Algorithmic program - support in learning of 'handspring forward with 1½ tucked salto forward' on vault

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Abstract

This paper aimed to increase the learning efficiency of 'Handspring forward with 1½ tucked salto forward' on vault by exploiting gymnasts' internal factors of performance and shortening the assimilation time of technical elements using algorithmic programs. Experimental research involves the selection and adjustment of the most efficient means for specific physical and technical training required in learning 'Handspring forward with 1½ tucked salto forward' on vault. This paper also brings evidence to evaluate in an objective and gradual manner the technical preparation of gymnasts through all three series of algorithmic programme and finds significant and consistent differences between gymnasts' execution in initial testing relative to final testing. This implies that learning of any elements should be based on algorithmic program to ensure the perfect execution. The difference between the performance of the two groups of gymnasts in executing 'Handspring forward with 1½ tucked salto forward' on vault indicates that the proposed objective has been achieved. The results obtained by the two tested groups of gymnasts have shown that algorithmic programme that I have created makes a huge difference in performance score difference which can mean an Olympic medal.

Keywords: Algorithmic programme, technical elements, vault.

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1. Introduction

Using my experience gained in 15 years of high-level activity in artistic gymnastics, while I have obtained titles as: European, World and Olympic champion, I want to underline some details that make the difference between the type of training especially at vault apparatus.

For the vault apparatus, the gymnast will focus primarily on a schematic representation that is a crucial component in the implementation of vault. The feature of 'Handspring forward with 1½ tucked salto forward' vault that I focus on is the transverse axis rotation with 1½ tucked salto forward met in the second phase of jumping. Each phase is subject to certain requirements of mechanic, necessary in the execution of a jumping as close to perfection. Of similar importance are awarding proper attention and training education moral-volitional qualities (among these, we emphasise: courage, confidence in their own forces, will and perseverance, necessary for achieving outstanding results in sports activity). Physical training is the support of the whole performance because only the strongest manage to **win** (Vieru, 1997).

In artistic gymnastics, performance is assessed using athletes results in competitions (Cote; Salmela, Trudel,&Baria, 1995). Consequently, particular attention should be awarded to the elements that determine better placement in final standings. Specifically, I refer to the components of training as part of the development process – (adaptation, learning, improvement in the level of physical, psychological, artistic, technical, functional touched at some point (Bompa, 1994). All these components used in an algorithmic programme, implemented since the beginning of training brings important contributions in artistic gymnastics of high level (Potop, Grigore & Gavojdea, 2015).

The performance behaviour depends on showing the structure in its forms and the nature and characteristics of the stimulus that causes it. Moreover, it also encompasses the peculiarities of the gymnasts. Further, performance abilities, as a result of complex processes of preparation based on internal factors (skills, attitudes, characteristics of functional activity and body structure) and external factors (ambiance, the reference to the natural environment, technical-material and social), are assessed in competition based on rigorous criteria established and known in advance (Ping, 1992).

The learning process in general and the motor learning in particular, may not be effective if the gymnast does not have the physical necessary support, are not self-reliant during motor action and did not win sufficient coordination in his movements. There is a strong interdependence between them and none of motor skills cannot be developed independent of others (Predescu, 2011).

2. Research Hypothesis

In any branch of sports, the quality of the learning process influences performance and using an algorithmic programme based on the organisation of the three series of exercises in the period of learning may lead to a faster and more accurate learning of 'Handspring forward with 1½ tucked salto forward' vault.

3. Methods

In sports activities, learning is generally called 'motor learning', resulting in the development of skills based on sensory, kinesthetic and proprioceptive components; the end of a movement is the signal that triggers the next movement (Niculescu 2003).

To choose the most efficient means for providing physical support in learning of 'Handspring forward with 1½ tucked salto forward' vault, I focus on the principles of choice of phasic structure of elements. We specify that helpful methods are connected to the formation of driving skills while preparatory means are connected esspecially to developing of motor skills.

As the basis of means and methods stand algorithmic programme which is divided into three series of exercises (Popescu, 2007) (1. to provide physical support; 2. for learning and 3.for improvement of vault).

1. Helpful means should have a similar structure with the basic structure of the exercise.
2. The choice of exercises must take into account not only the structure of muscles request but also to the efforts that occur in the overall system. Have in view the changes of this phases (preparation phase, the phase of maximum effort and strain decline phase) at different times of movement.
3. The exercises should be arranged in the work plan, in order of increasing intensity, the coordination and muscular effort.

The image of vault appears very complicated due to the characteristics of space (amplitude), direction (length, sequence, rhythm, tempo) and strength (contraction, relaxation). This image is formed on the basis of the information, by way of explaining, demonstrating technical exercise, and then on path information at each execution.

In my research, I used six gymnasts as subjects. They needed to executed twice the 'Handspring forward with 1½ tucked salto forward' vault both at the beginning of algorithmic program (initial test) and at the end of algorithmic programme (final test).

4. The description of 'handspring forward with 1½ tucked salto forward' vault

Vault is a complex and short (not much more than 7 seconds in average) movement and for practical reasons we divide vault into important phases: approach, flight to springboard, springboard actions, first flight phase, support, second flight phase and landing.

Each vault and group of vaults has a different time structure. Some vaults require faster run, some slower and some vaults have long first flight phase, some short, etc (Cuk I & Karacsony, 2004).

Our vault 'Handspring forward with 1½ tucked salto forward' is a relatively simple element, listed in the code of points with 4.40 p (Code of Points, 2008), but underlie a vault with a degree of difficulty much higher. Vaults develop all the time, in the direction of more and more difficult vaults.

In the next lines, I will present the algorithmic programme on three series (Stroescu, 2014).

SERIES I - Exercises aimed at developing quantitative and qualitative muscle groups involved in the vault.

Exercise no. 1

Initial position: lying facial on the coffer gym, feet outside casing:

1. trunk extension with lifting legs above the horizontal;
2. comeback.

Purpose: back muscle development.

Exercise no. 2

Initial position: hung back on the fixed scale:

1. lifting legs bent knees to chest;
2. comeback.

Purpose: abdominal muscle development.

Exercise no. 3

Initial position: supine with arms above:

1. lifting grouped sat with his hands on shins;
2. comeback.

Purpose: abdominal muscle development.

Exercise no. 4

Initial position: support lying facial feet supported by a partner:

1. Forward runs using hands only (maid).

Purpose: scapular-humeral muscle development; abdominal muscle development; back muscle development.

Exercise no. 5

Initial position: support lying facial feet supported by a partner:

1. Forward runs through simultaneous detachment hands on the ground.

Purpose: scapular- humeral musde development; abdominal musde development; back musde development.

Exercise no. 6

Initial position: sitting facing fixed ladder on the third strip, the strip from the shoulders started:

1. lifting tiptoes;
2. return with more pressing heels down.

Purpose: lower leg musde development.

Exercise no. 7

Initial position: sitting facing a coffer cover gym:

1. Jump up—down on coffer cover seated next fixed scale.

Purpose: develops leg muscles.

Exercise no. 8

Initial position: support squat :

1. tumbles forward the squat in the squat.

Purpose: gymnast builds the timing group and develops spatial-temporal orientation.

Exercise no. 9

Initial position: support lying face:

1. balancing supply feet with passage on hands stand and rolling forward, with help from the coach;
Final position: dorsal lying or crouching.

Purpose: develop abdominal, back and shoulders muscle strength.

Exercise no. 10

Initial position: sitting on the trampoline and palms on a box:

1. Balancing supply feet with passage on hands stand and rolling forward.
Final position: hand stand

Methodic

Throwing legs must be very energetic and impulsive arms the same.

Purpose: developed lumbar muscles and arms.

Exercise no. 11

Initial position: standing:

1. run, overturning forward through hands stand, with laying of hands on semi-elastic trampoline, landing on an exalted plane, followed by rolling forward.

Purpose: squat thrust of assimilation; develop strength, speed, arm muscles, acquisition squat position.

SERIES II: aims fully learning of 'Handspring forward with 1½ tucked salto forward' vault.

Exercise no. 1

Initial position: standing

Running, beating on the trampoline - tucked salto forward.

Purpose: vestibular accommodation to the rotation of the body about the transverse axis, expansion effort.

Exercise no. 2

Initial position: standing

Run and forward salto with crouch delayed.

Purpose: lead to better coordination of movement; develops the capacity to accelerate strikeout angular velocity about the transverse axis of the body; develop courage; lead to the acquisition of temporal - spatial orientation.

Exercise no. 3

Initial position: standing

Forward salto with landing in standing.

Purpose: acquisition of temporal-spatial orientation

Exercise no. 4

Initial position: lying face over the bar, bellied on the bar and hands on the trampoline

Swing-through hands stand, detachment – jump before landing grouped with dorsal slept in the den of sponges;

Final position: lying dorsal

Purpose: squat thrust of assimilation; develop strength, speed, arm muscles, acquisition squat position;

methodic

Insist on good squatting and helper with lanyard.

Exercise no. 5

Initial position: Standing on vault apparatus

Hands stand, tucked salto forward landing in the pit with sponges.

Comments: approaching execution conditions of the jump itself. It grants help.

Exercise no. 6

Initial position: Standing

Running, overturning forward by hands stand with hands on trampoline - tucked salto forward landing in the pit with sponges.

Purpose: squat thrust of assimilation; develop strength, speed, arm muscles, acquisition squat position;

Methodic:
Focus on uplifting flight.

Notice: develops strength arms, back and abdomen, gives subjective feeling about impulse.

Exercise no. 7

Initial position: Standing

Handspring forward with 1½ tucked salto forward, with laying of hands on a trampoline, with help from the coach and landing in the den of sponges.

Purpose: squat thrust of assimilation; develop strength, speed, arm muscles, acquisition squat position.

Exercise no. 8

Initial position: Standing

Handspring forward with 1½ tucked salto forward, with laying of hands on a trampoline, without help from the coach and landing in the den of sponges.

Purpose: squat thrust of assimilation; develop strength, speed, arm muscles, acquisition squat position.

Notes: not to abuse the elastic support

Exercise no. 9

Initial position: Standing

Handspring forward with 1½ tucked salto forward, executed on vault apparatus with help from the coach and landing in the den of sponges.

Exercise no. 10

Initial position: Standing

Handspring forward with 1½ tucked salto forward, executed on vault apparatus with help from the coach and landing in the den of sponges but with mattresses stacked at ground level.

SERIES III - aims improving jump 'handspring forward with 1½ tucked salto forward'
Exercise no. 1

Handspring forward with 1½ tucked salto forward executed on vault apparatus.

Exercise no. 2

Handspring forward with 1½ tucked salto forward executed on vault apparatus with landing in a marked area by two lines to avoid deflection to the left or right.

Exercise no. 3

Handspring forward with 1½ tucked salto forward executed on vault apparatus with landing in an area marked with a square.

Exercise no. 4

Handspring forward with 1½ tucked salto forward executed under competition (competitions verification).

The whole process of the experiment was composed of 25 exercises, staggered, with increasing difficulty until the gymnasts got to the overall execution of the vault.

5. Results

Following the tests carried out at each stage of preparation, respectively initial and final testing, on 'Handspring forward with 1½ tucked salto forward' vault, were recorded the following results:

During the initial testing, the six gymnasts had to execute the exercise twice, and they obtained for the first execution, grades between 12.325 points through the P.A. and through C.I. 13.150 points, and at the second evolution from the P.A. 12.475 points to 13.100 by C.I., best average had C.I. 13.125 points.(Table 1).

Table 1. Results obtained in initial testing

No.	Name	Vault I	Vault II	Average
1.	M. A.	12.700	13.00	12.850
2.	C. I.	13.150	13.100	13.125
3.	Z. S.	12.800	12.800	12.800
4.	S. A.	13.050	12.900	12.975
5.	R. M.	12.500	12.800	12.600
6.	P. A.	12.325	12.475	12.400

In final testing, we have seen real progress by getting points by P.A. 12.625 and 13.550 by C.I., points received for the first execution, the second is much better appreciated by the points of P.A. 12.800 and C.I. 13.700, the best average with a 13.625 of C.I. (Table 2).

Table 2. Results obtained in final testing

No.	Name	Vault I	Vault II	Average
1.	M. A.	12.900	13.100	13.000
2.	C. I.	13.550	13.700	13.625
3.	Z. S.	13.125	13.300	13.212
4.	S. A.	13.350	13.300	13.325
5.	R. M.	13.000	12.900	12.950
6.	P. A.	12.625	12.800	12.712

The average values corresponding to the two vaults increased at final testing with 0.350 points, vaults averages at initial testing being 12.790 points, respectively, 13.140 at final testing. The dispersion of average values is homogeneous at both tests (Table 3).

Table 3. Averages vaults I and II

Averages vaults I and II	Average	Q1	Quart Median	Q3	Standard deviation	Min.	Max.	Coefficient of variation
Initial testing	12.79	12.65	12.83	12.94	0.26	12.40	13.13	2.03%
Final testing	13.14	12.96	13.11	13.30	0.32	12.71	13.63	2.44%

Non-parametric Wilcoxon test (Table 4) shows that there are significant differences between average ranks of the two tests (Z = −2.207, Asymp. Sig. (2-tailed) = 0.027 < 0.05). Index of effect size (0637) indicates a big difference between the results of two tests.

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Table 4. Wilcoxon test

Ranks	N	Average ranks	Sum of ranks	Test parameters	Results
Negative	0	0.00	0.00	Z	-2.207
Positive	6	3.50	21.00	Asymp. Sig. (2-tailed) - P	0.027
Equal	0			Effect Size	0.637
Total	6				

6. Conclusions

Research and practice show that the effectiveness of learning complex gymnastic elements increases if the phasic structure of elements is checked during the process of technical training. Consistent with there elements, periods of movement, with or without support, in the technical structure of gymnastics exercises can be identified. An important step in the initial technical training is the learning of the universal components of basic movements. All handspring vaults taught under the form of algorithmic programmes. By applying this meotd, we put into practice the didactical principles whose observance leads, as we know, to a faster, more accurate learning of motor skills.

By analysing the association between performances recorded at the applied tests and grades obtained by the gymnasts at Handspring forward with 1½ tucked salto forward vault, we can say that the proposed objective has been achieved. In this case, we reject the null hypothesis and accept the research hypothesis that there are significant differences between the two tests on average results of the two vaults execution corresponding to the two tests (initial and final testing).

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