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Programmed Instruction as an Effective Tool in Developing the Technical Level of U13 Female Volleyball Players

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Abstract: *The hereby research examines the efficiency of using the ramified programmed instruction method in optimizing the technical training of U13 female volleyball players. The ramified programmed instruction enables the personalization of the learning process, adapted to the performance and progress of each sportswoman. The aim of this paper is to analyze the efficiency of ramified programmed instruction in optimizing the technical preparation of U13 female volleyball players. The experiment was carried out in the competition year 2023 - 2024 and consisted in applying the ramified programmed training through a series of limited sequences called "methodical steps", carried out in a logical sequence and gradation that allow the sportswoman to advance "step by step" in the assimilation of the knowledge she is going through while training. Using ramified programmed instruction, the aim is not only to improve technical performance, but also to increase players' motivation and commitment to the learning process. We mention that the research was carried out at Dacia Technological High School in Pitești, and the measurements were performed with the help of volleyball specific technical training tests which were used on two groups (control and experimental). After the application of our proposed training session, significant differences were recorded in all the technical-tactical tests included in the experiment, with Pearsons's correlation value ranging from 0.001 to 0.0001. The shape of the distribution curve for the technical-tactical parameters was ascending for all thirteen evaluation samples. The distribution registered an increase across tests which reveal that the parameters developed significantly. In conclusion, this study contributes to a deeper understanding of how innovative training methods, such as ramified programming, improve the technical training process of female volleyball players, enhancing training efficiency and training outcomes in a sport setting.*

Keywords: *volleyball, ramified programmed instruction method, technical training, personalized training.*

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Introduction

The volleyball game is a sport that involves a complex combination of technical, tactical and physical training, requiring constant and well-organized preparation to make it possible for athletes to reach their full potential.

In the context of young female volleyball players, such as those in the U13 age group, technical preparation is the foundation on which advanced playing skills are built. At this stage of development, the focus should be on learning the fundamental technical skills of volleyball (two-handed overhead passing, forehand passing, serving, attacking) in a systematic and efficient way.

The specialized literature emphasizes the importance of developing scientifically validated instructional methods for the effective teaching of the basic technical elements of the volleyball game, as well as the need to adapt them according to the level of preparation of the players (Destriana et al., 2021; Jariono et al., 2023).

Traditional methods of instruction, although useful, can encounter difficulties in responding to the individual needs of sportswomen, as each player learns at a different pace and has distinct educational needs.

Studies emphasize the role of modern instructional methods in improving the process of teaching technique in volleyball, stressing the importance of an analytical and structured approach of the technical-tactical actions (Oliinyk et al., 2021; Pavlovic & Zotova, 2024). In addition, the integration of specific algorithms and periodization principles in the organization of training allows optimizing the development of sports performance (Junior, 2018; Neag et al., 2024).

The use of feedback and modern technology in sports performance contributes to improving technical training in volleyball. By using video analysis and digital applications, athletes can correct technical errors more quickly in skills such as serving, receiving, or attacking. Thus, the motor learning process becomes more efficient (Pârvu et al., 2024).

The essential role of technical-tactical training in volleyball lies in a set of specialized, integrated, and automated movements (such as acts, gestures, skills, and habits), through which the offensive and defensive tasks of the game are accomplished. (Colibaba & Bota, 1998)

Programmed training is that training strategy which, through special programming of the command, imprints a well-determined and self-regulating meaning to the teaching-learning relationship (Colibaba, 1993, 41).

Moreover, the authors Krem (2021), Krivyca et al. (2023), Veličković et al. (2018), and Martin et al. (2013), through the conclusions formulated in their studies, support the usefulness of modern and structured instructional

methods in the development of athletes, particularly in sports such as volleyball. These findings support the premises of the present research, highlighting that programmed instruction, when adapted to the age and developmental level of athletes, can significantly contribute to the improvement of motor, technical, and physical performance among children and juniors. Therefore, the application of a structured training program, based on modern pedagogical principles, is justified both theoretically and practically.

Recent researches show the efficiency of the programmed instruction method in teaching technical skills, as it provides a structured and progressive learning framework adapted to the individual pace of the players (Sima & Potop, 2018; Hussein, 2024).

Programmed instruction involves organizing the entire amount of knowledge, skills or habits in a program of limited sequences known as "methodical steps", organized in a logical sequence and gradation that ensures the player's progress "step by step" in the assimilation of knowledge that she goes through.

In a programmed training, the main element is the "program" itself, in which each learning step is marked and reinforced by underlining and reinforcing the correct answer, giving the performer the possibility to know the result of her work from the very beginning.

On the other hand, ramified programming - with "answers" of one's choice and integrating complementary elements - pioneered by N.A. Crowder, has a completely different approach.

Ramified programming is drawn up by the leader of the training process and has several answers, options, methodical steps and sequences. Usually, 3 - 4 methodical steps are selected and the sportswomen have to choose the one considered to be right for themselves. There can be wrong "answers" among them.

As an example, the following sequence is represented in figure no 1:

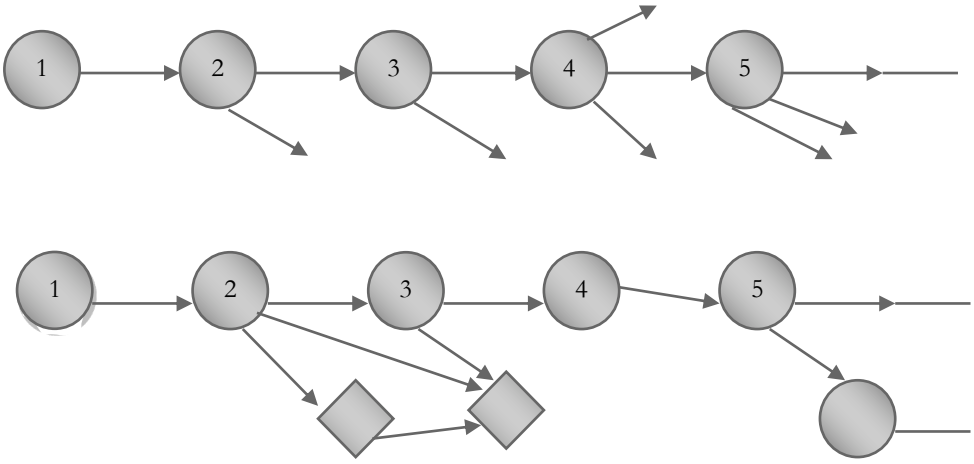


Figure 1. Ramified programming (source: Cerghit, 2006)

Choosing the right answer allows the participant to move on to the next, main sequence, thus encouraging an accelerated pace of training. If, on the other hand, the competitor has chosen an incorrect or partially correct answer, she is taken to the ramifications (to information, additional explanations or exercises meant to help) where the causes of the incorrect answer are clarified and set what she needs to do to correct the mistake and not to repeat it; she is then passed on to the main or next sequence. Depending on the nature of the mistake, everyone is given individual guidance;

Curriculum design is the key to the success of the training process. The more judiciously designed, the more logically put together, the more successful it is.

In this context, ramified programmed instruction emerges as an innovative method that can make learning more personalized, adaptable and effective. Ramified programmed instruction is based on the idea that the learning material is structured in methodical steps that branch out according to the sportswoman's progress. In this way, the method allows the exercises to be continuously adjusted so that the trainee receives exactly the challenges required for her level of competence.

Scope: The main aim of the study is to assess how ramified programmed instruction can contribute to optimizing the technical preparation of novice volleyball players, improving both their technical skills and their motivation to learn. It also aims to identify the differences in performance between groups using ramified programmed instruction and those applying traditional training techniques.

Hypothesis: We assume that ramified programmed training will lead to a significant improvement in the technical preparation of beginner volleyball players (U13) compared to the group following a traditional training program. It is expected that this method will accelerate the learning process and allow faster adaptation of the sportswomen to the specific technical requirements of volleyball.

Objectives: 1. Evaluation of the efficiency of ramified programmed training: To compare the technical performance of beginner volleyball players following a ramified training program with those following a traditional program. 2. Improvement of fundamental technical skills: To determine the impact of ramified programmed instruction on fundamental technical skills (such as serving, passing, and retrieving). 3.Personalizing the learning process: To investigate the ways in which adapting the instructional material according to the athletes' progress can optimize learning and technical performance.

Methodology

Participants: As part of the study, a group of 100 volleyball players under the age of 13 (U13 category) was subjected to a comprehensive evaluation protocol, which included somatic measurements (height, body weight, arm span, trunk length, thoracic perimeter), motor tests (sprint running, standing long jump, abdominal muscle strength, 2 kg medicine ball throw, hip joint mobility), as well as psychomotor tests (Flamingo test – static balance, Bass test – dynamic balance, Matorin test – trunk rotation).

The purpose of these evaluations was to determine the level of physical, motor, and psychomotor development of each player, in order to identify age-specific performance potential.

Following a comparative analysis of the obtained results, 24 players who recorded higher values in the assessed parameters were selected. Based on a ranking established according to individual performance, two groups were formed, each consisting of 12 players: the experimental group (composed of players in odd-numbered positions in the ranking) and the control group (composed of players in even-numbered positions).

The participants in the study were registered female volleyball players in the preparatory phase of their training. As the participants were minors, written informed consent was obtained from all parents or legal guardians. Additionally, the players were informed in advance about the nature, purpose, and procedures of the study, and they participated voluntarily, with the freedom to withdraw at any time without any negative consequences

Presentation of the experimental period

The experiment was carried out from September 2023, when the initial testing started, and ended in May 2024, when the final testing of the 13 technical tests took place. Throughout the experiment the volleyball players of ACS Extreme Piteşti applied the technical training program developed by us, whereas the volleyball team of LPS Viitorul Piteşti applied the traditional training program developed by the coach of the respective team.

The final part of the experiment consisted in the interpretation and graphical representation of the statistical-mathematical data on the basis of which conclusions and suggestions for the specialized coaches were drawn.

Organization of training sessions

During the period of the experimental approach (annual cycle 2023/2024), both the control and experimental groups carried out a number of 165 training sessions of 100 min each. Therefore, it is assumed that the two groups (control and experimental) went through the same amount of training (official time) and benefited from the same material conditions.

The difference between the control and experimental groups was that in the latter (experimental group) the programmed training sessions were converted into training units that made it easier to stagger the objectives and contents of the technical training throughout the experimental period, individualizing the training during the preparation. At the same time these training sessions also facilitated the establishment of the methodical steps required to be programmed during the training.

The instructional unit is a relatively autonomous instructional sequence resulting from the division of the content of a sport discipline in order to deepen the learning activity. The instructional unit aims at assimilating instructional objectives or content involving a chain of information that leads to the solving of the proposed instructional object. The structure of an instructional unit includes a set of information, skills, abilities and operations, which are required to be solved for a given topic or instructional objective.

Table 1. Annual scheduling of training units (Source: Amzăr, 2014)

Training units	Reference Objectives	Contents Methodological Steps	No. of allocated training sessions
1. Basic stance and field movements	✓ To know the basic mechanism of the transition to the fundamental stance (high stance, medium stance, low stance); ✓ To execute the basic stance correctly and with ease; ✓ To correctly execute the field displacements with changes of pace and direction; ✓ To master all forms of movement on the field: simple step; added step: sideways, forward, backward; double step; running; jumping: one-legged, two-legged; stopping, change of direction; forward, sideways sprint.	▪ **MS1** - Exercises for learning the basic stance; ▪ **MS2** - Exercises for learning the basic stance, while moving in response to visual and auditory signals	**4 training sessions**
2. Overhand pass	✓ To know he basic mechanism of an element; ✓ To acknowledge the pattern of executing the two-handed overhead pass with 3 operators: ▪ medium basic stance; ▪ cup action; ▪ other segments' action. ✓ To efficiently carry out the technical procedures; ✓ To develop accuracy and constancy of steps;	▪ **MS1** - Two-handed overhead pass with the ball offered by the coach; ▪ **MS2** - Step from above with displacement from the ball offered by the coach with the indication of the place; ▪ **MS3** - Step from above with two hands from the ball offered by the coach without indicating the place where to throw, work with a partner; ▪ **MS4** - Step from above, group of 3-4 players;	**22 training sessions**

3. *Three hit sequence*	✓ To move quickly towards the ball; ✓ To coordinate the extension action of the legs. Trunk and arms with the strike and release of the ball; ✓ To anticipate the ball's trajectory;	▪ **MS1** - To pass the ball in triangle to the right; ▪ **MS2 -** To pass the ball in triangle with nominalized intervention; ▪ **MS3** - To pass the ball in triangle, then ball over the net to the coach;	**13 training sessions**
4. *Underhand pass (Bump)*	✓ To know the basic mechanism of the skill; ✓ To understand the execution model of the underhand pass (bump) using three components: ▪ Fundamental stance; ▪ Arm movement; ▪ Action of the other body segments. ✓ To perform the taught technical skills efficiently; ✓ To develop accuracy and consistency in underhand passes.	**MS1** - Underhand pass from a ball tossed by the coach ▪ **MS2** - Stationary underhand pass (two-handed) against the wall; ▪ **MS3** - Underhand pass (two-handed) in coordination with teammates; ▪ **MS4** – Underhand pass (two - handed) over the net.	**22 training sessions**
5 *Overhand serve*	✓ To understand the basic mechanism of the skill; ✓ To learn the execution model of the overhand serve: ▪ Fundamental stance; ▪ Ball toss; ▪ Action of the dominant arm (used to strike the ball); ▪ Movement of the other body segments. ✓ To achieve proper arm-leg coordination and accurate ball direction toward the intended area. ✓ Emphasis is placed on serve accuracy and consistency.	▪ **MS 1** – Familiarization and learning drills for striking the ball during the serve (from behind the ball) ▪ **MS** - Drills for learning the overhand serve over the net ▪ **MS3** - Drills for practicing ball placement during the serve into a designated target zone.	**30 training sessions**

6 Serve receive	✓ To direct the serve receive toward the player in area 3; ✓ To impart a high trajectory to the ball; ✓ To develop accuracy in execution; ✓ To perform the serve receive, according to the individual's capabilities, in complex conditions.	▪ **MS1** – Underhand pass from a tossed ball and served from different distances; ▪ **MS2** – Drills for underhand pass with an emphasis movement; ▪ **MS3** – serve receive drills in game-like conditions;	**22 training sessions**
7. Spike	✓ To understand the basic mechanics of the skill; ✓ to learn the execution model of the spike using five components: ▪ approach; ▪ swing; ▪ jump; ▪ ball strike; ▪ landing. ✓ To achieve proper arm-leg coordination and accurate ball direction toward the intended area. ✓ Emphasis is placed on attack hit accuracy and consistency.	▪ **MS1** - Drills for learning the approach and arm-leg coordination (without ball); ▪ **MS2** – Drills for learning the attack hit from a ball tossed by the coach or teammate, or from a suspended ball – shaping the movement pattern; ▪ **MS3** - Drills for learning the attack hit at the net; ▪ **MS4** - Spike in game-like conditions	**30 training sessions**
8. Dig	✓ To have the ability to anticipate the speed, force, and trajectory of the ball; ✓ To direct the serve receive toward area 3; ✓ To develop accuracy in execution; ✓ To develop balance capacity.	▪ MS1 - Practicing digs in pairs; ▪ MS2 - Practicing digs from a powerful attack hit by the coach; ▪ MS3 - Practicing digs in game-like conditions.	**22 training sessions**

(Note: MS1, MS2, MS3, MS4 - represent the main methodological steps.)

Setting the main training sequences

Main sequences

After organizing the material into work syllabuses, the next step was to write the sequences that represent the basic units of the syllabus.

The programmed content (the content of the game technique) was divided into sequences, and the development of the sequences was carried out according to the type of program chosen and the structure of the training lesson.

Each sequence was developed to fulfill the following conditions:

- be written in such a way that the information is provided gradually, in "small steps", in a form that awakens the curiosity, interest and holds the attention of the participants;
- should be designed in such a way that the answers require independent activity and knowledge of the data in the sequences, in order to ensure that the technical-tactical procedures are fully mastered;
- to ensure an immediate inverted link between the answer given and the correct answer, between the execution of the sportswomen's performance and the required execution model.

Each sequence generally consists of two parts: information and homework. In the first informational part, the participants should be provided with knowledge and the assignment should be linked to the theme, while the assignment should allow them to appreciate, understand and deepen the information.

We targeted were the following issues: what is introduced in the informational assignment, in what way is the assignment organized to ensure a stronger connection between the homework and the information, and how to organize the succession of the sequences?

When introducing the information, we have taken into account the following:

- The volume of the information to be reasonable, the data be precise and clear, in a permanent dialogue 'with participants;
- Not to offer "false" or supplementary information that harshen execution when forming the basic mechanism;

In the composition of the topics, the answers were also anticipated in order to guide the players towards a correct execution/understanding and at the same time to contribute to the development of the skill of working independently for one's own development.

The answers were determined according to the type of sequence used, noting that the answer had to be a rule, a sign, an execution, etc.

The following considerations were taken into account to establish the answers:

- answers were set that could be given according to the information received;
- answers were also set according to the main execution mistakes of the volleyball players;

Other types of created and introduced sequences

The following types of sequences were used in programming the learning content:

- introductive sequences – meant to prepare the upcoming of an information;
- sequences of orientation when facing a new issue or when anticipating the reception of information;
- proper informational sequences – prepare for the transmission of the information;
- repetition sequences- repeats the technical elements from a previous sequence in a new form, or prepares a topic of greater difficulty;
- repetition sequences with additional drills for the player to practice the basic mechanism in other conditions;
- update sequences – to review and repeat the syllabus;
- applicative sequences – to use the actual technical elements in the game;
- key sequences – used to ask some questions or create some essential situations, for analysis, independent thinking.

Technical sequences in training

According to the content of the program for beginner volleyball players, we have proposed the following fundamental sequences:

Table 2. Representative sequences (source: Amzăr, 2014)

No.crt	*Sequence*	*Evaluation means*
1.	Basic stance and field movements	▪ To complete the following circuit within one minute: sprint diagonally across the court, perform side steps along the width of the court parallel to the net while maintaining the medium ready position, then move backward to the starting corner.
2.	Three hit sequence	▪ Which team can keep the ball in the air the longest using passes.
3.	Overhand pass	▪ Perform 50 controlled passes without letting the ball drop; ▪ Step-up to a designated area (area 5): five successful passes out of 10 attempts; ▪ Overhead pass against the wall at a fixed point for 30 seconds
4.	Underhand pass (Bump)	▪ Underhand passes: 40 successful out of 50 attempts; ▪ To perform 30 underhand passes against the wall at a fixed point in 30 seconds
5.	Overhand serve	▪ To serve 5 balls successfully into area1 and area 5 out of 10 attempts
6.	Serve receive	▪ To perform 5 successful serve receives directed to area 3 out of 10 attempts
7.	Spike	▪ To perform 5 successful spikes in the direction of the approach out of 10 attempts
8.	Dig	▪ To perform 5 successful digs directed to area 3 out of 10 attempts

For each sequence, specific evaluation tasks were established to indicate the extent to which the programmed content has been acquired and to allow the transition to new information.

The planning process always begins with setting the theme, defining the objective, selecting the exercises, and arranging them in a mandatory order for everyone. The same applies to the teaching of sport-specific techniques: all the skills that need to be learned—namely, technical elements and procedures—are listed in order.

Three key factors are involved in the process: the coach's actions, the athlete's actions and the monitoring of execution. This framework creates what is known as **alignment**.

In volleyball:

- the coach shows, explains – the player executes;
- the coach controls – the player performs self-control;
- execution correction – a new control – correction - a new control.

In conclusion, the ramified programmed method presents a number of solutions for the player to respond to each sequence. The error can be corrected through one or a series of helpful/correction exercises. In volleyball technique, we do not pinpoint the wrong option or extra connections.

Comparative analysis – technical-tactical tests for the control group

Comparative analysis of the results obtained in the control group for the two tests (initial and final) is performed by calculating a classical set of statistical indicators:

- average, standard deviation, coefficient of variability, one-tailed t-test for the difference of means.

We can notice that the analysis for the control group between the two tests, registers insignificant differences in the technical-tactical tests (Service on the left side, Service on the right side, Takeover from service in Area 1, Attack from A2 to A1, and from A5 to A3), with a Pearsons correlation value between 0.05 and 0.07. The shape of the distribution curve of the technical-tactical parameters was ascending for the other eight evaluation tests. The distribution showed an increase between tests which reveals that the eight parameters developed significantly.

Table 3. Control group – Technical-tactical tests *(source: author's own conception)*

INITIAL							
Statistical Indicator	Control passes 50	Control takeover 50	Forward lifting in a precisely defined space	Left side service10	Right side service10	Takeover from service from area 5 10	Takeover from service from area 1
Average	26,33	17,16	2,91	2,25	2,41	2,75	2,91
Standard deviation	3,39	1,33	0,79	0,86	0,90	0,45	0,66
Variability coefficient	12,88	7,78	27,18	38,49	37,25	16,44	22,92
No. of subjects	12	12	12	12	12	12	12
FINAL							
Average	29,91	26,08	3,75	2,83	3,08	3,33	3,41
Standard deviation	3,65	2,87	0,6	0,71	0,79	0,65	0,66
Variability coefficient	12,21	11,02	16,57	25,33	25,71	19,54	19,56
No. of subjects	12	12	12	12	12	12	12
INDICATORS – T TEST							
Degrees of freestyle / df	22	22	22	22	22	22	22
Error standard	1,438	0,913	0,272	0,315	0,359	0,228	0,243
95% Range of trusting the difference interval	0,607 – 6,57	7,02 – 10,81	0,27 – 1,4	0,073 – 1,23	0,07 – 1,41	0,106 – 1,05	0,003 – 1,03
Average difference	3,59	8,92	0,84	0,58	0,67	0,58	0,5
t	**2,49**	**9,76**	**3,08**	**1,83**	**1,86**	**2,54**	**2,06**
P	**0,02**	**0,0001**	**0,005**	**0,07**	**0,07**	**0,02**	**0,06**

INITIAL						
Statistical Indicator	Strike from A4 to A5	Strike from A2 to A1	Takeover from attack, from A5 to A3	Takeover from attack, from A1 to A3	Wall passes for 30 sec	Wall takeovers for 30 sec
Average	2,58	2,66	2,91	3	19,16	11,83
Standard deviation	0,51	0,49	0,51	0,42	2,24	1,64
Variability coefficient	19,93	18,46	17,65	14,21	11,73	13,87
No. of subjects	12	12	12	12	12	12
FINAL						
Average	3,16	2,91	3,41	3,41	30,58	18,5
Standard deviation	0,71	0,66	0,66	0,51	3,34	1,50
Variability coefficient	22,66	22,92	19,56	15,07	10,93	8,14
No. of subjects	12	12	12	12	12	12
INDICATORS – T TEST						
Degrees of freestyle / df	22	22	22	22	22	22
Error standard	0,252	0,237	0,241	0,191	1,161	0,642
95% Range of trusting the difference interval	0,05 – 1,103	0,04 – 0,94	0,007 – 0,99	0,014 – 0,805	9,01 – 13,82	5,33 – 8,006
Average difference	0,58	0,45	0,5	0,41	11,42	6,67
t	**2,29**	**1,89**	**2,07**	**2,14**	**9,83**	**10,39**
P	**0,03**	**0,08**	**0,05**	**0,04**	**0,0001**	**0,0001**

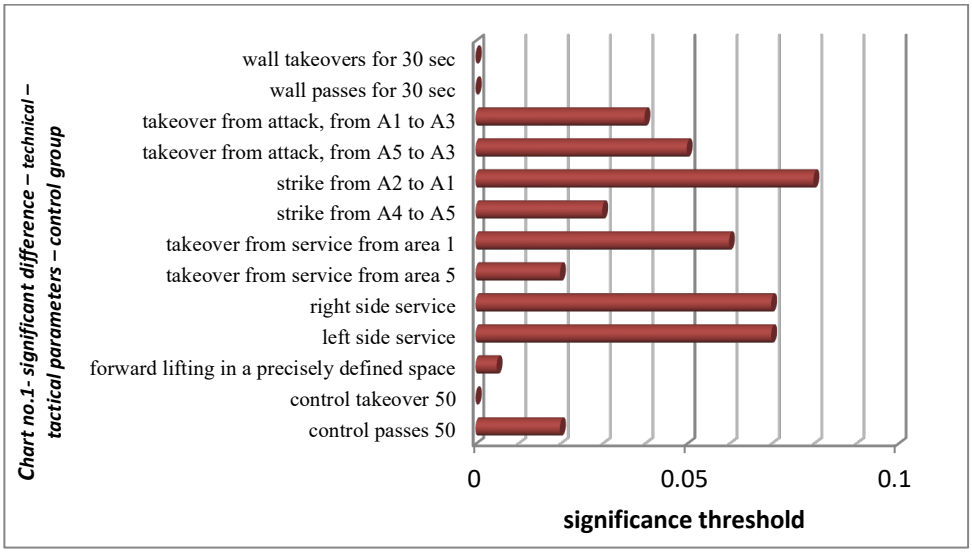


Chart 1. Significant difference – technical – tactical parameters – control group (source: author's own conception)

Comparative analysis – technical-tactical tests for the experimental group

Comparative analysis of the results obtained in the experimental group for the two tests (initial and final) is performed by calculating a classical set of statistical indicators:

- average, standard deviation, coefficient of variability, one-tailed t-test for the difference of means.

We can notice that the comparative analysis on the experimental group between the two tests, registers significant differences for all the technical-tactical samples included in the experiment, with a Pearsons correlation value between 0.001 - 0.0001. The shape of the distribution curve of the techno-tactical parameters was ascending for all thirteen evaluation samples. The distribution showed an increase between tests revealing that the parameters developed significantly.

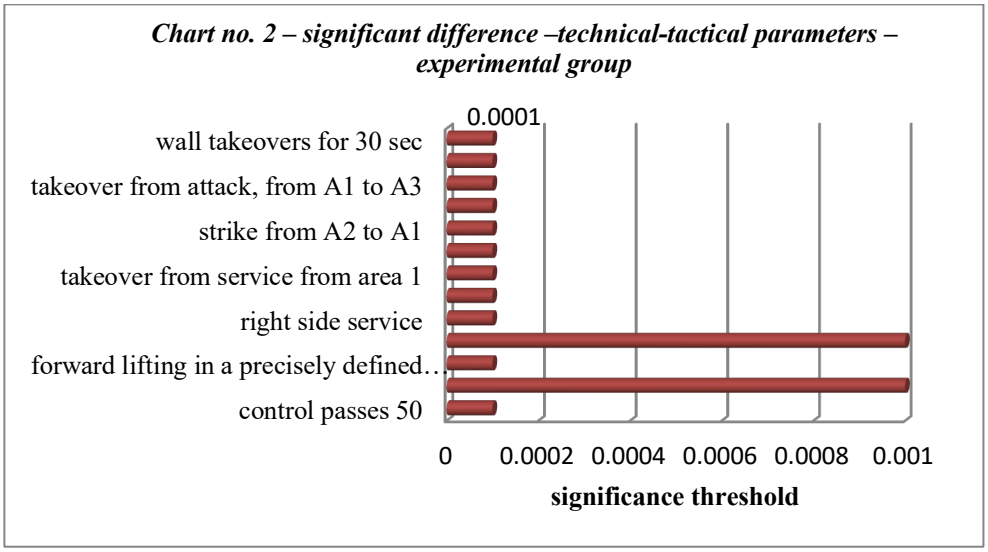
Table 4. Experimental group - Technical-tactical tests *(source: author's own conception)*

INITIAL							
Statistical Indicator	Control passes 50	Control takeover 50	Forward lifting in a precisely defined space	Left side service10	Right side service10	Takeover from service from area 5 10	Takeover from service from area 1
Average	27,08	22,25	3,25	2,91	2,58	3,16	3,08
Standard deviation	3,08	3,25	0,75	1,08	0,99	0,57	0,66
Variability coefficient	11,403	14,61	23,19	37,15	38,56	18,23	21,68
No. of subjects	12	12	12	12	12	12	12
FINAL							
Average	46,58	34,58	6,41	6,33	6,16	6,33	6,58
Standard deviation	3,11	5,19	0,51	0,65	0,71	0,65	0,51
Variability coefficient	6,69	15,02	8,02	10,28	11,63	10,28	7,82
No. of subjects	12	12	12	12	12	12	12
INDICATORS – T TEST							
Degrees of freestyle / df	22	22	22	22	22	22	22
Error standard	1,264	1,768	0,262	0,364	0,352	0,250	0,241
95% Range of trusting the difference interval	22,12 – 16,87	15,99 – 8,66	3,703 – 2,61	4,17 – 2,66	4,309 – 2,85	3,68 – 2,65	3,99 – 3,007
Average difference	19,5	12,33	3,16	3,42	3,58	3,17	3,5
t	15,43	6,97	12,06	9,39	10,17	12,7	14,53
P	0,0001	0,001	0,0001	0,001	0,0001	0,0001	0,0001

INITIAL						
Statistical Indicator	Strike from A4 to A5	Strike from A2 to A1	Takeover from attack, from A5 to A3	Takeover from attack, from A1 to A3	Wall passes for 30 sec	Wall takeovers for 30 sec
Average	2,58	2,75	3,16	3,16	21,16	14,25
Standard deviation	0,51	0,62	0,83	0,57	3,27	2,005
Variability coefficient	19,93	22,60	26,36	18,23	15,45	14,07
No. of subjects	12	12	12	12	12	12
	FINAL					
Average	5,5	5,5	6,41	6,16	38,41	24,66

Standard deviation	0,52	0,52	0,51	0,71	4,03	2,38
Variability coefficient	9,49	9,49	8,02	11,63	10,49	9,67
No. of subjects	12	12	12	12	12	12
	INDICATORS – TEST T					
Degrees of freestyle / df	22	22	22	22	22	22
Error standard	0,210	0,234	0,281	0,263	1,498	0,894
95% Range of trusting the difference interval	3,55 – 2,48	3,23 – 2,26	3,83 – 2,66	3,54 – 2,45	20,35 – 14,14	12,26 – 8,55
Average difference	2,92	2,75	3,25	3	17,25	10,41
t	13,88	11,77	11,55	11,41	11,51	11,64
P	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001

Chart 2. Significant difference –technical-tactical parameters – experimental group
(source: author's own conception)



Discussions

A series of researches that lead to the elaboration of some programmed instruction manuals (Mihăilescu & Mihăilescu, 2002) claim that the advantages of using this method are:

- it debates all elements that determine the learning and perfecting of technique: the basic mechanism, the dynamic stereotype, the spatial-temporal and dynamic characteristics of the movement (duration, amplitude, direction, distance, rhythm, etc.), the dynamic-energetic characteristics (speed, strength, endurance, coordination, precision, balance).
- it ensures the acquisition of knowledge in a limited time;

- it achieves the shortest and safest route to a clear and fast understanding of knowledge;
- it raises awareness of some operational action schemes;
- it favours the process of individualized training.

The ramified programming that we designed and applied, namely the eight main sequences are accompanied by other advanced and auxiliary sequences as well as "key sequences" for sending forward (when the main sequence is learned) and key sequences for sending backward (in case corrections, replay, dynamic stereotype reinforcement, other links, etc. are needed). In this sense we present this scheme once again:

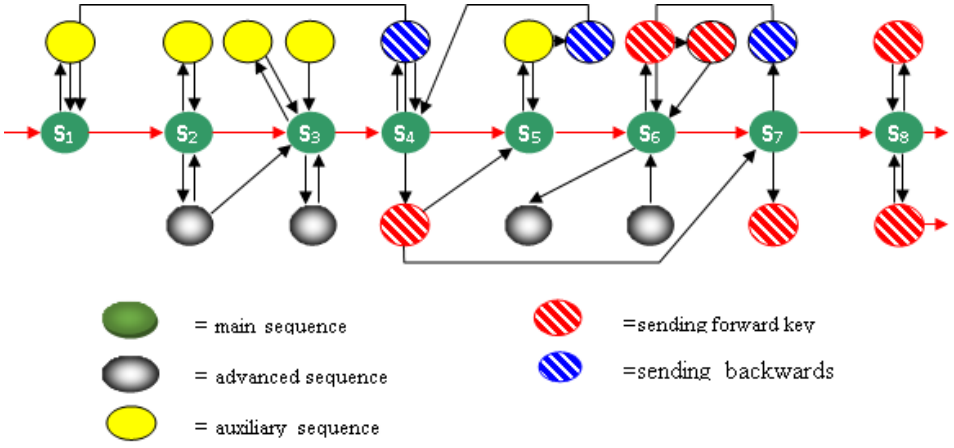


Figure 2. The conceptual scheme used as base for learning the ramified programmed technique (source: Amzăr, 2014)

Conclusions

The conceptual scheme verified by us in practice represents the operational part of the experimental approach. It assures deep and thorough learning of the technique in the game of volleyball, leaving no possibility of omission in learning the technical elements and procedures. Moreover, this scheme favors the individualization of teaching - learning act in the sense that it gives the possibility to go back and replay a previous sequence through key sequences, or to approach an advanced sequence. Thus, those who have had difficulties in learning and give wrong answers - are given helpful sequences and if they do not solve a sequence considered key, which synthesizes the information and themes from previous sequences, they are sent back to the sequence considered as the starting sequence.

As for the hypothesis that programmed training achieves major changes in all categories of individual and collective behaviors in learning technical procedures, compared to those obtained through traditional training, we can argue that it is achieved through the results obtained in the technical-tactical tests, both for the control and experimental groups.

By applying the ramified programmed training in the teaching - learning - evaluation of the volleyball technique, the sportswoman's path is shortened, the progress is more evident, contributing also to active and conscious participation in the training process.

Programmed training reinforces the control and verification of training results. It gives the trainer the possibility to check immediately whether the work has been done well or not.

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