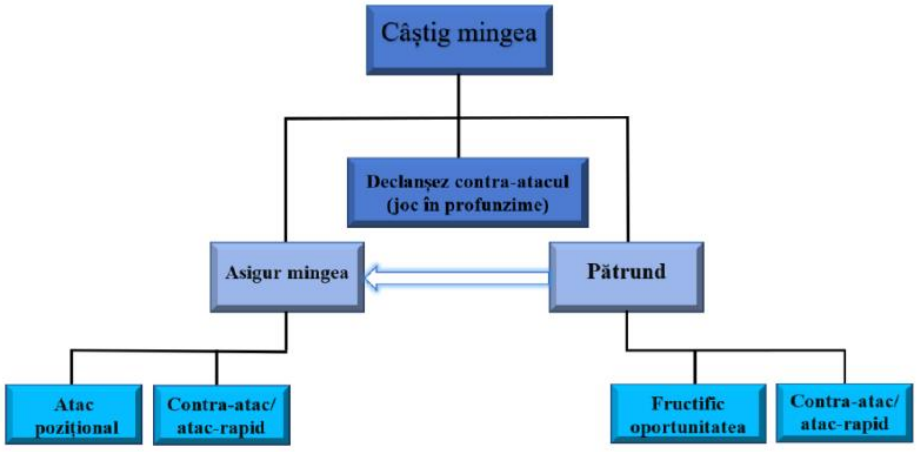


Figure 18. Graphic representation of the offensive transition

3.3. Principles of the game

The general principles of the football game involve the collective or intersectoral scale of the team (Damunt & Guerrero, 2013). Normally, the basic principles do not change from game to game, maintaining the identity of the team. For example, for a possession-oriented team, their main principle during the organization of the attack could be possession and rapid movement of the ball, unbalancing and disorganizing your opponent and playing through the lines to create opportunities to score. Regardless of the opposition, a team should not change this principle, as it risks losing its identity, which could lead to confusion of players on the ground and, most likely, to negative results.

Sub-principles usually involve the intersectoral, sectoral or group scale of the team (Delgado Bordonau & Mendez-Villanueva, 2018). Although it is important that these principles remain consistent from one week to the next, some flexibility can be allowed to adapt to an opponent.

For a game, sub-sub principles are at hand and primarily targets the individual or small group (Delgado Bordonau & Mendez-Villanueva, 2018), such as the two central defenders. These principles shape specific behaviors for the individual or small group in various circumstances. With even more flexibility than sub-principles, sub-sub-principles allow customization to be specially prepared for an opponent. For example, a central striker who usually, trying to run behind the opponent's defensive line must change this approach against a team that is deep where there is no back space, usually, the space when facing a team that stands deep is between the defensive and middle lines. The center first must adapt the style and seek to drop and receive the ball between the lines. The desired behavior for that player must be trained until the game.

Basic tactical principles of the offensive phase

• The principle of penentrant passes and interactions;

• The principle of providing support;

• The principle of mobility;

• The principle of occupying space;

• The principle of creativity.

Basic tactical principles of the defensive phase

• The principle of timing / delay;

• The principle of balance;

• The principle of control and resistance;

• Defensive block principle;

• The principle of pressing.

3.4. 9v9 Game systems

3.4.1. System 1 - 3 - 2 - 3

Advantages:

- Multiple variants of starting the rear construction with the help of the 3 defenders and 3 midfielders;

- The three strikers should put a lot of pressure to win the ball as soon as (Damunt & Guerrero, 2013) is lost.

Disadvantages:

- It can be outnumbered in the central area and remain vulnerable side areas;

- It can give a lot of care color if the team does not make the transition fast and does not become compact immediately after losing the ball (Damunt & Guerrero, 2013).

3.4.2.System 1 - 2 - 4 - 2

Advantages:

- The two strikers can make a close mark on the opposing central defenders. Allows attackers to play slightly farther away for departures from the second line of the central midfielder;

- Player positioning offers many bird lines (Fernandez, 2012).

Disadvantages:

- Quite vulnerable on the counterattack;

- Can ask players to play in a wide variety of positions (Fernandez, 2012).

3.4.3.System 1 - 4 - 3 - 1

Advantages on the attack phase:

• If the opponent tries to intercept the passes in the back game by human-to-human marking of the defenders, midfielders or striker can provide support above to be able to play the ball in front faster;

• Provides amplitude through the back game (Jozak & Kepcija, 2018).

Disadvantages in the attack phase of the system:

• Lack of support for the striker;

• Due to the lack of extremes, the side defenders must try not only to be in defensive positions next to the central defenders, but also, must position itself in strips when the team has possession, providing support to the attacker. This can cause fatigue because it must cover the entire field both in attack and defense (Jozak & Kepcija, 2018).

Advantages in the defense phase:

• Compact shape in the middle;

• The team can play in depth and better defend the square when under pressure from an attack (Gréhaigne, Godbout & Bouthier, 1999).

Disadvantages in the defense phase of the system:

• If defenders leave their middle position, then they can create spaces between midfielders, which can turn into opportunities for opponents to make different combinations;

• if the team retires, the opponent can easily play from behind, regardless of whether he plays on a defensive line of two, three or four players (Gréhaigne, Godbout & Bouthier, 1999).

3.5. Job requirements

System 1-4-3-3

a. Goalkeeper requirements:

On the construction / porting attack phase:

• Have good control of the ball so that it allows construction through a short pass;

• They can perform technical blows at a certain speed, so as to create an advantage (Sanchez & Perdomo, 2016).

On the defense phase goalkeeper:

• Move well in and in front of the gate due to the good game of the feet;

• Position directly in front of the gate in corners or free kicks (Sanchez & Perdomo, 2016).

Physical conditions of goalkeepers:

• can play the whole match without reducing the quality of the executions;

• Have a good footwork that adds to the team when they are in possession (Tamarit, 2009).

Personal qualities of goalkeepers:

• Ability to continue even after minor obstacles;

• They are open in communication with the coach;

• Defend your gate enthusiastically (Tamarit, 2009).

b. Requirements for side defenders:

On the construction / attack phase, side defenders:

• know where to position myself on the construction phase;

• Have good control of the ball so as to allow them to build through a short pass;

On the defense phase, the side defenders:

• Win duels along the field;

• Involves in duels 1v1 (Morin, 2014).

Physical conditions of side defenders:

• can play the whole match without reducing the quality of the executions;

• Fast enough to defend yourself on the middle line.

Personal qualities of side defenders:

• Ability to continue even after minor obstacles;

• can manage disappointments with the help of coach (Sanchez & Perdomo, 2016).

c. Requirements for central defenders:

On the construction / attack phase, the central defenders:

• know where to position myself on the construction phase;

• They use their technical skills at good speed so that they are not dispossessed (Tamarit, 2009).

On the defense phase, the central defenders:

• Win duels along the field;

• Involves in duels 1v1 (Tamarit, 2009).

Physical conditions of central defenders:

• can play the whole match without reducing the quality of the executions;

• Fast enough to defend yourself on the middle line.

Personal qualities of central defenders:

• Able to focus on the essentials during training and matches;

• Take the initiative to organize materials on the ground and outside (Tamarit, 2009).

d. Central midfielders requirements:

On the construction phase / central midfielders attack:

• ask for the ball when the defenders have possession;

• They can perform technical blows at a certain speed, so as to create an advantage (Wein, 2007).

In the defense phase of the central midfielders:

• Win duels along the field;

• know when to enter and when to move the game to the edge.

Physical conditions of central midfielders:

• can play the whole match without reducing the quality of the executions;

• They are agile enough to:

o Quickly exit in front of the opponent when the team defends itself;

o Win the ball when the opponent is about to send the ball back (Wein, 2007).

Personal qualities of central midfielders:

• Ability to continue even after minor obstacles;

• They are respectful of people, given agreements and ancillary materials;

e. Requirements for offensive midfielders:

On the construction / attack phase of the offensive midfielders:

• Demonstrates a good vision after overcoming the opponent (with the ball at the foot);

• They can perform technical blows at a certain speed, so as to create an advantage (Morin, 2014).

In the defense phase of the offensive midfielders:

• know when to enter the center;

• Do not be overtaken when opponents try to build;

Physical conditions of offensive midfielders:

• can play the whole match without reducing the quality of the executions;

• Agile enough to create an advantage in individual duels;

Personal qualities of offensive midfielders:

• find creative solutions in the field;

• They are respectful of people, given agreements and auxiliary materials (Morin, 2014).

f. Requirements for extremes:

On the construction / attack phase the extremes:

• know how to position myself so that I can receive a pass;

• They can perform technical blows at a certain speed, so as to create an advantage (Tamarit, 2009).

In the defense phase the extremes:

• They can stop opponents' construction initiatives;

• Do not be overtaken when opponents try to build;

Physical conditions of extremes:

• can play the whole match without reducing the quality of the executions;

Personal qualities of extremes:

• Ability to continue even after minor obstacles;

• They are respectful of people, given agreements and auxiliary materials (Tamarit, 2009).

g. Requirements for strikers:

During the construction / attack phase, the attackers:

• know how to position myself so that I can receive a pass;

• They are able to perform technical acts with a clumsy foot; (Damunt & Guerrero, 2013).

On the defense phase of the attackers:

• They can stop the construction initiatives of the opponents (and in 2v1 situations against two opposing central defenders);

• Do not be overtaken when opponents try to build;

Physical conditions of the attackers:

• can play the whole match without reducing the quality of the executions;

• Agile enough to create an advantage in individual duels;

Personal qualities of the attackers:

• Ability to continue even after minor obstacles;

• They are respectful of people, given agreements and auxiliary materials (Damunt & Guerrero, 2013).

4. Methodological aspects

4.1. Stage training process

With reference to the process, this is done using training as a key concept. Therefore, it is possible to identify the various aspects that the player needs for his training and to experience game scenarios that allow an optimal self-organization.

From the training sessions that take place in a football club, there are different conFiguretion elements with the aim of extending the sport's knowledge about identity, own game. The training process will include fun and dynamic sessions, with content and ideas for reflection to encourage understanding of the game, promoting the optimization of the different characteristics of each player, as well as the interaction between them and the environment (Caldwell, 2005). The player should feel motivated to continue training the next day. To this end, it is necessary for the coach to be passionate about designing exercises based on the game and to have a desire to compete and, at the same time, to understand not only the sport, but also the needs that appear in each of the structures that form the sport, in a non-linear and variable context, such as football.

Stages of preparation

According to Guindos (2015), it is important to describe the characteristics regarding the new and different phases that appear during the training session. They should be closely linked and their objectives should be secondary to the main objective of the special session, as follows:

1. Sub-dynamic introduction: the goal is to promote a predisposition and vigilance in all player systems oriented towards the goal to be achieved or improved in the training session.

2. Sub-dynamic optimization: the main objective is to extend the content provided in the training session so that the tactical, physical, technical and psychological dimensions are contextualized in all this, despite the fact that they can promote a greater trend towards some of these dimensions.

3. Sub-dynamic completion: in order to consolidate, optimize or strengthen content that has not been correctly absorbed and to restore player levels in all contexts, both psycho-emotional and physical.

Storage of sensory information

Short-term memory (MTS) is the information processing center. The information recorded here from sensory storage is generally new. If this information is not repeated and stored instantly, it is very likely to be forgotten. If a person manages to repeat new information for 20-30 seconds

in MTS, he can learn it and transfer it to the long-term memory (MTL). MTS can be assimilated as a working memory. According to its dynamic nature, it stores information relevant only for the present time (Seirul · lo, 2017).

Long-term memory (MTL) contains stored information that is generally permanent. With the help of MTS, information from MTL can be updated, reorganized and consolidated (Seirul · lo, 2017). It should not be overlooked that motor learning does not routinely use this approach.

Stimuli

Perceived stimuli are responsible for triggering a series of events, which are captured and processed by various areas (Wright & Forrest, 2007). It is very important to train athletes to distinguish stimuli.

According to their nature, stimuli can be differentiated, according to Damunt and Guerrero (2013), as follows:

• Significant stimuli: provides relevant information for the receiver, who chooses the best option depending on his purpose. These stimuli are divided into motion stimuli / statics, specific / non-specific, proximal / distal, interoceptive / exceptional.

• Insignificant stimuli: on the field, significant specific stimuli are those that transfer best in real gaming situations due to the similarities of the exercises. In this case, the perceptual memory comes into play during the competition if it was previously trained with extremely specific stimuli.

Sensors

They are divided into four categories: visuals, audiences, kinesthetics / tactiles, vestibulo-oculars (Silva, 1998).

In training exercises, sensors can be differentiated from the player's holistic vision, although it is not appropriate to become a training rule. They may be trained in accordance with the objectives pursued in a particular training session.

Sensors are the organs through which we receive information from perceived stimuli. It is important to emphasize that the goal, in this case, is to understand. Sensors understand stimuli and, through perceptual memory and attention / concentration, we understand what is happening, allowing optimal decisions to be made.

Motor memory

The motor memories of strategic intentions, game models, etc., are part of a previous emotional filtering. We remind you that through the perception-action cycle the player uses this

motor memory and implicitly makes the motor action appear. Motor memory includes the following variables:

• Procedural knowledge of coordination skills;

• Inborn movements (genetic);

• Movements learned through training;

• Default / explicit movements (Kugler, Kelso & Turvey, 1980).

In a football game, decision making will be done in different ways. It will depend on the player's position on the field and the situation and whether it is essential or not.

In this respect Torrents (2005) argues that human motor actions and sports actions, in particular, are "regulated mainly in subcortical areas and does not require the existence of previously stored programs in the brain or consciously developed motor decisions."

4.2 The training

4.2.1.Structure

The methodology used for the learning process is of crucial importance, as it determines the type of learning that the player will have and the related skills that he will acquire. The methodology must be closely linked to the player / team optimization plan.

Learning methodologies vary depending on the goal pursued: it is not the same if the goal is for players to learn specific game situations and how to solve them, unlike the situation where if the goal is for players to prepare to adapt to changing game environments.

In the first case, the training session will be developed through repetitive exercises that simulate a specific situation. For this situation to occur, the coach must stop the game at the end of the action, give players time to return to their starting positions and repeat it. The positions and actions performed will be established by the coach. The situation is created and, with it, the solution needed to achieve the objective of the exercise. With each repetition, these actions will become "automatic" for the player.

In the second case, a real game context is created, with constraints, so that something specific that we want to optimize takes place naturally. It will not always be resolved, and when it does, it will not be in the exact same conditions. The player will have to adapt to a changing environment in which, at certain times, the goal to be optimized will appear.

During the training process, coaches have two ways to convey the message to players, namely through exercise and intervention style. By creating Preferential Simulation Situations (SSP), subjects are allowed to play and feel the experience of the chosen game philosophy.

Design and exercise development are very important pieces in structured training, because they are part of the process of optimizing the athlete in the paradigm of complexity. In this sense,

Espar (quoted in Seirul · lo, 2017, p. 244) states “exercise will be the key to changing the athlete. Exercises must be adapted to his needs, knowing that they will change continuously during his sports career.”

4.2.2.Means

There are various aspects to consider in the training session, which have an impact on the life of the athlete during his development:

1. organization

• Start the training session on time;

• It is important to provide a brief explanation of the training session, exercises and planned objectives. If possible, this should be displayed in the locker room on a board before the training session begins;

• The training exercises in the session must be prepared in different locations in the training space;

• Avoiding the agglomeration of materials that will not be used in the field allows the optimization of the time necessary for the teaching of the content;

2. Activation

• Evaluation of the intensity with which players perform training exercises during the session;

• Ensuring an optimal level of activation (neither too little nor too much);

• Avoiding excessive shouts and directions that could make players stressed, regardless of their age or experience;

3. Learning

• It is important to focus information on the goal of training;

• The coach should prepare the training session, focusing not only on what will be done, but also on what will be said;

• Avoid grabbing training to the detriment of staff;

Times in each phase

An exercise is defined as a situation that simulates the context of the competition, which allows the selective improvement of a certain component of the training and the increase or reduction of its energy consumption.

The round is currently one of the most popular approaches among coaches, as the adaptations generated in practices will be transferred to the game, due to their relatively high level of specificity. In comparison, other exercises do not have the cooperation- adversity and therefore

the necessary decision-making in the common space. Obviously, there are exercises with a higher degree of specificity, such as gaming situations (situational games). In any case, rondo is an optimal exercise for any training session, due to its simplicity, low conditional requirements and continuous contact with the ball.

The training must be performed under specific conditions, depending on the characteristics of each sport. This specificity in the methodological approach is a key principle in generating solutions for adaptation in training. This is characteristic of rondo, as it guarantees the activation of the player's structures, to a greater or lesser extent and promotes a greater transfer to games.

Positional games

In 1988 a new approach to methodology emerged, being the most suitable to develop a game idea based on the organization of players on the field depending on the ball.

According to Fernandez (2012) the characteristics of these approaches are:

• Players are arranged at different points, making it easier for them to create bird lines;

• It is essential that players be spaced away so that the interior corridors (appear either with defenders or with extremes);

• The concept of “open man” is fundamental;

• Players do not only care for the sake of doing this, they must master the concepts: when to dribble and when to pass;

• Dribbling makes it possible to attract the opponent, causing the appearance of “open man”;

• The general idea is to generate superiority behind the player trying to regain possession of the hand - positional superiority (positions in offensive response to the reference point in the defensive organization of the opponent - the player in in defensive duel 1v1 / intervention area).

• Continuous formation of bird triangles, which allow the game with “third man”.

4.3. Cognitive elements of the player

Emotions are considered the basis of all the decisions we make. Every decision goes through our emotional filter. In a sport as complex and emotionally charged as football, understanding emotional dynamics is very important due to the way emotions influence decision making (Araújo, Davids & Hristovski, 2006).

During a football game, so many decisions are made that it is not possible to follow them. For this reason, we need to develop methodological strategies and optimization tools to improve the decision-making process of players, in order to be able to make better decisions faster. This methodology educates and trains the unconscious in a pragmatic way and applied to football. As

the conFiguretion elements are developed in exercises, skills will form in the unconscious and allow agile responses, once assimilated during the training process (Paques, Fruchart, Dru & Mullet, 2005).

During the decision-making process, the information received is compared with that of previously experienced and resolved scenarios. If similarities are found, previous successful answers are used. If the intervention scenarios are new, a response is given based on information obtained from gaming experiences in similar contexts (Araújo, Davids & Hristovski, 2006).

Actions that are taken to resolve situations are not done in an isolated manner. They are connected in a short time and some are performed even simultaneously. Experienced players, while performing certain actions, are already thinking and analyzing the circumstances to decide what the next intervention will be. Of the many stimuli a player should expect, two can be distinguished as the most important: the actions of teammates and opponents. This is where the idea of strategy begins.

Team sports are characterized by situational and changing environmental dynamics (Johnson, 2006), which requires the athlete to constantly adapt to changes based on decision-making. Declarative learning is important to understand the game, but not to act on it, because when a player participates in an action, he does not have time to reason.

4.4 The planning

When setting targets for team sports, it is necessary to highlight planning as an organizational tool within an institution. This will be done in accordance with the holistic approach of interactive sports in a common space. That is, planning will adapt to the complex reality of a changing environment, in which players and their hyper-complex structures interact and coexist in continuous change, in response to the variability present during their sports career and in personal life.

In short, in this perspective, in his book Sports Team Training, Seirul · lo brings us closer to the planning concept that best applies to interactive sports in a common space (Figure 26).

The set of theoretical hypotheses made by the coach includes the description, forecast, organization and design of each of the stages of training that the players will carry out at that specific moment in their sports career, while remaining with their team. It also provides a means of analysis and control, which is necessary to change these steps and provide a more appropriate training process for optimizing players, which will help to continuously achieve the desired results in the respective competition in which they are involved (Seirul · lo, 2017, p. 284).

This new approach to planning is based on the needs of the game and the player. It allowed a qualitative leap in achieving the approach within the training methodology in football. That is,

the training is focused on the style of play, according to the needs and interactions of footballers (Sanz, 2014).

In this regard, it is recommended that planning for interactive sports in a common space be unique, specific and personalized.

The unique term is associated with a paradigmatic element that provides support to team sports. The sciences of complexity are relevant in this methodology in terms of the unique approach to understanding the game, ie through systemic thinking. The unpredictability of a sport, such as football, means that its planning must highlight such types of events, the unification of the criteria for communication and intercommunication between players, as well as the interaction between the player and the coach.

On the other hand, planning must be specific. This expression refers to a planning program with its own identity, one that is unique among the various team sports, respecting the competitive processes and institutionalized regulations of each team sport, as well as the individual and collective needs of the players.

Personalized planning aims to detach conceptually from the individual, ie in a sport such as football, training exercises are generally designed in large groups. This indicates that those customization criteria in planning for interactive sports in a common space should respect the following aspects: personal sports talent, life as a sport, differentiated integration.

CONCLUSIONS OF THE LITERATURE REVIEW

• The relationships between the constituent components and the whole must necessarily be mediated by the average term of the interactions. The significance of this term is enhanced due to the fact that the systems consist primarily of interactions between complex units, rather than "parts" or "individual components".

• When it comes to living or social systems, the general theory of the system, which is based exclusively on the concept of open system, is inadequate. To discover the connections between our physical, biological and anthropo-social theories, we must delve into their system / organizational dimension

• The ecological approach to decision-making presupposes that it is the result of the interaction between the individual, the environment and the workload.

• The holistic approach is characterized by: guided discovery, experiential learning, implicit and non-interventionist learning.

• The decision-making process is influenced by both the game situation and the local circumstances, being at the same time shaped by the socio-cultural context and by "the decision-making context". Due to previously agreed strategies, laboratory research cannot provide a comprehensive understanding of the decision-making process.

• The most important task of the coach when transmitting information to players related to the vision of the game through this approach is to design and manipulate the environment

• Football, implicit sports, and the game that a team produces is a complex phenomenon, given that it consists of various components (tactical, technical, physical, psychological and strategic on certain occasions) and moments (offensive moment, the defensive moment and their two transitions) which are part of a whole and which cannot exist separately from the rest, given that the factors that make them up are inseparable.

• The systemic method treats complex phenomena, because it contemplates the object in its entirety and context. There is no order in the method of dividing the object. More than a theory of divisions is a theory of synergies, given that the articulation of its components is what gives it complexity, wealth, but especially viability to be coherent and specific.

• During the construction of a game strategy, a key factor to consider is the type of game preferred by the coach for each stage. It is absolutely essential that players are familiar with the appropriate actions for each situation on the ground.

Part II

Personal research on the systemic method

5. Preliminary research on the efficiency of Xampions Ensoles sensors

5.1. Introduction

The application of technology in sport can generally be divided into two areas: technology that helps improve the performance of an athlete and technology used as a movement control mechanism.

If sport is a place where you can express your physical abilities, the importance of technology lies in its ability to help people increase their performance. In the context of this goal, technology should promote performance standardization and ensure the balance, credibility and validity of assessments, measurements and judgments.

5.2. Purpose

The purpose of the research is to perform a comparative analysis of the recordings made by Xampions Insoles sensors with the Catapult One GPS in terms of physical parameters of effort dynamics, respectively with the record sheets in terms of technical parameters (passes, takeovers and strokes).

5.3. Objectives

1. The objective of the preliminary research is to compare the accuracy of the data recorded by the Xampions Ensoles sensors and their limitations.

2. Knowledge of the level of training and game model of footballers aged 12-14, through Xampions sensors, Catapult One and observation sheets.

5.4. Hypoteses

1. The data recorded by Xampions Insoles sensors can have relevant accuracy and can help us in monitoring, modeling, evaluating the means used in training and the physical and technical parameters of matches.

2. With the help of montotorization systems, we will be able to determine the level of technical-tactical training of football players of 12-14 years of the U Evolution club in order to design a game model and a training structure as much as possible close to the reality of the game.

5.5. Materials and methods

5.5.1. Research design

To obtain physically relevant comparative data we used the Catapult One GPS and the Xampions Insoles boot sensors both being applied after heating. The GPS was fixed with the help of news on the athlete while the game boots were worn only before leaving the field.

In order to have as little interference as possible in the data collection, we organized a friendly tunnel between September 24-26, 2021, in Vişea. The tournament was attended by two groups included in the research (called Evo Experiment and Evo Control), GT Sport Alba Iulia, Academica Târgu Mureș, LPS Târgu Mureș, Sporting Cluj and CFR Cluj.

Each game lasted 40 minutes x 2 rounds, applying the line change system to 20 minutes (all 8 field players go out and enter 8 other players). Thus, research subjects were monitored for 40 minutes each.

5.5.2. Research participants

In the pilot study, 5 subjects from the control group and 5 subjects from the experiment group for the 5 matches were randomly chosen using the random.org site. In addition to the fact that the choice of subjects was made randomly, we chose to monitor a front-line topic and a line 2 topic.

All 10 subjects selected for this preliminary practical football study for 6 years, but the period of collaboration with the researcher of this study varies. All subjects are currently training at the U Evolution 2020 football club.

5.5.3. Research period and place

The period during which the preliminary investigation took place was from 18.09.2021 until 23.10.2021, period in which a set of 5 games from a friendly tournament was organized and monitored, randomly choosing 2 subjects, one from the experimental group and one from the control group. Data recorded by Xampions sensors, Catapult One GPSs and observation sheets were centralized in Excel tables after the end of the tournament. These can be found in Annexes.

5.5.4. Equipment

Xampion Insoles sensors

In conducting the preliminary research we used Xampion Insoles sensors that are placed in the boots of football players measure in detail the following training indices, which can be analyzed after the training session/I play in the mobile application installed or online, through a search engine.

GPS Catapult One

We also used GPS vests Catapult One is worn by players during training and games to track and measure their performance on the field. The vest is designed to hold a bridge between the shoulder blades that contains a 10Hz GPS, an accelerometer and a magnetometer. These GPS devices are able to capture over 1250 data points per second to measure how much and how hard players work, and players and coaches are able to analyze data such as total distance, maximum speed, number of sprints, sprint distance, power, loading, intensity and more.

Observation sheets

In addition to the Xampion sensors and the Catapult One GPS, we used the observation sheets as a comparative method for the technical elements measured by Xampion (left and right foot shot, left and right foot passes and left and right) pickles.

5.5.5. Research methods used

Observation method

In the preliminary research, the observation method was materialized through observation sheets and the analysis of the immediate reality by the faithful recording of with + the successful passes and with – of the failed passes.

I considered a successful pass when the ball reached from the player "A ” to the player" B ” and he performed its takeover.

Statistical-mathematical method

This method was used after centralizing the data recorded by Xampoion, Catapult One and the observation sheets. Through the statistical-mathematical method we calculated the differences and the percentage of error between two different instruments in order to conclude if the Xampion sensors have accuracy in terms of the measured parameters.

5.6. Results

Table 5. Evolution of distance depending on the match and the instrument used for the two subjects

	Subjects	**Xampion**	**Catapult One**
Game 1	S9	7693m	7610m
	S17	5625m	5930m
Game 2	S5	7933m	7700m
	S25	7305m	7150m
Game 3	S16	6194m	5960m
	S30	7201m	6850m
Game 4	S8	6471m	6320m
	S27	7467m	7280m
Game 5	S7	7695m	7550m
	S19	6891m	6790m
Average		**7047.5**	**6914**
Percentage			**-1.89%**

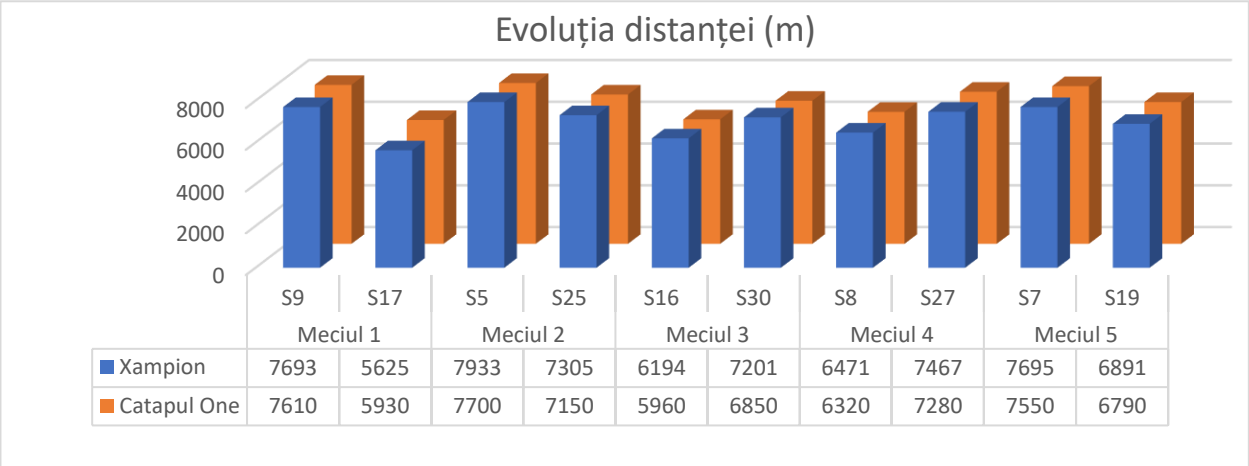
A comparison was made between the data recorded by the Xampions Sensors, respectively the data recorded by the Catapult One GPS for a t test for the “, Km ” item. No significant difference was observed between the scores obtained by the research subjects in any of the games at the Km runaway. Recorded results suggest that there is no statistically significant difference between the data recorded by Xampions and Catapult, the difference being - 1.89% km run, recorded Capult one in total on the 5 games.

Table 6. The evolution of seconds in the sprint depending on the match and the instrument used for the two subjects

	Subjects	**Xampion**	**Catapult One**
Game 1	S9	51s	56s
	S19	43s	48s
Game 2	S5	55s	48s
	S27	34d	30s
Game 3	S16	53s	57d
	S30	50s	53s
Game 4	S8	41s	42s
	S25	41s	46s
Game 5	S7	37s	35s
	S17	30s	22d
Average		**43.5**	**43.7**
Percentage			**0.45%**

A comparison was made between the data recorded by Xampions, respectively the data recorded by the GPS Catapult One for the item “seconds in sprint ”. No significant difference was observed between the scores obtained by the research subjects in any of the games in the “seconds in sprint ” run. Recorded results suggest that there is no statistically significant difference between the data recorded by Xampions and Catapul, the difference being – 0.45% „ seconds in sprint ”, recorded Capult One in total on the 5 games.

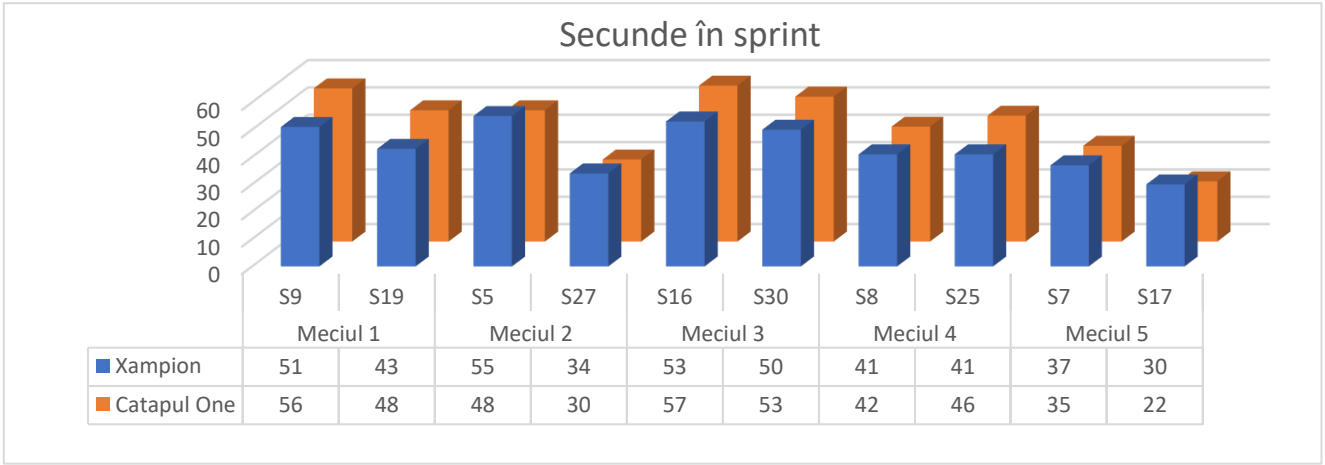
5.7. Discussion



	S9	S17	S5	S25	S16	S30	S8	S27	S7	S19
	Meciul 1		Meciul 2		Meciul 3		Meciul 4		Meciul 5	
Xampion	7693	5625	7933	7305	6194	7201	6471	7467	7695	6891
Catapul One	7610	5930	7700	7150	5960	6850	6320	7280	7550	6790

Graph 1. Evolution of distance depending on the match and the instrument used for the two subjects

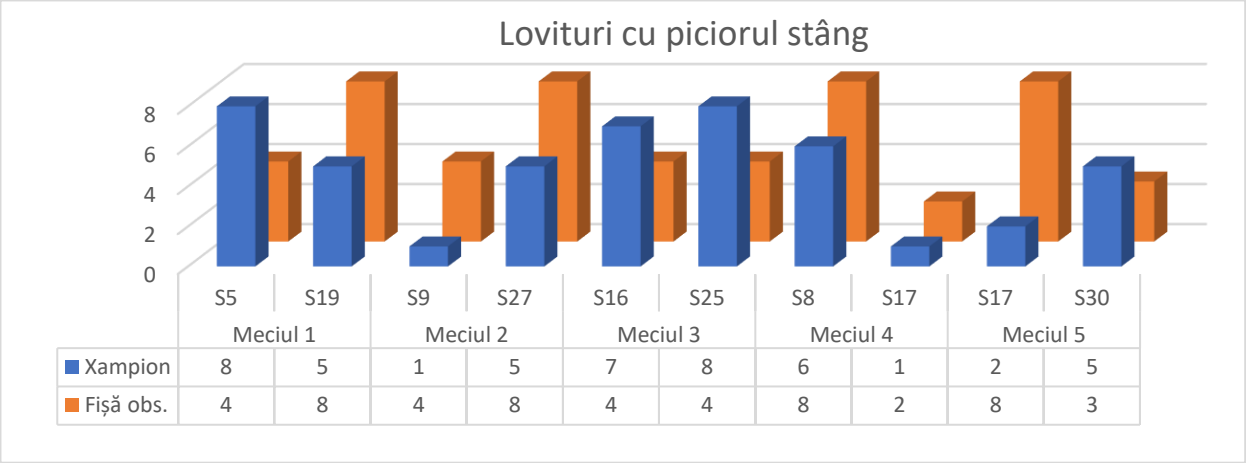
As can be seen on chart 21, the differences measured by the Xampion and Catapult One sensors in the 10 subjects in the 5 monitored matches are small, statistically insignificant. Xampion sensors attached to the subjects' boots have recorded a greater distance covered by players in each match than the GPSs attached to the Catapult One vests.



	S9	S19	S5	S27	S16	S30	S8	S25	S7	S17
	Meciul 1		Meciul 2		Meciul 3		Meciul 4		Meciul 5	
Xampion	51	43	55	34	53	50	41	41	37	30
Catapul One	56	48	48	30	57	53	42	46	35	22

Graph 2. The evolution of seconds in the sprint depending on the match and the instrument used for the two subjects

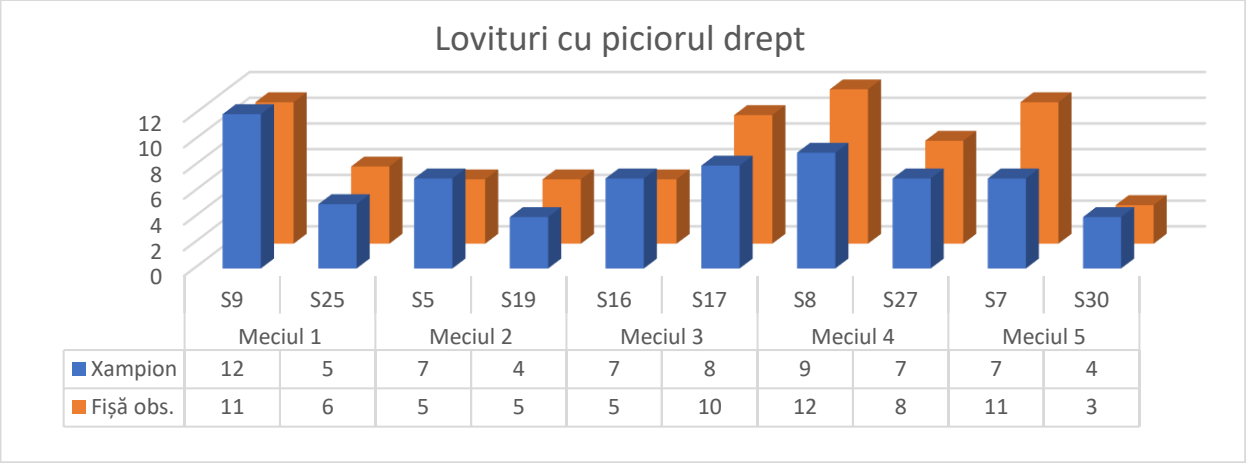
Regarding the sprint seconds of the subjects, the difference between the two devices is again small, statistically insignificant. Catapult One recorded several seconds this time in the vast majority of matches against Xampions. The biggest difference between the two devices is 8 seconds, recorded in match 5.



	S5	S19	S9	S27	S16	S25	S8	S17	S17	S30
	Meciul 1		Meciul 2		Meciul 3		Meciul 4		Meciul 5	
Xampion	8	5	1	5	7	8	6	1	2	5
Fișă obs.	4	8	4	8	4	4	8	2	8	3

Graph 3. Evolution of left-footed kicks depending on the match and the tool used for the two subjects

To test the accuracy and efficiency of Xampion sensors in terms of the technical elements tested, we used the observation sheets. The differences between the two instruments used for comparison were insignificant, the margin of error being 10.41% in terms of left foot kicks.



	S9	S25	S5	S19	S16	S17	S8	S27	S7	S30
	Meciul 1		Meciul 2		Meciul 3		Meciul 4		Meciul 5	
Xampion	12	5	7	4	7	8	9	7	7	4
Fișă obs.	11	6	5	5	5	10	12	8	11	3

Graph 4. Evolution of right kicks depending on the match and the tool used for the two subjects

The differences measured by Xampion and the observation sheets regarding the right kick are smaller than those recorded in the left leg, the margin of error being 8.57%. The differences

are insignificant, from which we can conclude that the sensors have recorded quite a few verap of reality the number of blows with the right foot.

5.8. Conclusions of the pilot study

•Conducting preliminary research has helped us draw important conclusions about the particularities of the 12-14 year junior game model and we can say that the research hypothesis according to which the data recorded by the Xampions sensors Insoles have relevant accuracy and can help us in monitoring, modeling, evaluating the means used in training and the physical and technical parameters in matches and trainings, it has been confirmed.

•The implementation of new technologies can be very beneficial in monitoring training in the training of children and juniors. Coaches for children and juniors should prioritize understanding and awareness of this need and the potential opportunities it can offer. By doing so, all training factors can be positively influenced.

•Obtaining constant feedback from players and integrating player evaluation into the process of preparing young footballers is vital. This approach can have positive consequences for the development of the training of future generations of football players. Today's global football scenario opens its doors to the highest possible level and the most exciting advances in football training. It is therefore crucial to have this approach in football clubs.

6. Elaboration of strategies for the use of the systemic method in junior footballers aged 12-14 years

Between July – October 2021, we formed the research intervention plan, related to the value level of the subjects and to the particularities of the age of 12 years.

In the construction of the game model, we took into account the phases of the game, these being detailed in figure 30:

Fazele atacului	
FAZA 1 - DECLANȘAREA ATACULUI-RAPID/CONTRA-ATACULUI	Tranziție ofensivă foarte rapidă după câștigarea posesiei prin asigurarea mingii și cu mingi jucate în „buzunarele laterale" sau în spatele apărătorilor adverși.
FAZA 2 - CONSTRUCȚIE PROGRESIVĂ ÎMPOTRIVA PRESINGULUI AVANSAT	Scop: pentru a depăși cel putin o linie de apărare adversă, prin superioritate numerică și pozițional, dar tot timpul pregătiți să recuperăm mingea în caz că se pierde.
FAZA 3 - CONTROLUL CONSTRUCȚIEI PRIN MOBILITATEA JUCĂTORILOR	Stabilizarea posesiei mingii prin ocuparea rațională a terenului, crearea și ocuparea spațiilor prin mobilitatea jucătorilor, dar pregătiți să recuperăm mingea imediat dupa pierderea ei.
FAZA 4 - PASE ȘI INTERACȚIUNI PENETRANTE	Poziționări și demarcări în preajma careului pentru a înscrie goluri cu păstrarea unei bune poziționări. Acțiuni penetrante în ultima treime, PREGĂTIȚI permanent pentru recuperarea mingii.
Fazele apărării	
FAZA 1 - PRESIUNE ȘI ZONA DE PRESIUNE DUPĂ PIERDEREA MINGII	Recuperarea cât mai rapidă a mingii și trecerea cât mai rapidă în tranziție ofensivă.
FAZA 2- REORGANIZARE SUB LINIA MINGII ȘI CÂȘTIGAREA ECHILIBRULUI	Căutarea echilibrului pentru a închide culoarele, formarea rapidă a blocului defensiv în caz că adversarul a reușit ieșirea din presiune.
FAZA 3 - PRESING	Exercitarea unui presing cât mai avansat și pregătirea „capcanelor" pentru recuperarea mingii.
FAZA 4 - APĂRARE ÎN PÂLNIE	Apărarea centrului, apărarea careului în zona centrală și împotriva centralilor, pregătiri în permanență pentru declanșarea contra-atacului.

Figure 30. Phases of the game

In order to define as clearly as possible the concepts to be trained, we established the principles from the beginning, under the principles and under the principles we consider appropriate to be implemented at this age both in attack and defense.

METODA SISTEMICĂ		
ATAC		
PRINCIPII (ECHIPĂ)	SUB-PRINCIPIU (GRUP/COMPARTIMENT)	SUB-SUB-PRINCIPIU (INDIVIDUAL)
OCUPAREA SPAȚIULUI	Amplitudine	Informare
	Profunzime	Poziționare (S-M-A-C-P)
	Schimbarea direcției de joc	Sprijin
SUPORT	Crearea spațiului	Susținere
	Utilizarea spațiului creat	Demarcare falsă
	Crearea superiorității numerice central și lateral	Formarea de triunghi
MOBILITATE	Jocul între linii	Formare de romb
	Jocul peste o linie	Schimb de locuri
	Primul om generează mișcare	Rotație
CREATIVITATE	Jocul în funcție de al 2-lea	Coordonare
	Crearea liniilor de pasare	Anticipare
	Jocul vertical în spatele fundașilor	Învăluire
PASE ȘI INTERACȚIUNI PENETRANTE	Crearea situațiilor de finalizare	Tăiere
	Atacarea careului	

Figure 31. Principles in attack of the systemic method

APĂRARE		
PRINCIPII (ECHIPĂ)	**SUB-PRINCIPIU (GRUP/COMPARTIMENT)**	**SUB-SUB-PRINCIPIU (INDIVIDUAL)**
ÎNTÂRZIERE	Blocarea jocului vertical al adversarului	Presiune
	Blocarea jocului între linii	Poziționare (M-A-C-P)
	Distanțe scurte pe orizontală și verticală între jucătorii proprii	Triunghi defensiv
ECHILIBRU		Marcaj
	Translație	Dublaj
	Direcționarea adversarului	Intercepție
PRESING	Zonă de presiune	Preluare-Predare
	Triunghi defensiv	Comunicare
	Reorganizare în bloc defensiv	Tatonare-direcționare
COMPACTEȚE	Apărare în pâlnie	Simularea deposedării
	Elastic defensiv	Deposedare
	Închiderea culoarelor de pasare	
CONTROL ȘI REZISTENȚĂ	„T" defensiv	
	Romb defensiv	

Figure 32. Principles of defense of the systemic method

Regarding the game model, we approached it through the prism of the two major important phases: offensive and defensive.

MODELUL DE JOC	
Stilul de joc este caracterizat de 5 obiective principale:	Posesie progresivă cât mai aproape de poarta adversă cât mai repede posibil
	Efectuarea tranzițiilor în viteză maximă și cu plecări în adâncime
	Păstrarea stilului de joc indiferent de scor
	Atacăm cu o organizare defensivă puternică - ne apărăm pregatiți pentru declanșarea atacului
	Recâștigarea posesiei printr-o reacție imediată și efectuarea presiunii și zonei de presiune

Figure 33. The objectives of the game model

Offensive

In this guide we will present the game model used in research based on the structural organization 1-2-3-2-1, presenting the advantages and disadvantages of the offensive phase, respectively defensive and how we can use this system in the development of young players.

From the point of view of the offensive phase, 1-2-3-2-1 is a dynamic system and has some important advantages in terms of understanding the game and developing the player. Among these important advantages we mention:

•Facilitates construction from the goalkeeper;

•The ease of creating triangles and diamonds;

•Rational occupation of space in amplitude and depth;

•Freedom of movement for players.

Disadvantages from the opposite point of view of this structural organization can be:

•Lack of support for the central striker;

•Large coverage distance for side players.

If we look at the distribution of players on positions in this system (2 defenders and 5 midfielders) respectively we can have difficulties in the offensive game by positioning a single striker. Especially in the case of an opponent who insulates and compresses the spaces on the central area a lot, the communication and support of the attacker can be difficult to do.

As mentioned above, this settlement allows us to make deep demarcation especially in the side aisles, but this requires a lot of effort on the part of the players in the band which can lead to a defensive imbalance in the event of the loss of the ball.

Defensive

This system is defensively characterized by balance and is distinguished by:

•Compacts in the middle area;

•Good coverage of the defensive line;

•Allows counterattack.

This system creates a large variety of players on the central aisles (6 players out of 8), which reduces the type and space of the opposing team to initiate the penentrant actions on the central area. Naturally, opponents are forced to take the ball to the side areas where we can trigger the presing, reduce the opponent's birding possibilities by marking and blocking the bird's pathways.

Like any other organization and this system has certain disadvantages:

•There is still plenty of space in the side areas behind the gang players;

•Low defense risk;

•Frequent situations of 1v1 central defender - opposing striker.

In October – November 2021, the annual planning and the indicative program of the group, both training and competitive, were carried out, which can be analyzed in figures 44 and 45.

From January 2022 to December 2022, the implementation of the application program based on the systemic method in football in the experiment group took place, after a training structure prepared by the study researcher.

7. Study on the efficiency of the systemic method on the analytical technique

7.1. Introduction

Football technique is a way of moving that solves certain motor tasks. The football technique refers to the efficient biomechanical execution of the structured movements that make up the content of a football game and allow the full expression of the potential of motor skills.

7.2. Purpose

The purpose of research is to improve and evaluate the individual technical skills of football players aged 12-14 years as a result of using systemic training. This will be done with the help of control samples.

7.3. Objectives

1. Carry out a measurement to test the impact of using the systemic method on the analytical technique for taking over, shooting the gate, driving the ball and keeping the ball in the air.

2. Learning and consolidating basic technical procedures in order to achieve performance both in the training process and in official games.

7.4. Hypotheses

1. The systemic method can have a positive impact on the analytical technique of football players aged 12-14 years.

2. Using technical exercises in adversity to football players aged 12-14, three times a week can help improve the technical level.

7.5. Materials and methods

7.5.1. Research design

1.Between July – October 2021, the samples and tests used for the initial test for the experimental and control groups were established, as follows:

a) Keeping the ball in the air

Objective: The player must keep the ball in the air with any part of the body, except the hand

Materials: Cones, ball.

Protocol: The exercise begins with the player having the ball in his hand in a square with a side of 10 m. The exercise ends when the ball has fallen or the player comes out with the ball from the square. Each contact with the ball = 1 point, the player is entitled to three attempts.

Figure 46. Graphic representation of the test keeping the ball in the air

a) Ballcontrol

Objective: Evaluation of the speed of the ball

Materials: cones, ball

Protocol: Between 2 A and B gates, at a distance of 20 m, the player slalom between the covers arranged 5 m from each other. The timer is turned on when the ball is set in motion and is opted when the player has crossed the B-gate with the ball. The player has 2 attempts.

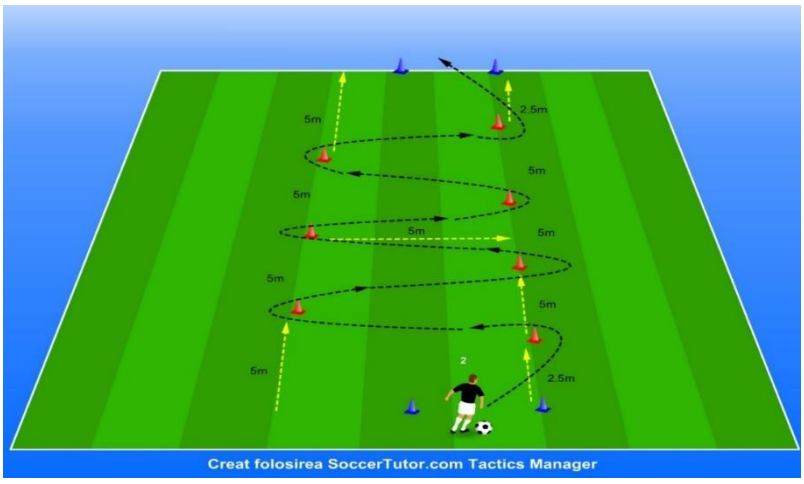


Figure 47. Graphic representation of ball controling in the slalom

a) Hitting the ball with the side in the bench

Objective: Pass accuracy

Materials: bank, cones, ball.

Protocol: Draw a rectangle of 5m / 10m. An overturned gym bench is placed on one side of 10m. A net gate is placed behind the bench. The ball hits only before the 5m line. If the ball exceeds the bench and stops in the net, the player can use the spare ball. If it has been used, it must recover it, bring it behind the 5m line and resume the exercise. The player is only entitled to a spare ball. It is not mandatory for the ball to be hit in one piece. It can be taken over, cushioned.

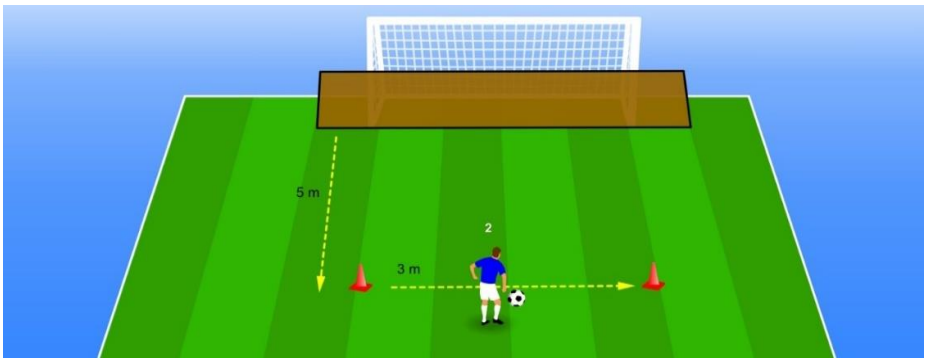


Figure 48. Graphic representation of the test of hitting the ball with the side in the bench

d) Goal shot

Objective: to assess the accuracy of the shot

Materials: ball, bench.

Protocol: The ball must enter the air into the gate (direct aerial trajectory). The sum of the 10 shots is made.

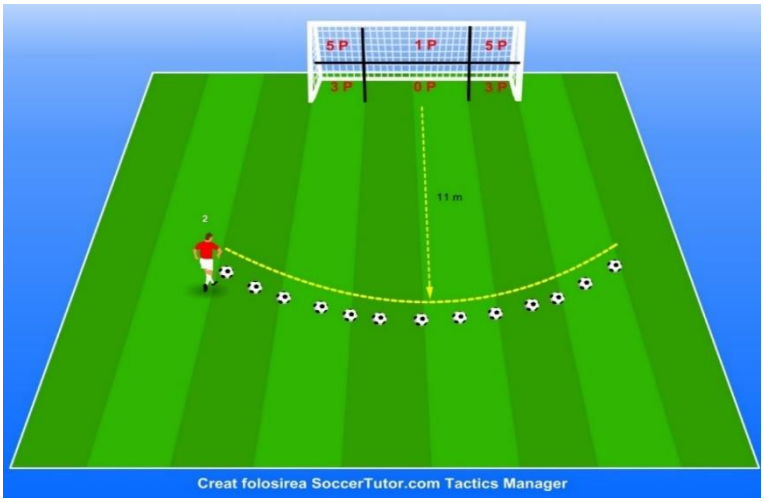


Figure 49. Graphic representation of the shot test at the gate

The centralization of the parameters recorded in the technical tests of each player can be consulted in the Annexes.

1.In January 2022, the initial testing of the two groups took place, followed by centralization and processing of initial test results obtained from the application of samples and tests to the experiment group and control group.

2.In July 2022, intermediate tests for both groups took place.

3.At the end of 2022, in December, the final tests were performed.

4.Between January – February 2023, the final data obtained from the application of samples and tests to the experiment group and control group were centralized and statistically analyzed, they will be blackened in this research in March 2023.

7.5.2. Research participants

This study was attended by 32 children aged 12 with at least three years of experience in football and at least 1 year since we have been collaborating with them.

The parents, respectively the club, were fully informed about the objectives and procedures of the study and signed informed consent forms for the participation of children and uses of sensors and devices. All participants were notified that they could withdraw from the study at any time.

Table 13. Experiment group subjects

Nr. Crt.	Subject	Football experience	Years of collaboration	Total training	Total games	Total individualization activities
1	S1	6	4	131	51	19
2	S2	6	4	123	56	12
3	S3	6	3	119	56	18
4	S4	6	3	114	52	18
5	S5	6	1	133	55	19
6	S6	6	3	133	54	13
7	S7	6	3	132	53	12
8	S8	6	4	134	50	19
9	S9	6	4	142	48	16
10	S10	6	4	112	51	20
11	S11	6	4	124	54	17
12	S12	6	4	130	48	17
13	S13	6	4	133	50	13
14	S14	6	3	130	55	19
15	S15	6	4	121	48	15
16	S16	6	4	129	51	19

Table 14. Control group subjects

Nr. Crt.	Subject	Football experience	Years of collaboration	Total training	Total games	Total individualization activities
1	S17	6	3	146	56	20
2	S18	6	4	140	54	12
3	S19	6	4	138	49	20
4	S20	6	3	140	52	17
5	S21	6	4	146	48	18
6	S22	6	4	136	50	16
7	S23	6	2	140	56	17
8	S24	6	4	118	56	20
9	S25	6	4	144	56	15
10	S26	6	4	138	53	17
11	S27	6	3	131	49	20
12	S28	6	1	121	48	14
13	S29	6	4	127	48	20
14	S30	6	4	126	50	14
15	S31	6	1	143	49	20
16	S32	6	4	138	50	19

7.5.3. Research period and place

The experiment took place between January 2022 – December 2022, during which time the 3 tests took place and the intervention plan was implemented.

The tests and tests took place within the U Evolution football club, in Cluj-Napoca.

7.5.4. Equipment

WITTY-GATE photocell

Thanks to the integrated transmission system, which has a range of 150 meters, the photocells were reliable for this experiment. The redundant radio transmission provided the transmission of data obtained to the timer with maximum accuracy (± 0.4 thousandths of a second), even if the signal had moments of disturbance.

Timer

A manual Kalenji ONSTART 500 timer was used to measure the sample execution time. It is designed to measure sports performance and schedule training. The timer is suitable for many sports, with an accuracy of 1/100, with 50 laps and splits (intermediate times).

7.5.5. Research methods used

Statistical-mathematical method

From the multitude of statistical indicators we considered useful in interpreting the results of the arithmetic mean, T test, MANOVA, Shapiro-Wilk.

Test and evaluation method

In this case, the subjects of the two groups were technically tested in the following control samples: keeping the ball in the air, driving the ball in the slalom, hitting the ball with the side in the bench, the shot of the gate.

Experiment method

In the present research, the sample of 32 subjects underwent 3 technical tests during 2022, period in which the intervention program designed by the researcher was implemented within the experiment group, based on the systemic training method.

7.6. Results

7.6.1. T test results

Table 15. Comparative test results for independent samples Double between the experiment group and control for the three tests

	Perechea	N	Media	Deviatia Standard	p	Dif. Medii
Double_M1	GE	16	53.75	17.27	0.94	
	GC	16	53.25	18.26		
Double_M2	GE	16	240.63	156.55	0.96	
	GC	16	237.88	166.79		
Double_M3	GE	16	304.94	142.56	0.85	
	GC	16	294.00	171.21		

A t test was performed for independent samples to compare Double_M1 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 53.75, SD = 17.27) and the control group (M = 53.25, SD = 18.26); t (30) = 0.08, p = 0.94. These results suggest that there is no statistically significant difference between the control group and the experiment in M1.

A t test was performed for independent samples to compare Double_M2 between the experiment and control group. A significant difference was observed between the scores obtained between the experiment group (M = 240.63, SD = 156.55) and the control group (M = 237.88, SD = 166.79); t (30) = 0.048, p = 0.96. These results suggest that there is a statistically significant difference between the control group and the experiment at M2.

A t test was performed for independent samples to compare Double_M3 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 304.94, SD = 142.56) and the control group (M = 294, SD = 171.21); t (30) = 0.196, p = 0.85. These results suggest that there is no statistically significant difference between the control group and the experiment at M3.

Table 16. Comparative test results for independent samples Ball control between the experiment group and the control for the three tests

	Perechea	N	Media	Deviatia Standard	p	Dif. Medii
CondMinge_M1	GE	16	20.12	1.34	0.38	
	GC	16	20.62	1.85		
CondMinge_M2	GE	16	17.51	0.77	0.32	
	GC	16	17.75	0.61		
CondMinge_M3	GE	16	16.85	0.67	0.47	
	GC	16	17.02	0.62		

A t test was performed for independent samples to compare CondMinge_M1 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 20.12, SD = 1.34) and control group (M = 20.62, SD = 1.85); t (30) = -0.884, p = 0.38. These results suggest that there is no statistically significant difference between the control group and the experiment in M1.

A t test was performed for independent samples to compare CondMinge_M2 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 17.51, SD = 0.77) and the control group (M = 17.75, SD = 0.61); t (30) = -1.002, p = 0.32. These results suggest that there is no statistically significant difference between the control group and the experiment at M2.

A t test was performed for independent samples to compare CondMinge_M3 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 16.85, SD = 0.67) and the control group (M = 17.02, SD = 0.62); t (30) = -0.739, p = 0.47. These results suggest that there is no statistically significant difference between the control group and the experiment at M3.

7.6.2. Manova Test/ Shapiro-Wilk results

Table 19. MANOVA test results for double control group at the three measurements

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
Double_M1_GC	53.25	18.26	16	0.149	.000	M2-M1	4.688	15	.000	1.172
Double_M2_GC	237.88	166.79	16	0.119		M3-M2	1.875	15	.080	0.469
Double_M3_GC	294.00	171.21	16	0.156		M3-M1	6.024	15	.000	1.506

The MANOVA test was performed to compare Double_M1_GC, Double_M2_GC and Double_M3_GC. A significant difference was identified between the scores obtained between the three measurements: p = 0. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare Double_M1_GC and Double_M2_GC. A significant difference was observed between the scores obtained for Double_M1_GC (M = 53.25, SD = 18.26) and Double_M2_GC (M = 237.88, SD = 16, p = 0.000. These results suggest that the training plan implemented does have an effect on Double_GC.

A pair t test was performed to compare Double_M3_GC and Double_M2_GC. A significant difference was observed between the scores obtained for Double_M3_GC (M = 294, SD = 171.21) and Duble_M2_GC (M = 237.88, SD = 166, p = 0.000. These results suggest that the training plan implemented does have an effect on Double_GC.

Table 20. Rezultate teste MANOVA pentru duble a grupei experiment la cele trei măsurători

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
Double_M1_GE	53.75	17.27	16	0.121	.000	M2-M1	4.769	15	.000	1.192
Double_M2_GE	240.63	156.55	16	0.192		M3-M2	1.086	15	.295	0.272
Double_M3_GE	304.94	142.56	16	0.161		M3-M1	6.620	15	.000	1.655

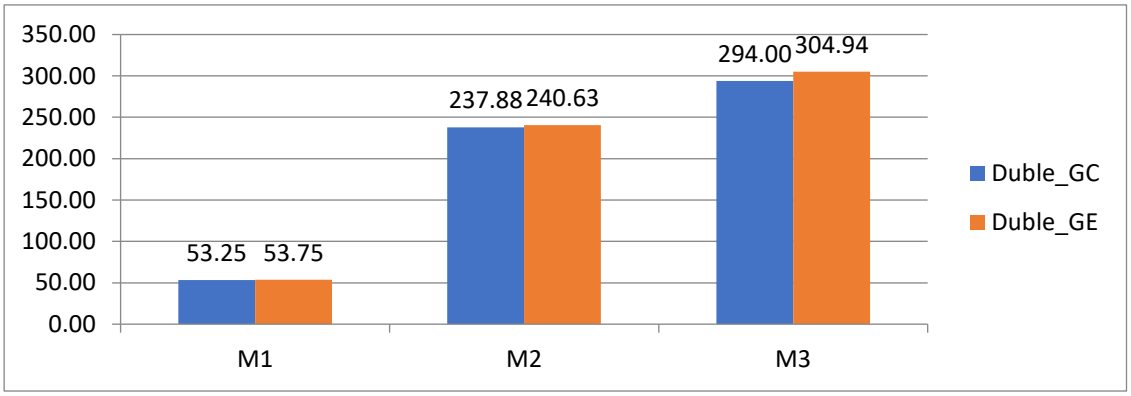
The MANOVA test was performed to compare Double_M1_GE, Double_M2_GE and Double_M3_GE. A significant difference was identified between the scores obtained between the three measurements: p = 0. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare Double_M1_GE and Double_M2_GE. A significant difference was observed between the scores obtained for Double_M1_GE (M = 53.75, SD = 17.27)

and Double_M2_GE (M = 240.63, SD = 156, p = 0.000. These results suggest that the training plan implemented does have an effect on Double_GE.

A pair t test was performed to compare Double_M3_GE and Double_M2_GE. A significant difference was observed between the scores obtained for Double_M3_GE (M = 304.94, SD = 142.56) and Double_M2_GE (M 240.63, SD = 15, p = 0.000. These results suggest that the training plan implemented does have an effect on Double_GE.

7.7. Discussion

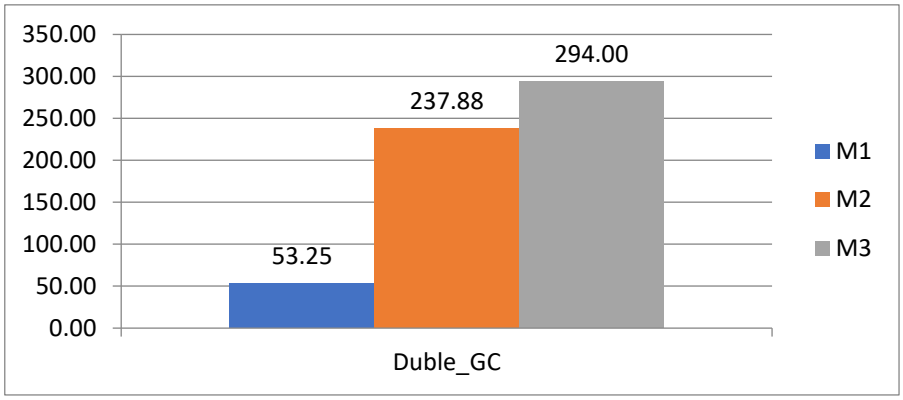


Graphic 9. Comparative results in the three measurements between the two groups in doubles

Regarding the t test for Double_M1, the results suggest that there is no significant difference between the experiment and control groups at M1. This means that the intervention of the experiment did not have a significant effect on the scores from M1.

Regarding the t test for Double_M2, the results suggest that there is a significant difference between the experiment and control groups at M2. However, it is important to keep in mind that p-value is quite large (0.96), which means that there is insufficient evidence to support the existence of significant difference. This can be explained by the fact that the sample is relatively small and the variability of the scores is quite high.

Regarding the t test for Double_M3, the results suggest that there is no significant difference between the experiment and control groups at M3. This means that the intervention of the experiment did not have a significant effect on the scores from M3.



Graphic 10. MANOVA test results for double control group at the three measurements

These results show that the training plan implemented has a significant effect on the performance of players in doubles in the control group (GC). Tests in pairs compared the scores obtained in two different moments of time: Double_M1_GC vs. Double_M2_GC and Double_M3_GC vs. Duble_M2_GC. For both comparisons, a significant difference was observed between the scores obtained, with values of t and $p < 0.05$. This suggests that the training plan has led to a significant improvement in double performance for players in the control group and that this improvement has been consistent over time.

7.8. Research concluzion

•The first hypothesis of the research according to which, the systemic method has a positive impact on the analytical technique of football players of 12-14 years has been confirmed. And the second hypothesis was confirmed, the use of technical exercises in conditions of adversity to football players aged 12-14, three times a week contributes to improving the technical level.

•In general, the results for the 3 tests when the ball is kept in the air suggest that the intervention of the experiment did not have a significant effect on the scores from tests 1 and 33, but there is a possible significant difference to the second, which requires further investigation to be confirmed.

•The results suggest that the training plan implemented is effective in improving the performance of players in the test of driving the ball of the experiment group and could be considered as a useful strategy for coaches and players who want to to improve its performance on this specific ball test.

8. Study on the efficiency of the systemic method on physical parameters

8.1. Introduction

Motor quality is a characteristic of the human body that develops throughout life. The initial level of their expression depends on the genetic inheritance. The motor development of each individual depends on the motor training, even if these motor qualities are genetically determined. External stimuli tend to cause the body to create specific adaptation conditions, which in turn develop certain motor skills. Environmental factors and social circumstances are also very influential.

8.2. Purpose

For this research project, we intended to perform tests on physical attributes (speed, strength, suppleness), both in the experimental group and in the control group. After analyzing the data, we aim to analyze the results and verify any deviations from our predetermined objectives.

8.3. Objective

1. Carrying out an initial, intermediate and final measurement of research subjects to test the impact of using the systemic method on physical parameters speed 10m and 20m, agility (Illinois test), long and high jump and mobility (Sit & Reach Test).

8.4. Hypotheses

1. The systemic method is more effective compared to traditional training methods in terms of developing the physical parameters of football players aged 12-14 years.

2. Physical fitness testing can provide relevant information about the individual's ability to perform.

8.5. Materials and methodes

8.5.1. Research design

The protocol and stages of the study coincide with those on the analytical technique. These studies were performed simultaneously.

Thus, between July – October 2021, the samples and tests used for the initial test in the experimental and control groups were established, as follows:

1.Speed 10m / 20 m

Objective: to assess acceleration capacity and short-distance travel speed.

Materials: stopwatch, adhesive tape (for marking the start and finish line), roulette.

Protocol: the subject is placed behind the starting line, with one foot in front and one in the back. Departure to the race is not made to the signal, the timer starting at the first movement of the subject. Run at the highest speed until the finish line is exceeded.

Results: the time obtained by the subject is expressed in seconds and tenths of a second. Each subject is entitled to two attempts, taking the best attempt.

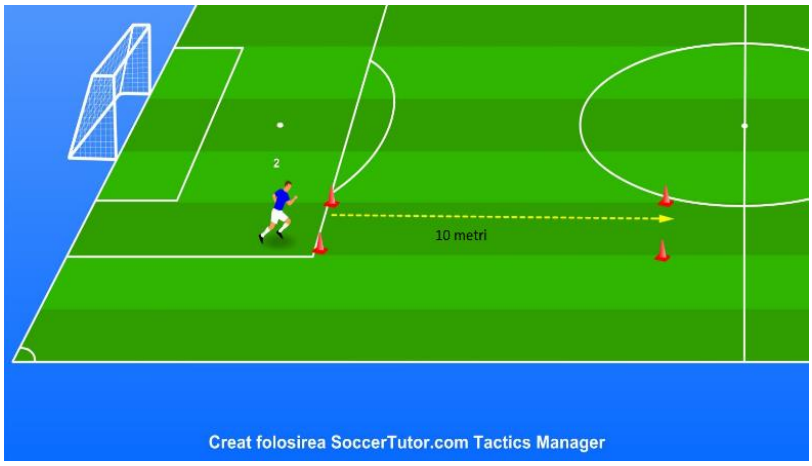


Figure 52. 10m speed test representation

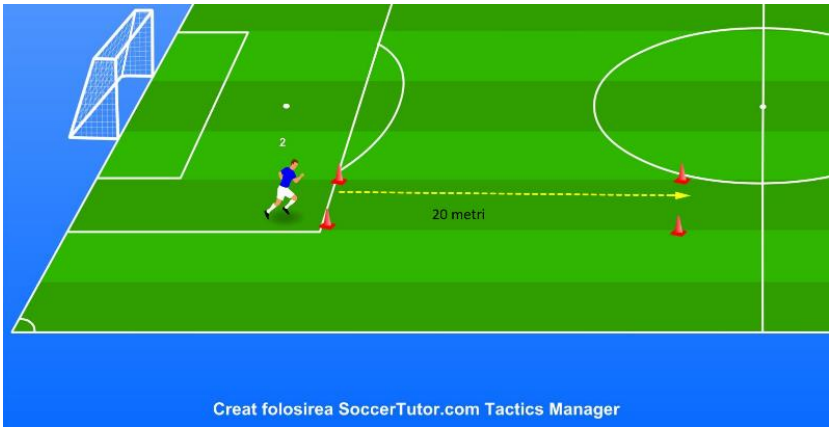


Figure 53. 20m speed test representation

2. Illinois test

Objective: to assess agility, ability to move with rapid changes of direction from different angles, combining muscle strength, starting force, explosive force, balance, acceleration and deceleration.

Materials: stopwatch / photocell, route cones, roulette, track.

Protocol: the surface is 10m / 5m, and the distance between cones is 3.3m. Run according to the route indicated in the adjacent Figure. You can change the direction of running.

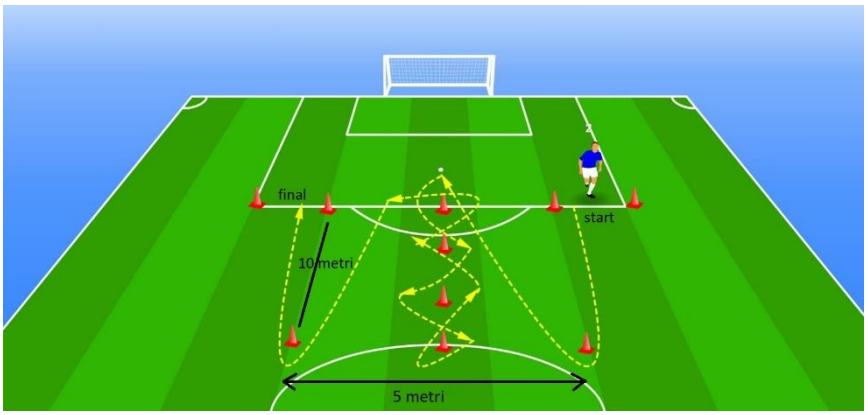


Figure 54. Illinois test representation

3. Long jump on the spot

Objective: to measure the horizontal explosive force at the level of the lower train.

Materials: graduated scale, adhesive tape (for marking the start line).

Protocol: the subject, standing with his legs apart at shoulder level, jumps on both legs in length; the distance between the starting line and the position of the heels after landing is measured.

4. Height jump

Objective: to measure the vertical explosive force at the level of the lower train

Materials: chalk, roulette.

Protocol: from the position sitting costal with the arm up, the subject draws a line on the evaluation wall, then from the same position he makes a vertical jump and draws another line as high as possible without leaving the chalk in his hand and without leaning against the evaluation wall. The distance between the 2 lines is measured. Repeat twice, noting the best execution.

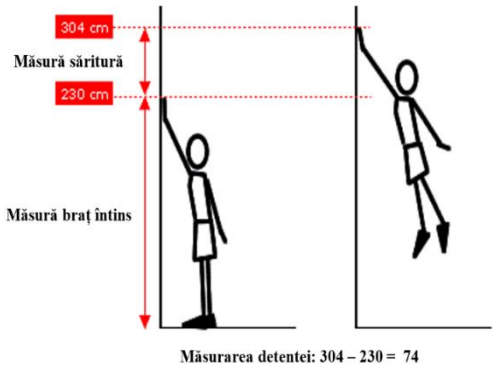


Figure 55. Height jump representation

5. .Sit & Reach Test

Objective: to evaluate joint mobility and muscle flexibility

Materials: gym, roulette

Protocol: from sitting with his knees stretched forward, bend the trunk forward with the arms outstretched as far as possible on the bench.

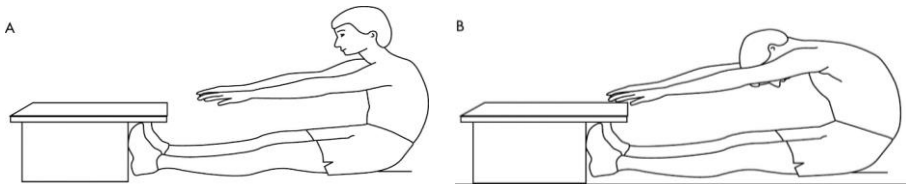


Figure 56. Sit&Reach test representation

Centralization of the parameters recorded in the physical tests of each player can be consulted in the Annexes.

In January 2022, the initial testing of the two groups took place, followed by centralization and processing of initial test results obtained from the application of samples and tests to the experiment group and control group.

In July 2022, intermediate tests for both groups took place.

At the end of 2022, in December, the final tests were performed.

At the beginning of 2023, between January – February 2023, the final data obtained from the application of samples and tests to the experiment group and control group were centralized and statistically analyzed, they will be blackened in this research in March 2023.

8.5.2. Research participants

This study was attended by the same 32 subjects aged 12 from the Uevolution football club in Cluj-Napoca, the groups in which they were distributed being preserved.

8.5.3. Research period and place

The experiment took place between January 2022 – December 2022, during which time the 3 tests took place and the intervention plan was implemented.

8.5.4. Equipment

a. WITTY-GATE photocell

The photos were used to accurately measure the time obtained by subjects in the 10m and 20m speed test and the Illinois test.

b. timer

8.5.5. Research methods used

Statistical-mathematical method

This method was used after centralizing the data of the three physical tests for statistical analysis and to see the progress of the two groups. From the multitude of statistical indicators we considered useful in interpreting the results of the arithmetic mean, T test, MANOVA, Shapiro-Wilk.

Test and evaluation method

In this case, the subjects of the two groups were physically tested at the following control samples: speed 10m and 20m, long jump from place to place and in height, Illinois test and Sit & Leach Test.

Experiment method

In the present research, the sample of 32 subjects underwent 3 physical tests during 2022, period in which the intervention program designed by the researcher was implemented within the experiment group, based on the systemic training method.

8.6. Results

8.6.1. T test results

Table 28. Comparative test results for independent samples Speed 20m between experiment group and control for the three tests

	Perechea	N	Media	Deviatia Standard	p	Dif. Medii
Speed20_M1	GE	16	3.90	0.18	0.40	
	GC	16	3.82	0.30		
Speed20_M2	GE	16	3.74	0.25	0.81	
	GC	16	3.76	0.26		
Speed20_M3	GE	16	3.30	0.09	0.19	
	GC	16	3.39	0.25		

A t test was performed for independent samples to compare Speed20_M1 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 3.9, SD = 0.18) and the control group (M = 3.82, SD = 0.3); t (30) = 0.847, p = 0.4. These results suggest that there is no statistically significant difference between the control group and the experiment in M1.

A t test was performed for independent samples to compare Speed20_M2 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 3.74, SD = 0.25) and the control group (M = 3.76, SD = 0.26); t (30) = -0.237, p = 0.81. These results suggest that there is no statistically significant difference between the control group and the experiment at M2.

A t test was performed for independent samples to compare Speed20_M3 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 3.3, SD = 0.09) and the control group (M = 3.39, SD = 0.25); t (30) = -1.354, p = 0.19. These results suggest that there is no statistically significant difference between the control group and the experiment at M3.

Table 31. Comparative test results t for independent samples Height jump between experiment group and control for the three tests

	Perechea	N	Media	Deviatia Standard	p	Dif. Medii
SarInal_M1	GE	16	30.00	4.50	0.53	
	GC	16	28.94	4.96		
SarInal_M2	GE	16	33.31	3.09	0.08	
	GC	16	31.13	3.81		
SarInal_M3	GE	16	35.69	3.28	0.04	2.63
	GC	16	33.06	3.47		

A t test was performed for independent samples to compare SarInal_M1 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 30, SD = 4.5) and the control group (M = 28.94, SD = 4.96); t (30) = 0.635, p = 0.53. These results suggest that there is no statistically significant difference between the control group and the experiment in M1.

A t test was performed for independent samples to compare SarInal_M2 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 33.31, SD = 3.09) and the control group (M = 31.13, SD = 3.81); t (30) = 1.783, p = 0.08. These results suggest that there is no statistically significant difference between the control group and the experiment at M2.

A t test was performed for independent samples to compare SarInal_M3 between the experiment and control group. A significant difference was observed between the scores obtained between the experiment group (M = 35.69, SD = 3.28) and the control group (M = 33.06, SD = 3.47); t (30) = 2.198, p = 0.04. These results suggest that there is a statistically significant difference between the control group and the experiment at M3.

8.6.2. MANOVAtest /Shapiro-Wilk results

Table 35. MANOVA test results for speed 20m of the control group at the three measurements

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
Viteza20_M1_GC	3.82	0.30	16	0.138	.000	M2-M1	-.544	15	.595	-0.136
Viteza20_M2_GC	3.76	0.26	16	0.135		M3-M2	-5.761	15	.000	-1.440
Viteza20_M3_GC	3.39	0.25	16	0.115		M3-M1	-4.801	15	.000	-1.200

The MANOVA test was performed to compare Speed20_M1_GC, Speed20_M2_GC and Speed20_M3_GC. A significant difference was identified between the scores obtained between the three measurements: p = 0. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare Speed20_M3_GC and Speed20_M2_GC. A significant difference was observed between the scores obtained for Speed20_M3_GC (M = 3.39, SD = 0.25) and Speed20_M2_GC (M = 3.76, SD = 0.26, p = 0.000. These results suggest that the training plan implemented does have an effect on Speed20_GC.

A pair t test was performed to compare Speed20_M3_GC and Speed20_M1_GC. A significant difference was observed between the scores obtained for Speed20_M3_GC (M = 3.39, SD = 0.25) and Speed20_M1_GC (M = 3.82, SD = 0.3, p = 0.000. These results suggest that the training plan implemented does have an effect on Speed20_GC.

Table 36. MANOVA test results for speed 20m of the experiment group at the three measurements

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
Speed20_M1_GE	3.90	0.18	16	0.158	.000	M2-M1	-1.755	15	.100	-0.439
Speed20_M2_GE	3.74	0.25	16	0.191		M3-M2	-6.631	15	.000	-1.658
Speed20_M3_GE	3.30	0.09	16	0.513		M3-M1	-12.751	15	.000	-3.188

The MANOVA test was performed to compare Speed20_M1_GE, Speed20_M2_GE and Speed20_M3_GE. A significant difference was identified between the scores obtained between the three measurements: p = 0. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare Speed20_M3_GE and Speed20_M2_GE. A significant difference was observed between the scores obtained for Speed20_M3_GE (M = 3.3, SD = 0.09) and Speed20_M2_GE (M 3.74, SD = 0.25 <TAG1, p = 0.000. These results suggest that the training plan implemented does have an effect on Speed20_GE.

A pair t test was performed to compare Speed20_M3_GE and Speed20_M1_GE. A significant difference was observed between the scores obtained for Speed20_M3_GE (M = 3.3, SD = 0.09) and Speed20_M1_GE (M 3.9, SD = 0.18 <TAG1, p = 0.000. These results suggest that the training plan implemented does have an effect on Speed20_GE.

Comparing the scores obtained between Speed20_M3_GE and Speed20_M2_GE, a significant difference is observed, suggestive of a positive effect of the training plan implemented between the two measurements.

Comparing the scores obtained between Speed20_M3_GE and Speed20_M1_GE, the significant difference is even greater, indicating a significant improvement in performance at the running speed test over a distance of 20 meters after the implementation of the training plan.

Table 41. MANOVA test results for high jump of the control group to the three measurements

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
SarInal_M1_GC	28.94	4.96	16	0.414	.047	M2-M1	2.108	15	.052	0.527
SarInal_M2_GC	31.13	3.81	16	0.284		M3-M2	1.950	15	.070	0.487
SarInal_M3_GC	33.06	3.47	16	0.115		M3-M1	2.864	15	.012	0.716

The MANOVA test was performed to compare SarInal_M1_GC, SarInal_M2_GC and SarInal_M3_GC. A significant difference was identified between the scores obtained between the three measurements: p = 0.047. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare SarInal_M3_GC and SarInal_M1_GC. A significant difference was observed between the scores obtained for SarInal_M3_GC (M = 33.06, SD = 3.47) and SarInal_M1_GC (M = 28.94, SD = 4, p = 0.012. These results suggest that the training plan implemented does have an effect on SarInal_GC.

The results show that there is a significant difference between the scores obtained by the subjects in the SarInal_M3_GC and SarInal_M1_GC tests. Specifically, the scores obtained at SarInal_M3_GC (average = 33.06, the standard deviation = 3.47) are higher than those obtained at SarInal_M1_GC (average = 28.94, standard deviation <TAG1. T and p values indicate that the observed difference was not determined by random variability and suggest that the implemented training plan has a significant effect on performance at SarInal_GC.

Table 42. MANOVA test results for high jump of the experiment group to the three measurements

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
SarInal_M1_GE	30.00	4.50	16	0.355	.000	M2-M1	2.549	15	.022	0.637
SarInal_M2_GE	33.31	3.09	16	0.167		M3-M2	3.841	15	.002	0.960
SarInal_M3_GE	35.69	3.28	16	0.191		M3-M1	4.584	15	.000	1.146

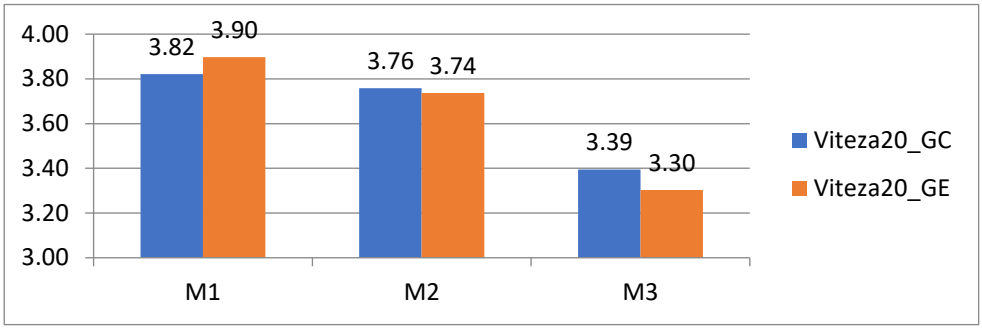
The MANOVA test was performed to compare SarInal_M1_GE, SarInal_M2_GE and SarInal_M3_GE. A significant difference was identified between the scores obtained between the three measurements: p = 0. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare SarInal_M3_GE and SarInal_M2_GE. A significant difference was observed between the scores obtained for SarInal_M3_GE (M = 35.69, SD = 3.28) and SarInal_M2_GE (M = 33.31, SD = 3.09, p = 0.002. These results suggest that the training plan implemented does have an effect on SarInal_GE.

A pair t test was performed to compare SarInal_M3_GE and SarInal_M1_GE. A significant difference was observed between the scores obtained for SarInal_M3_GE (M = 35.69, SD = 3.28) and SarInal_M1_GE (M 30, SD = 4.5 <TAG1, p = 0.000. These results suggest that the training plan implemented does have an effect on SarInal_GE.

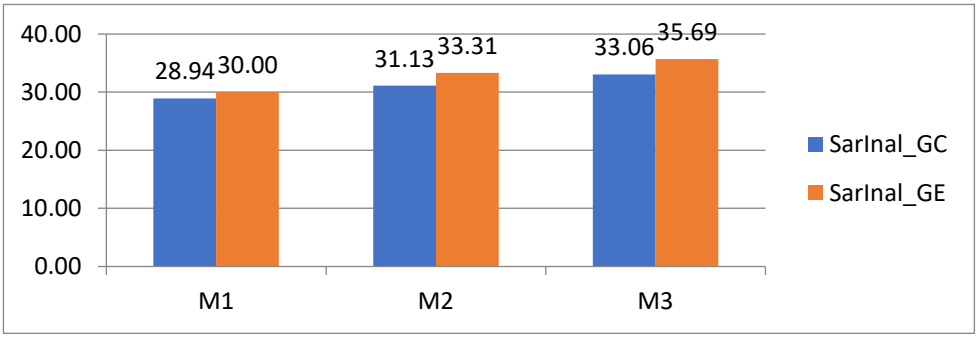
These results show that the training plan implemented has a significant effect on the performance of SarInal tests, both for SarInal_GC and for SarInal_GE. In both cases, a significant improvement in scores was observed from the first test (SarInal_M1) to the third test (SarInal_M3), suggestive that the preparation plan was effective. It is important to emphasize that these conclusions are valid only in the context of this analysis and that other factors could influence performance in SarInal tests, such as previous experience or general health.

8.7. Discussion



Graphic 22. Comparative results to the three measurements between the two groups at speed 20m

All three t tests for independent samples suggest that there is no statistically significant difference between the experiment and control group for all three levels of the Speed20 factor (M1, M2 and M3). P values are all higher than the usual level of significance of 0.05, which means that we cannot reject the null hypothesis that there is no significant difference between the two groups. Although the two groups have different averages for each level of the Speed20 factor, the differences are not large enough to be considered statistically significant. The results suggest that the handling of the Speed20 factor did not have a significant effect on performance, at least for this sample and these factor levels.



Graphic 25. Comparative results in the three measurements between the two groups in high jump

The first two t tests show that there are no significant differences between the control group and the experiment group for SarInal_M1 and SarInal_M2. Instead, the results of the t test for SarInal_M3 suggest that there is a significant difference between the control group and the experiment group, as the p value is less than the conventional significance level of 0.05. This indicates that the intervention in the experiment group had a significant effect on performance at SarInal_M3, compared to the control group. In general, it is important to interpret such results with

caution and to consider the context of the study, the size of the sample and the possible limitations of the study.

8.8. Research conclusion

•From the analysis of the data resulting from the experiment, we can conclude that testing physical skills can provide relevant information about the individual's ability to achieve performance – the research hypothesis is confirmed.

•Following the research, we can confirm the hypothesis that the systemic method is just as effective in developing the physical parameters of football players aged 12-14, along with other traditional training methods.

•The results of the two groups in the 10m speed tests suggest that the intervention of the experiment had no significant influence. It is important to note that, although there is no statistically significant difference, there may still be a practical difference between the two groups, which may be less statistically obvious.

•The results indicate that the training plan implemented had a significant effect on the performance of the 20-meter running speed test in both groups of athletes, both in those with normal weight and in overweight ones.

9. Study on the efficiency of the systemic method in decision making

9.1. Introduction

In football, decision-making is largely based on the ability of the human brain to perceive relevant information from a complex environment, while blocking irrelevant distractions (Baker et al., 2003; Gantois et al., 2019).

In this sense, TacticUP is a platform that allows the evaluation of the tactical skills of football players through an online test. The test results provide objective information about the game's vision and decision-making skills of football players.

9.2. Purpose

Scopul cercetării vizează realizarea unei analize comparative a trei testări prin intermediul platformei TacticUp Video Test, care oferă date relevante cu privire la deciziile luate de jucătorii de fotbal din timpul unui meci.

9.3. Objective

The objective of the research is to study the efficiency of the systemic method in terms of decisions taken by football players, with the help of TacticUp Video Test.

9.4. Hypotheses

1. The systemic method can bring improvements to football players aged 12-14 in terms of decisions made during matches, but also on the vision of the game as a whole.

2. TacticUp Video Test can provide a detailed and relevant analysis of the degree of understanding of the game of the tested players.

9.5. Materials and methods

9.5.1. Reserach design

For each scene, participants had to choose the most appropriate solution from four possible scenarios. Prior to the start of the test, participants were instructed on the structure of the test and three practical tests were presented to familiarize participants with the task. These three scenes included two offensive sequences (one scene with the player observed with the ball and the other scene with the player observed without the ball) and a defensive sequence (the team of the observed player was in phase defensive). These three conditions were chosen to allow participants to be aware of the nature of the videos they were to watch.

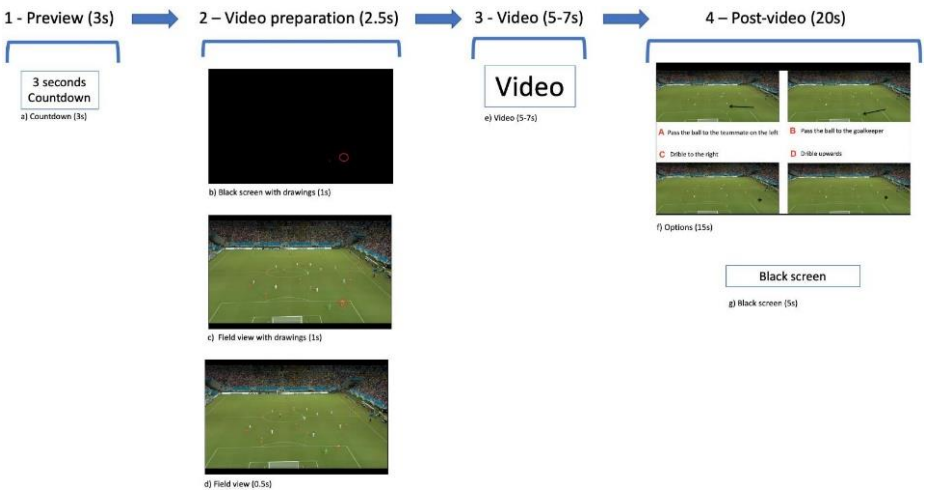


Figure 58. Screenshots with the sequence of TacticalUP Video test steps

9.5.2. Research participants

In this research, the same sample was included, 16 subjects in the experiment group and 16 subjects in the control group. The subjects of both groups train at the U Evolution football club in Cluj-Napoca.

9.5.3. Research period and place

The experiment took place between January 2022 – December 2022, during which time the 3 tests took place and the intervention plan was implemented.

9.5.4. Equipment

The TacticalUP video test is based on the basic tactical principles of football. These principles allow players to find effective solutions to game situations by managing the playing space inside and outside the game center. The game center is a circumference of 9.15 m radius from the location of the ball. It was designed based on football laws, as it is assumed that players located more than 9.15 m from the player in possession of the ball cannot interfere directly with his actions. Principles are classified according to the game phase. On the defensive phase, the test analyzes skills such as delay, defensive coverage, pressing, defensive balance, control and resistance and defensive block. On the offensive phase, the test covers penetrating passes and actions, offensive coverage, creativity, space occupation, mobility and support.

9.5.5. Research methods used

BiblioGraphic study method

It was used to create the possibility of documentation regarding the validity of the TacticalUP test. This test assesses offensive and defensive skills in situations close to and far from the ball, based on the basic tactical principles of football.

Statistical-mathematical method

From the multitude of statistical indicators we considered useful in interpreting the results of the arithmetic mean, T test, MANOVA, Shapiro-Wilk.

Experiment method

In the present research, the sample of 32 subjects underwent 3 TacticalUP tests during 2022, period in which the intervention program designed by the researcher was implemented within the experimental group, based on the systemic training method.

9.6. Results

9.6.1. Statistical results t tests for independent samples

Table 45. Comparative test results for TacticalUP independent samples between the experiment group and control for the three tests

	Perechea	N	Media	Deviația Standard	p	Dif. Medii
TacticUP_M1	GE	16	23.32	1.86	0.29	
	GC	16	22.49	2.44		
TacticUP_M2	GE	16	34.42	2.99	0.00	4.76
	GC	16	29.65	3.35		
TacticUP_M3	GE	16	43.43	4.17	0.00	8.28
	GC	16	35.16	4.59		

A t test was performed for independent samples to compare TacticalUP_M1 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 23.32, SD = 1.86) and the control group (M = 22.49, SD = 2.44); t (30) = 1,085, p = 0.29. These results suggest that there is no statistically significant difference between the control group and the experiment in M1.

A t test was performed for independent samples to compare TacticalUP_M2 between the experiment and control group. A significant difference was observed between the scores obtained between the experiment group (M = 34.42, SD = 2.99) and the control group (M = 29.65, SD = 3.35); t (30) = 4,246, p = 0.000. These results suggest that there is a statistically significant difference between the control group and the experiment at M2.

A t test was performed for independent samples to compare TacticalUP_M3 between the experiment and control group. A significant difference was observed between the scores obtained between the experiment group (M = 43.43, SD = 4.17) and the control group (M = 35.16, SD = 4.59); t (30) = 5,338, p = 0.000. These results suggest that there is a statistically significant difference between the control group and the experiment at M3.

Table 49. MANOVA TacticalUP test results of the experiment group at the three measurements

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
TacticUP_M1_GE	23.32	1.86	16	0.977	0.000	M2-M1	12.231	15	.000	3.058
TacticUP_M2_GE	34.42	2.99	16	0.183		M3-M2	8.960	15	.000	2.240
TacticUP_M3_GE	43.43	4.17	16	0.232		M3-M1	18.615	15	.000	4.654

The MANOVA test was performed to compare TacticalUP_M1_GE, TacticalUP_M2_GE and TacticalUP_M3_GE. A significant difference was identified between the scores obtained between the three measurements: p = 0. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare TacticalUP_M1_GE and TacticalUP_M2_GE. A significant difference was observed between the scores obtained for TacticUP_M1_GE (M = 23.32, SD = 1.86) and TacticUP_M2_GE (M = 34.42, SD = 2.99, p = 0.000. These results suggest that the training plan implemented does have an effect on TacticUP_GE.

A pair t test was performed to compare TacticalUP_M3_GE and TacticalUP_M2_GE. A significant difference was observed between the scores obtained for TacticUP_M3_GE (M = 43.43, SD = 4.17) and TacticUP_M2_GE (M = 34.42, SD = 2.99, p = 0.000. These results suggest that the training plan implemented does have an effect on TacticUP_GE.

A pair t test was performed to compare TacticalUP_M3_GE and TacticUP_M1_GE. A significant difference was observed between the scores obtained for TacticUP_M3_GE (M = 43.43, SD = 4.17) and TacticUP_M1_GE (M = 23.32, SD = 1.86, p = 0.000. These results suggest that the training plan implemented does have an effect on TacticUP_GE.

These results suggest that the training plan implemented has a significant effect on performance in tactical tests in the football game (TacticalUP_GE). The results show that the difference between the scores obtained before and after the training plan is significant in all three comparisons made.

Specifically, the first set of results shows a significant difference between the scores obtained for TacticalUP_M1_GE and TacticalUP_M2_GE, suggesting that the training plan

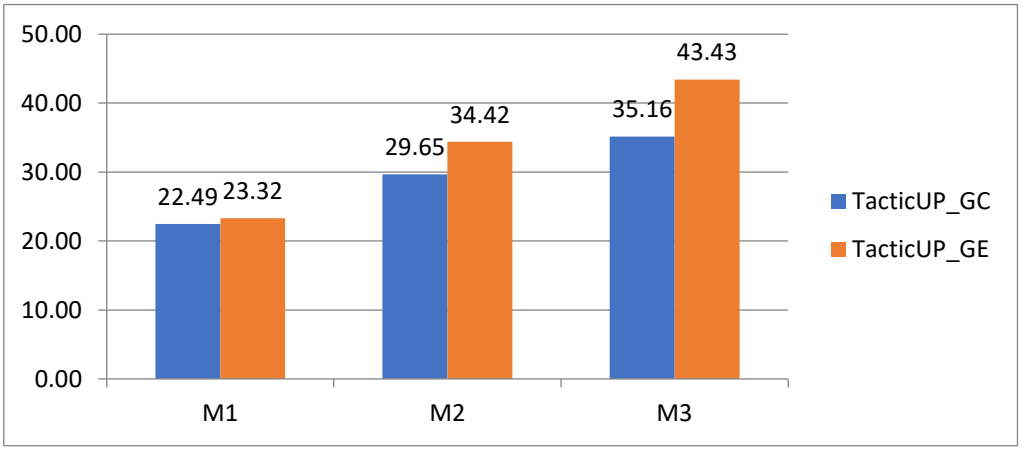
implemented had a positive effect on performance in the tactical test after application. This is reflected by the significant increase in the average score from 23.32 to 34.42.

The second set of results also shows a significant difference between the scores obtained for TacticalUP_M3_GE and TacticalUP_M2_GE, suggesting that even in this case the training plan implemented had a positive effect on performance in the tactical test. In this case, the average score increased significantly from 34.42 to 43.43.

Finally, the third set of results shows a significant difference between the scores obtained for TacticalUP_M3_GE and TacticalUP_M1_GE, suggesting that the training plan implemented had a significant positive effect on performance in the tactical test. In this case, the average score increased significantly from 23.32 to 43.43.

In general, these results indicate that the training plan implemented had a significant effect on performance in tactical tests in the game of football and that it can be considered a success in improving performance players in this specific aspect of the game.

9.7. Discussion



Graphic 27. Comparative results to the three measurements between the two groups at TacticalUP

The first two results suggest that there is a significant difference between the experiment group and the control at M2 and M3, but not at M1. The difference is measured by t-statistical (t value) and associated p value, indicating the probability of obtaining a difference between the two groups so large or larger than that observed in the sample, if there is no real difference between the groups.

In the first case, the value of t is 1,085 and the value p is 0.29, indicating that the difference between the two groups in M1 is not statistically significant (ie it is not likely to achieve this difference between the two groups if there is no real difference between them). In the second and

third cases, the values of t are 4,246 and 5,338, respectively, and the values p are 0,000 in both cases, which indicates that the differences are statistically significant.

9.8. Research conclusion

•The systemic method brings improvements to football players aged 12-14 in terms of decisions made during matches, but also on the vision of the game as a whole, so the first hypothesis is confirmed

•TacticUp Video Test generates detailed and relevant analyzes on the degree of understanding of the game of the tested players, which confirms the second hypothesis.

•A new approach to improving the football training experience for players aged between 12 and 14 is to include positional games based on a game model as part of the game process teaching. This method promotes modern training strategies that aim to optimize the efficiency of exercises, while keeping juniors involved and excited by the learning process.

•According to research, the subjects of the experimental group who were subjected to the systemic method showed a significant improvement in the parameters of understanding the game (according to the TacticUp) evaluation compared to the subjects in the control group. This validates the hypothesis that the systemic method benefits both the individual development of players and the development of the team.

10. Study on the efficiency of Xampions sensors in monitoring system-based training

10.1. Introduction

More, numerous studies and research have shown the emergence and consecration of visions on the real content of the game and its method of training, which accentuates the learning process and game development and a considerable increase in the efficiency of individual and collective actions of players.

10.2. Purpose

The aim of the research is to perform a comparative analysis of three tests through Xampion Insoles sensors, which provide relevant data on technical and physical indices.

10.3. Objectives

1. The aim is to streamline the training of children and juniors, to dimension and evaluate the integration of the new characteristics of modern training, based on the systemic methodology. Knowing the modern methodical requirements of preparing and training new footballers to access high performance is the essential condition from which this experiment was started.

2. Elaboration of a conceptual model of periodization of football training at the level of children and juniors of 12-14 years based on a game model, with means to combine holistic development as efficiently as possible.

10.4. Hypheteses

1. The systemic method can be a potential solution in terms of the simultaneous development of training factors and the increase in training volume.

2. The systemic method can lead both to the individual development of each player, but also to the development of the team.

10.5. Materials and methods

10.5.1. Research design

Xampions Insoles boot sensors were fixed in the game boots only before they came out on the field.

Each game lasted 40 minutes x 2 rounds, applying the line change system to 20 minutes (all 8 field players go out and enter 8 other players). Thus, research subjects were monitored for 40 minutes each.

Table 51. Initial testing game development program

Sunday, 23.01.2022			
Game 1	9:00	U Evolution Exeriment	GT Sport Alba Iulia
Game 2	11:00	U Evolution Control	Optimum Alba Iulia
Game 3	16:00	U Evolution Exeriment	Optimum Alba Iulia
Game 4	18:00	U Evolution Control	GT Sport Alba Iulia
Saturday, 29.01.2022			
Game 5	9:00	U Evolution Exeriment	LPS Tg. Mureș
Game 6	11:00	U Evolution Control	Academica Tg. Mureș
Game 7	16:00	U Evolution Exeriment	Academica Tg. Mureș
Game 8	18:00	U Evolution Control	LPS Tg. Mureș
Sunday 30.01.2022			
Game 9	9:00	U Evolution Control	Echipa 1 CJ
Game 10	11:00	U Evolution Exeriment	Echipa 2 CJ
Game 11	16:00	U Evolution Control	Echipa 2 CJ
Game 12	18:00	U Evolution Exeriment	Echipa 1 CJ

10.5.2. Research participants

This research included the same sample of 32 subjects, divided into the experiment group and control group. Subjects train at the U Evolution football club in Cluj-Napoca. More details about the particularities of the subjects can be found in Tables 13 and 14.

10.5.3. Research period and place

The experiment took place between January 2022 – December 2022, during which time the 3 tests took place and the intervention plan was implemented.

10.5.4. Equipment

Xampion Insoles sensors that are placed in the boots of football players measure in detail the following training indices, which can be analyzed after the training / game session in the installed mobile application or online, through a search engine. Parameters that we analyzed in the research are: distance, high tempo, seconds in the sprint, shots with the left and right foot, passes with the left and right foot, control of the ball with the left and right foot.

10.5.5. Research methods used

Statistical-mathematical method

From the multitude of statistical indicators we considered useful in interpreting the results of the arithmetic mean, T test, MANOVA, Shapiro-Wilk.

Experiment method

In the present research, the sample of 32 subjects was monitored during 18 matches with the help of Xampion sensors during 2022, period in which the intervention program designed by the researcher was implemented within the experimental group, based on the systemic training method.

10.6. Results

10.6.1. Statistical results t tests for independent samples

Table 54. Comparative test results for independent Tempo_TacticUP samples between the experiment and control group for the three tests

	Perechea	N	Media	Deviația Standard	p	Dif. Medii
Tempo_M1	GE	16	144.95	29.45	0.43	
	GC	16	136.75	27.91		
Tempo_M2	GE	16	156.18	16.60	0.01	17.32
	GC	16	138.85	18.19		
Tempo_M3	GE	16	185.70	21.92	0.01	23.20
	GC	16	162.50	22.43		

A t test was performed for independent samples to compare Tempo_M1 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 144.95, SD = 29.45) and the control group (M = 136.75, SD = 27.91); t (30) = 0.808, p = 0.43. These results suggest that there is no statistically significant difference between the control group and the experiment in M1.

A t test was performed for independent samples to compare Tempo_M2 between the experiment and control group. A significant difference was observed between the scores obtained between the experiment group (M = 156.18, SD = 16.6) and the control group (M = 138.85, SD = 18.19); t (30) = 2.814, p = 0.01. These results suggest that there is a statistically significant difference between the control group and the experiment at M2.

A t test was performed for independent samples to compare Tempo_M3 between the experiment and control group. A significant difference was observed between the scores obtained between the experiment group (M = 185.7, SD = 21.92) and the control group (M = 162.5, SD = 22.43); t (30) = 2.959, p = 0.01. These results suggest that there is a statistically significant difference between the control group and the experiment at M3.

Table 55. Comparative test results for independent samples Km between the experiment and control group for the three tests

	Perechea	N	Media	Deviația Standard	p	Dif. Medii
Km_M1	GE	16	6183.35	370.09	0.72	
	GC	16	6126.40	517.07		
Km_M2	GE	16	6531.39	414.50	0.28	
	GC	16	6329.60	597.40		
Km_M3	GE	16	7340.00	446.43	0.00	939.95
	GC	16	6400.05	381.73		

A t test was performed for independent samples to compare Km_M1 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 6183.35, SD = 370.09) and the control group (M = 6126.4, SD = 517.07 <TAG1; t (30) = 0.358, p = 0.72. These results suggest that there is no statistically significant difference between the control group and the experiment in M1.

A t test was performed for independent samples to compare Km_M2 between the experiment and control group. No significant difference was observed between the scores obtained between the experiment group (M = 6531.39, SD = 414.5) and the control group (M = 6329.6, SD = 597.4); t (30) = 1.11, p = 0.28. These results suggest that there is no statistically significant difference between the control group and the experiment at M2.

A t test was performed for independent samples to compare Km_M3 between the experiment and control group. A significant difference was observed between the scores obtained between the experiment group (M = 7340, SD = 446.43) and the control group (M = 6400.05, SD = 381.73); t (30) = 6.401, p = 0.000. These results suggest that there is a statistically significant difference between the control group and the experiment at M3.

10.6.2 MANOVA test/ Shapiro-Wilk results

Table 64. MANOVA test results for tempo of the experiment group in the three measurements

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
Tempo_M1_GE	144.95	29.45	16	0.238	0.001	M2-M1	1.160	15	.264	0.290
Tempo_M2_GE	156.18	16.60	16	0.919		M3-M2	3.812	15	.002	0.953
Tempo_M3_GE	185.70	21.92	16	0.593		M3-M1	4.704	15	.000	1.176

The MANOVA test was performed to compare Tempo_M1_GE, Tempo_M2_GE and Tempo_M3_GE. A significant difference was identified between the scores obtained between the

three measurements: p = 0.001. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare Tempo_M3_GE and Tempo_M1_GE. A significant difference was observed between the scores obtained for Tempo_M3_GE (M = 185.7, SD = 21.92) and Tempo_M1_GE (M = 144.95, SD = 29.4, p = 0.002. These results suggest that the training plan implemented does have an effect on Tempo_GE.

A pair t test was performed to compare Tempo_M3_GE and Tempo_M2_GE. A significant difference was observed between the scores obtained for Tempo_M3_GE (M = 185.7, SD = 21.92) and Tempo_M2_GE (M = 156.18, SD = 16.6, p = 0.000. These results suggest that the training plan implemented does have an effect on Tempo_GE.

These results suggest that the training plan implemented had a significant effect on the players' tempo in both cases (Tempo_M3_GE and Tempo_M1_GE comparison, respectively Tempo_M3_GE and Tempo_M2_GE comparison), with p values below the usual significance level (0.05). Specifically, a significant increase in the Tempo for players can be observed following the implementation of the training plan in both cases. It is important to emphasize that this significant difference cannot be attributed to external factors or other variables, but is mainly due to the training plan implemented. Therefore, these results suggest that the training plan had a positive effect on the ability of players to play faster and can be considered a success.

Table 66. MANOVA test results for Km of the experiment group at the three measurements

Factor	Media	Deviația Standard	N	Shapiro-Wilk (p)	MANOVA (p)	Perechea	t	df	T-test perechi (p)	Mărimea efectului
Km_M1_GE	6183.35	370.09	16	0.481	0.000	M2-M1	3.755	15	.002	0.939
Km_M2_GE	6531.39	414.50	16	0.181		M3-M2	4.334	15	.001	1.083
Km_M3_GE	7340.00	446.43	16	0.281		M3-M1	7.789	15	.000	1.947

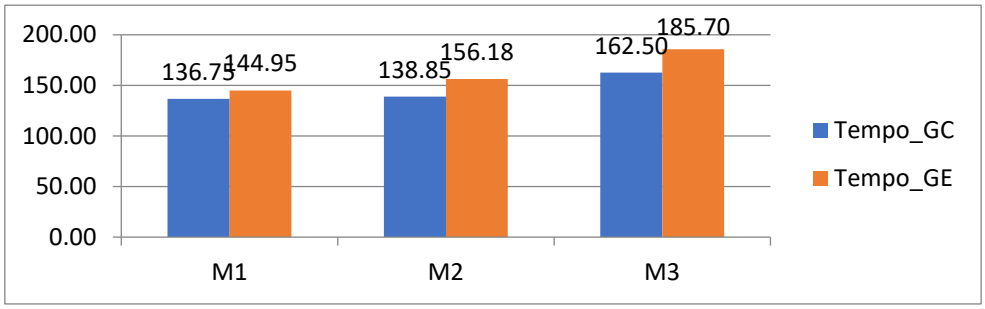
The MANOVA test was performed to compare Km_M1_GE, Km_M2_GE and Km_M3_GE. A significant difference was identified between the scores obtained between the three measurements: p = 0. It is necessary to perform the pair t test for each combination of the three measurements of this variable.

A pair t test was performed to compare Km_M1_GE and Km_M2_GE. A significant difference was observed between the scores obtained for Km_M1_GE (M = 6183.35, SD = 370.09) and Km_M2_GE (M = 6531.39, SD =, p = 0.002. These results suggest that the training plan implemented does have an effect on Km_GE.

A pair t test was performed to compare Km_M2_GE and Km_M3_GE. A significant difference was observed between the scores obtained for Km_M2_GE (M = 6531.39, SD = 414.5) and Km_M3_GE (M = 7340, SD = 446, p = 0.001. These results suggest that the training plan implemented does have an effect on Km_GE.

A pair t test was performed to compare Km_M3_GE and Km_M1_GE. A significant difference was observed between the scores obtained for Km_M3_GE (M = 7340, SD = 446.43) and Km_M1_GE (M = 6183.35, SD = 370, p = 0.000. These results suggest that the training plan implemented does have an effect on Km_GE.

10.7. Discussion



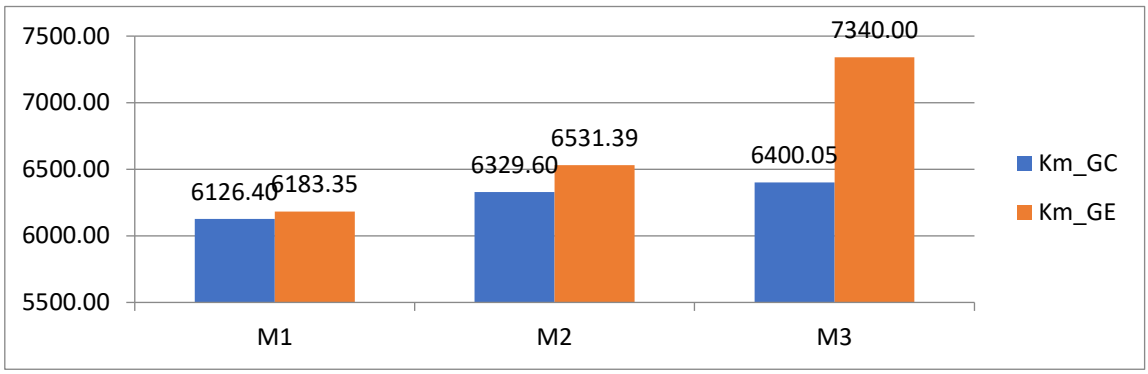
Graphic 29. Comparative results in the three measurements between the two groups at tempo

These results are presented in a similar way to those discussed above, but refer to the variables Tempo_M1, Tempo_M2 and Tempo_M3 and the differences between the experiment and control group.

For Tempo_M1, no significant difference was observed between the experiment group and the control, suggesting that the intervention of the experiment did not have a significant impact on this variable at M1.

For Tempo_M2 and Tempo_M3, a significant difference was observed between the experiment group and the control, suggesting that the intervention of the experiment had a significant impact on these variables at M2 and M3.

It is important to consider that these results are based on a single study and therefore cannot be generalized to other situations or populations. Also, it is important to consider other variables that could influence these results and to perform additional analyzes to verify that these differences are practically significant and clinical.



Graphic 30. Comparative results of the three measurements between the two groups per km

These results suggest that there is no statistically significant difference between the control and experiment groups in M1 and M2, but there is a significant difference between the two groups in M3. Specifically, the experiment group obtained higher scores at M3 (M = 7340) than the control group (M = 6400.05), which means that the intervention or treatment applied in the experiment group could be associated with a significant improvement in performance at M3, but not in M1 or M2.

In this case, the p values are relatively high for comparison to M1 and M2, suggesting that there is no significant difference between the two groups in these measurements. In contrast, for comparison to M3, the p value is very low (p = 0.000), which suggests that there is a significant difference between the two groups. In general, the p value below 0.05 indicates that the difference is statistically significant and is unlikely to be the result of a random fluctuation in the data.

10.8. Research conclusion

•The systemic method is a viable solution in terms of the simultaneous development of training factors and the increase of the training volume, thus confirming the first hypothesis of the research. The second hypothesis that the method will lead both to the individual development of each player, but also to the development of the team, has been validated, aspect supported by the results obtained between the initial and final testing in the motor and technical-tactical aptitude tests by the subjects of the experimental group, compared to the subjects of the control group. Here we must mention, even if no analytical work was done, there were increases on all technical parameters included in the research, even more so, to the items shot with the right, left shot, left pass, recorded data are also statistically significant.

•Through the research presented and the results obtained, it has been shown that the proposed tools can effectively validate the initial hypothesis that, the systemic method is a potential solution in terms of the simultaneous development of training factors and the increase in training volume.

GENERAL CONCLUSION

•There was a worrying lack of empirical studies to investigate the systemic method, despite the growing popularity and theoretical interest. It was desired to find at least some evidence to support this concept, but so far no scientific evidence has emerged for or against it. As a result, the method has remained until now a theoretical sentence, untested under scientific control. This lack of research is worrying, especially given the growing importance of the framework. Therefore, this research meets the coaches with a proposal for a model game, training structure and planning, so as to draw some guidelines for the preparation of children aged 12-14 by the systemic method.

•In order to keep up with the growing requirements of modern football, it is essential to analyze and refine training methodologies for children and juniors. The need for new, more efficient solutions is paramount to achieve the level of complexity required in today's game.

•In view of the above considerations, it can be deduced that experimental research began with both groups with a similar level of training alongside similar psychomotor indicators. In fact, there were no notable statistical differences between all samples that affected the subsequent execution of the experiment and the achievement of predetermined objectives, leading to consistent final results.

•The systemic method must be implemented in the process of preparing children and juniors in training centers. We believe that this is essential for their optimal evolution in line with the international training methodology.

•The training method proposed and implemented by the program using systemic actuation systems has successfully fostered an improvement in players' motor reactions and improved their technical-tactical and expression capabilities motorized at the standards of contemporary football.

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