

METHODOLOGICAL ASPECTS OF AEROBIC CAPACITY OPTIMIZATION IN TERMS OF LONG DISTANCE COMPETITION EFFORTS WITHIN THE FRAMEWORK OF M16 CATEGORY RACE ORIENTEERING

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Abstract: *Orienteering is an attractive sport, characterized by a complex balance between incisive thinking and hard physical activity. The fundamental of performance in the long distance discipline is represented by the aerobic capacity. This paperwork proposes a methodology focused on improving this feature of the effort, as a premise for upward growth of performances in orienteering.*

Keywords: *orienteering aerobic capacity, VO2 max, Cooper test.*

1. Introduction

Orienteering can be practiced no matter the age, as a means of recreation, mass sports or performance sports. An ever growing number of people are confident that orienteering is an excellent opportunity to discover the most benevolent environment in nature, including positive and long-lasting influences for the human body, an excellent physical exercise offered by running, and a wonderful framework for the joint action offered by two of the most accessible recreational elements, i.e. nature and sports; it is an accessible sport, easy to be organized and to be practiced at any age. (Forţu 1987)

Orienteering develops leadership spirit, the ability to cover overall aspects and details featured by different situations, the ability to set up a plan of attack even if on an unknown ground, promptness in making situational decisions further to a quick assessment and choosing the optimum version relying thereon. Also, orienteering helps people in getting familiar with nature under out-of-customary circumstances, making them notice the most thorough details, in „navigating” through it with much more ease, in developing a healthy boy, a clever mind, a positive thinking for finding solutions in unforeseeable situations.

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„Orienteering is an attractive sport, a captivating competition, which takes place on the most beautiful stadium in the world: „Natura”. [8]

The Reason for Choosing this Topic is the need to optimize the sports training process by using a methodology focused on improving aerobic effort capacity in sportsmen / sportswomen undergoing their 1st stage of initiation (phase II), with a view to their integration in the national competition system.

The Purpose of this investigation is to work out a training program focused on improving such typical efforts that are mainly used in long-distance running competitions within the M16 category race orienteering framework.

2. Investigational Tasks

- a. Assessment of somatic-functional, psychical and motoric peculiarities in 16 years old subjects.
- b. Description of the long-distance running competition within the race orienteering framework.
- c. Methodology for working out a training program focused on improving such typical efforts that are mainly used in long-distance running competitions within the M16 category race orienteering framework.
- d. Experimental check in sporting practice of the methodology thus worked out.
- e. Processing data from a statistical-mathematical viewpoint and interpreting the investigational results.

3. Investigational Hypothesis

“An overall review of the running competition results in differentiated training actions including significant consequences in terms of the maximum effort capacity improvement.”

4. Experimental Planning and Investigational Procedure

The experimental planning of this investigation is an Independent Variable. For the purpose of this investigation, only one group of subjects has been selected, and the performances thereof have been recorded both before and after using the Independent Variable. Since it is about the same subjects, for each an every experimental situation hereof, one can ascertain that this group is correlated. (Epuran 1995)

The Independent variable is a sophisticated action plan, i.e. an exhaustive instructional methodology including such specific means of training sports which are - by way of their very nature - decisive for the improvement of the long-distance running competition effort within the M16 category race orienteering.

Such means have been actually used on the occasion of the training lessons for a period of 6 months, which – according to orienteering periodisation specificity - covered a general training period (19.11.2009 -18.03.2010) and a conversion (pre-competition) period (16.03-15.04.2010) [9], with a view to achieve a top sporting condition by the end of the pre-competition period and to preserve the sporting condition level as attained due to using the said methodology over the said period of competition.

The Experimental Group include 7 sportsmen in progress of their 1st stage of initiation (phase II), who are involved in the Orienteering Department activity within the Braşov University Sports Club under the leadership of Mr. Dinu Gheorghe, coach, and who meet the M16 category requirements as set forth in the Orienteering Rules.

The Dependent Variable is the level of the aerobic effort capacity as highlighted by the distances covered by subjects within

the 12 minutes provided for the Cooper test and by the value of the maximum oxygen consumption (VO₂ max)/subject.

Further to a proper utilization of the Independent Variable, we pursued to produce such changes in the Dependent Variable that would demonstrate a causal relationship between these two variables, so that to enable us confirm the Investigational Hypothesis.

5. Investigational Phases

- the first meeting with the subjects was held on 23.11.2009 with a view to make acquaintance and have a brief introductory instruction showing what exactly is supposed to be done within the training process during the next 6 months;
- on 25.11.2009, an initial test was organized for those sportsmen (see Table no. 1.) according to the Cooper test requirements;
- further to processing the acquired data, an estimate value has been calculated for the maximum oxygen consumption of each sportsmen, and the initial level thereof has been set as soon as the investigational activity started; (Heyward 1998)

- the investigational activity continued under the methodology worked out for three meetings of training / week, i.e. on Mondays, Wednesdays and Fridays every week.
- in the final stage of the investigational activity (on 12.04.2010), all relevant components of the effort capacity have been assessed once again (see Table no. 1.) with a view to see whether there occurred any significant changes in terms of the improvement thereof, or not.
- as soon as all available data has been statistically processed and construed, a last meeting with the sportsmen has been scheduled for 16.04.2010 with a view to present the Investigational Results.

6. Utilized Investigational Methods

- study using the reference literature;
- the method of pedagogical observation;
- the experimental method;
- aerobic effort capacity assessment methods;
- statistical-mathematical processing methods for the acquired data.

Table 1

| Item no. | Initials | COOPER TEST | | VO ₂ MAX | | COOPER TEST | | VO ₂ MAX | |
|----------|----------|-----------------|-----------------|---------------------|------------------|--------------|---------------|---------------------|----------------|
| | | Initial results | Initial rating* | Initial value | Initial rating** | Final result | Final rating* | Final value | Final rating** |
| 1 | F.A. | 2350 | Average | 41.25 | Average | 2443 | Average | 43.33 | Average |
| 2 | F.I. | 2287 | Weak | 39.84 | Average | 2368 | Average | 41.65 | Average |
| 3 | G.A. | 2433 | Average | 43.11 | Average | 2527 | Good | 45.21 | Good |
| 4 | Gy.Sz. | 2381 | Average | 41.94 | Average | 2465 | Average | 43.82 | Average |
| 5 | H.V | 2274 | Weak | 39.55 | Average | 2351 | Average | 41.27 | Average |
| 6 | I.I. | 2415 | Average | 42.7 | Average | 2502 | Average | 44.65 | Average |
| 7 | M.A. | 2321 | Average | 40.6 | Average | 2406 | Average | 42.5 | Average |

* Ratings have been granted on grounds of the Tables related to the Cooper test and to the test intended for assessing the maximum O₂ consumption.

** The maximum oxygen consumption values (VO₂ max) have been calculated indirectly, using the results attained by the subjects in their Cooper test and applying the formula below: $VO_2 \max = \text{Distance covered in meters} - 504,9) \div 44$

Diagram 1

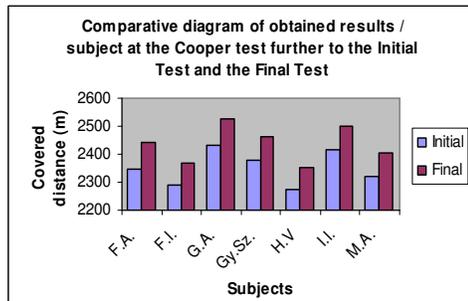
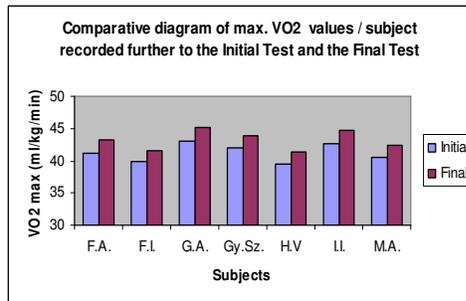


Diagram 2



7. Interpreting the Initial Test Results

Further to a thorough review of the distances covered by the subjects of the Investigational Group in the Cooper test (Table no. 1.) we first got an overview of the level where the Investigational Activity was started from.

All results recorded on the occasion of the Initial Test have been compared with the Tables related to the Cooper test (Cooper 1977) with a view to relieve the level range where the subjects fit in.

From the overall number of 7 sportsmen, two met the 2,200-2,299 meters range, which corresponds in the case of 15-16 years/ boys to the weak level, while the other 5 members of the Investigational Group met the 2,300-2,499 meters range, which corresponds to a average level (see Diagram 1).

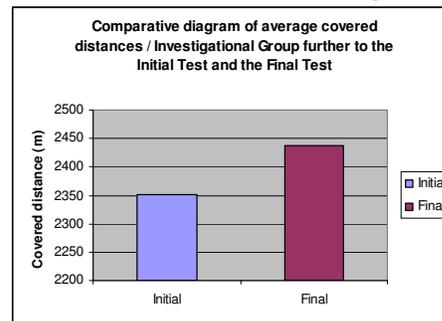
For assessing the maximum oxygen consumption, the same procedure has been used, and the relevant values were for each and every member of the Investigational Group within 38.4-45.1 ml/kg/min (see Diagram 2).

8. Interpreting the Final Test Results

Results acquired further to the Final Test featured an ascending curve as compared with the ones acquired at the beginning of the Investigational Activity, and this highlights the positive influences of the

Independent Variable upon the level of development in terms of the aerobic effort capacity and, implicitly, of the maximum O₂ consumption. Distances covered by subjects on the occasion of the Cooper test in the final stage of the investigation showed higher values than the ones recorded during the Initial Test, i.e. 85.86 m/subject in average. The initial average value of the covered distances / group was 2,351.57 m and the final average value thereof reached as high as 2,437.49 m (see Diagram 3).

Diagram 3



Those two subjects, who met during the Initial Test the range corresponding to the weak level have succeeded to move to a higher level, i.e. to the average level grace to the completed investigation. Subjects who failed to meet a higher level as compared to the one to which they were initially assigned to on grounds of the Initial Test Results but improved their

performances as expressed by the distances covered in those 12 minutes that were provided for the Cooper test, have however moved from the lower limit of the relevant level range towards the upper limit of the same level range, so that the basic conditions for them to reach a higher level as compared to the current one are met.

Implicitly, this evolution also influenced the maximum oxygen consumption whose values have improvingly changed, either improving or changing the subjects' categorization into the level ranges that are intended to be used for the assessment of this parameter. Six out of the 7 subjects have kept their average level range, however with values that were closer to the upper limit of the said level range, and one subject succeeded to attain a higher level, i.e. to reach from the average level to a level that is deemed to be good in the assessed age category.

The t-Student indicator showed a 14.03 calculated value for the Cooper test and 13.71 for VO₂ max, and both values were greater than the tabular t value of 3.143 at a 0.01 threshold for n-1 (n=7) subjects (see the Fischer S. table).

This difference is significant and therefore the void hypothesis is rejected and rather the Investigational Hypothesis is accepted. This aspect highlights the effects produced by the Independent Variable upon the Dependent Variable as a result of the Investigational Activity.

One can ascertain at a 98% probability that the development level of the aerobic effort capacity and of the max VO₂ improved due to utilized methodology.

9. Suggestions for the Main Training Indicators

Starting from the motoric training and performance indicators as set forth for II. category junior athlete (Bompa 2008; Scurt 2006), data have been adapted during the six months of investigation both in terms of the training level of the Investigational Group, and in terms of the objectives as set forth by this investigation.

The obtained statistical-mathematical results justify the suggested orientation for using the effort parameters (volume, intensity) (Balint 2003) in training sportsmen who practice orienteering when running. (M16) (Table no. 2).

Table 2

| PARAMETERS | VO ₂ max | 60-65% of VO ₂ max | 70-75% of VO ₂ max | TOTAL/6 months |
|------------|-----------------------|----------------------------------|----------------------------------|-------------------|
| INTENSITY | | | | |
| VOLUME | DURATION | 28 h | 48 h | 76 h |
| | KMS COVERED | 240 km | 480 km | 720 km |
| | NO. TRAINING MEETINGS | 72 | | |

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