

## Original Article

### Teaching method in volleyball service: intensive and extensive tools in cognitive and ecological approach

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#### Abstract

Service is fundamental of the volleyball that can be trained under the same match conditions, as there is no interference of the defense. It is a fundamental that theoretically has the highest degree of efficiency, so it is useful to know which specific training method allows the best possible performance. The aim of the present study is to evaluate the difference in yields (results) on service, through the intensive and extensive training method.

The method is experimental and the study was conducted on a sample of 20 males (12-14 years) divided into two experimental groups of 10 young athletes each. To them it was assigned the motor task of performing the service from high from the regular position at bottom of the field. Participants were initiated to learn the new motor task, using two different training methods: intensive method with the same number of services in a period of 2 days a week and extensive method with the same number of services in a period of four days. Each group done 2400 services at week for four weeks. Group A has conducted training on four days consecutive weekly, while Group B on two days consecutive weekly. They have been collected data on the services realized individual and of group (each service dropped in the opponent's defense zone was assigned a point).

The result for Group A (extensive training) resulted in an increase the performance by 10.43%. The result for Group B (intensive training) resulted in an increase the performance lower than Group A and was 6.13. The final percentage difference between the two groups has been 4.30%. After the first week, the results show the absence of significant differences between the two groups  $p\text{-value} = 0.127$  ( $p > 0.05$ ); instead, after four weeks, the results show a significant difference between the two groups  $p\text{-value} = 0.001$  ( $p < 0.05$ ), in favor of group A. Finally, from results appeared that extensive practice, in the realization of effective and consolidated motor learning, must be based on careful time distribution of the exercises and with a high number of repetitions in order to obtain high precision and an elevated stability of the performance.

**Key words:** motor learning, skill, training, performance.

#### Introduction

Volleyball is a sport with technical characteristics where the precision is the most important aspect of achieving a winning action. Is a sport where the study is in human and experimental sciences according to an ecological educational way, it includes some aspects of human science and experimental science to analyze descriptively the movement (Raiola, 2012a, Tiziana et al 2017). So on, didactics of volleyball into the educate program for coaches/trainers/technicians must to teach exactly by proper methods, distinctly for skills (D'Isanto, 2016, Raiola, D'Isanto, 2016, Raiola, 2012b). The experience and learning go hand in hand with the change in organic and evolutionary, being essential for the adaptation to the environment (Gaetano et al, 2014). According to the ecological approach "to learn" means being able to progressively find the best motor solution for a given task in a given context (Raiola, Di Tore, 2017). In volleyball individual skills, such as the serve, is minor part of technical aspect of the analysis of the training, but it is fundamental skill of volleyball, especially for young athlete and service (Parisi, Raiola, 2014ab).

The volleyball is a sport considered of attack and this fundamental (the service) is what that determines the points (if you do not score points with the attack, or you are wrong and you gives the point to the opponent, or you will give the chance to the opponent to attack and achieve point, and this, unlike other sports, it is very serious because all actions always end with a point for a team (Paolini, 2001). Service is the technical skill with which a set of a game of volleyball begins and can be performed from the down, from the high and to the jump. In this game the service represents the first attack with effect immediate on the successive defensive and offensive

actions of the opposing team (Raiola et al, 2016). Certainly, the service is the first fundamental for achieve points, both from the point of view chronological point of view (you can not start playing without service) both from the point of view tactical (an effective service is able to affect the play of the opponents). For the characteristics, this fundamental can be considered the most atypical and it should be seen as important fundamental not of "situation" in a sport of "Open skills" such as volleyball (Raiola, 2014). The aptitude to acquire new motor skills is defined as the ability of motor learning that through exercise achieves a high degree of stability, precision and efficiency (Petracovschi, 2012). When an individual learns a new movement or skill you can notice how the execution of these movements is wrong or inaccurate (Altavilla et al., 2013), then you need to work with effective methods. The effectiveness and efficiency of overall practice, interpreted as the number of repetitions, has been long recognized as the foundation of learning and perfecting movements (Lee and Genovese 1988). In fact, the number of repetitions of the new skill represents a basic element in reinforcing and creating the motor model (Schmidt, 1975).

There are different theories on what should be taken into consideration on designing a motor program (Adams, 1971; Schmidt and Wrisberg, 2000); however, task duration and structure definitely are crucial characteristics that influence the process (Delaš et al, 2008). With younger boys, it is definitely useful, for learning aims, propose couple activities with observation of companion, mutual evaluation of technical and tactical behaviors, analysis of difficulties and progress (M. Piéron 1989). Teaching strategies, to enhance learning, have to stimulate the emergence of spontaneous solutions to motor, problems (Di Tore et al, 2016). The purpose of the study is to evaluate the difference in yield on service from the high, through the intensive and extensive training method. Intensive training concentrates the repetitions in a limited time (half) of that extensive and remaining the number of repetitions unchanged.

Determining which methodology is most effective for motor learning means allowing coaches to schedule workouts so that they can have positive impact on performance and therefore on the final outcome of each match.

## METHODS and MATERIALS

The study method is experimental with the division of the sample in 2 groups: A and B. Group A has been trained with the intensive method, while B with the extensive method, distributing the amount of the workloads (Bompa & Buzzichelli, 2016). For an adequate training planning is necessary an optimal modulation of the loads (Gaetano & Rago, 2014), that is predicting the volume of the workload, the density of the workload and the intensity of the workload in training (Bompa, 1999), to determine the adapting in the young athletes to the training program (Rago et al, 2016). Furthermore, the structure of the training process in long and short steps facilitates the achievement of maximum sport performance, without underestimating the multifactorial nature of performance (Rago et al, 2017).

The motor task required for the boys foresees a service from high with ball and the regulatory net. The ball had to go above the net and to drop in the opponent defense zone (Fig. 1).

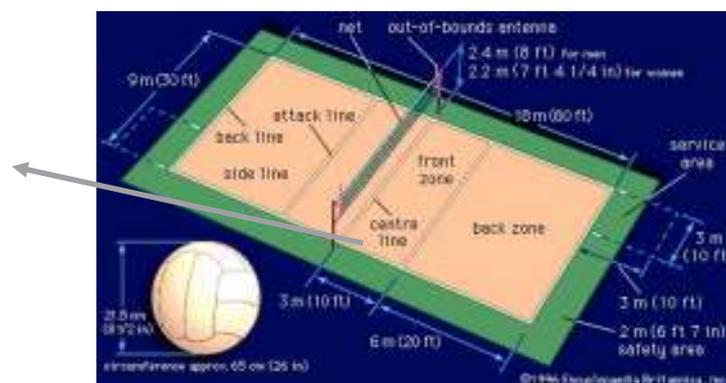


Fig.1

The training included 2000 services from high from the regular position at bottom of the field for each group weekly, for a four-week period (total 8000). The groups performed the training in the following ways:

- Group A, of 10 boys, have performed a distributed workout on 4 consecutive days (tuesday to friday), making 50 services from high for each boy at daily (total of 200 weekly services for each boy).
- Group B, of 10 boys, performed a concentrated workout in 2 no consecutive days (Wednesday and friday), making 100 services from high for each boy at daily (200 weekly services for each boy).

**Participants**

The survey was conducted on a sample of 20 young male who had not practice volleyball, of ages between 12 and 14 years, they have voluntarily participated in the study. The sample was divided into two groups of 10 boys, one experimental group (A) and one experimental group (B) and been assigned them a new motor task to learn the service from high ability, performing services from the regular position at bottom of the field. Nobody boy had previously performed sport activities concerning to the motor task of the research.

Participants were initiated to learn the new motor task (service from high), however using different ways of distributing the practice, with the aim of assessing whether and to what extent a different methodological approach (intensive and extensive method) is able to influence the learning of a new motor skill. In the table 1 summarizes age, height and weight of the 20 boys, showing that the mean age, height and weight of the two groups was similar.

**Tab. 1**

	<b>Gruppo A</b>		<b>Gruppo B</b>	
	<b>(n=10)</b>		<b>(n=10)</b>	
	<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>
<b>Age (year)</b>	<b>13,45</b>	<b>0,50</b>	<b>13,29</b>	<b>0,45</b>
<b>Height (cm.)</b>	<b>164,41</b>	<b>3,25</b>	<b>163,36</b>	<b>2,94</b>
<b>Weight (Kg.)</b>	<b>58,71</b>	<b>2,19</b>	<b>57,26</b>	<b>1,90</b>

**Statistical analysis**

Measures of central tendency and dispersion (mean ± standard deviation) of age, height and weight of two groups: group A; age: 13,45 ± 0,50; height: 164,41 ± 3,25; weight: 58,71 ± 2,19; group B; age: 13,29 ± 0,45; height: 163,36 ± 2,94; weight: 57,26 ± 1,90). A t-test for independent groups was conducted to check the differences between the two means of groups with relative percentages to improvement. The analysis covered basic statistics and percentages for the date considered. All statistical analyzes were conducted using Dell's statistical software 13.2.

**Tab. 2**

<b>Experimentalgroup A</b>				
<b>Subject</b>	<b>First week</b>	<b>Second week</b>	<b>Third week</b>	<b>Fourth week</b>
<b>1</b>	97	100	103	105
<b>2</b>	98	101	103	106
<b>3</b>	97	101	105	109
<b>4</b>	102	105	108	112
<b>5</b>	105	108	110	114
<b>6</b>	102	106	109	112
<b>7</b>	103	107	110	113
<b>8</b>	101	105	108	112
<b>9</b>	99	104	110	115
<b>10</b>	103	108	111	114
<b>Services centered</b>	1007	1045	1077	1112
<b>Services tempted</b>	2000	2000	2000	2000
<b>% Services</b>	50,35 %	52,25 %	53,85 %	55,60 %
<b>Mean</b>	<b>100,7</b>	<b>104,5</b>	<b>107,7</b>	<b>111,2</b>

**Tab. 3**

<b>Experimentalgroup B</b>				
<b>Subject</b>	<b>First week</b>	<b>Second week</b>	<b>Third week</b>	<b>Fourth week</b>
<b>1</b>	101	103	105	106
<b>2</b>	100	102	104	106
<b>3</b>	98	102	104	106
<b>4</b>	97	100	102	104
<b>5</b>	102	103	104	105
<b>6</b>	100	102	104	105
<b>7</b>	98	100	102	104
<b>8</b>	97	100	101	103
<b>9</b>	100	103	105	107
<b>10</b>	102	105	108	110
<b>Services centered</b>	995	1020	1039	1056
<b>Services tempted</b>	2000	2000	2000	2000
<b>% Services</b>	49,75 %	51,00 %	51,95 %	52,80 %
<b>Mean</b>	<b>99,5</b>	<b>102</b>	<b>103,9</b>	<b>105,6</b>

**Tab. 4**

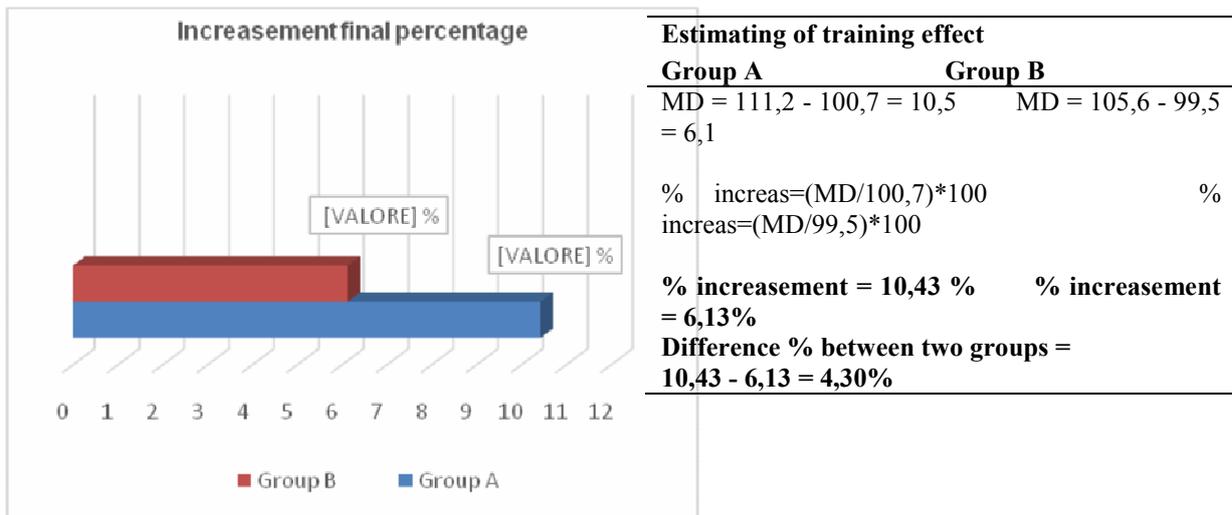
t-test groups A and B (treatment initial-final)		
t-test	First week	Fourth week
p-value	0,127	0,001
	No significant	Significant
	<b>Level significant <math>\alpha = 0,05</math></b>	

**Results**

A t-test for independent groups (Tab. 4) was conducted to evaluate any significant differences between the experimental group A and the experimental group B after the first week in relation to the performance on services from high. The results show the absence of significant differences between the two groups in exam ( $p > 0.05$ ). A t-test for independent groups was conducted then, after four weeks, between the group A and the group B, in relation to the performance on services from high. The results indicate a significant difference between the two groups in exam ( $p < 0.05$ ).

Tables 2-3-5 and diagram 1 summarize the results obtained in the present study. The boys of Group A obtained a number of successes (services centered = ball dropped in the opponent defense zone) significantly higher than those of group B. Group A had a steady increase in learning over the four weeks. Significant differences were observed at the end of training for the two groups with a percentage increase of group A in learning of 10.43%, while Group B obtained an increase of 6.13 (Diagr. 1). Finally, the estimation of the training effect, due to the type of method used (intensive and extensive), it gave a percentage difference between the two groups of 4.30% (Tab. 5).

**Tab. 5**



**Diagr. 1**

**Discussion**

The results of the present study reveal less advantageous improvements, using intensive training (group B), compared to the one performed with extensive training (group A). A practice distributed and extensive over time but constant involves undoubtedly significant advantages.

For every learning process, where there is a new motor task and its stabilization, constant repetition is indispensable. In fact, just repeating a motor task learns it, but it is also true that there are other factors that affect the success of a learning process such as motivation, teacher / coach-student / player ratio, initial capacity/skills, but above all the number of repetitions and the methodology to use.

The results obtained, using a sample of 20 boys aged between 12 and 14 (males), allow some considerations.

The four training sessions concentrated in 2 no consecutive days were sufficient to get slight improvements in learning a new motor task; however, the improvement observed in training sessions of 4 days is been more significant. It can then be concluded that, to learn a new motor task in a stable manner, the workout must be continued for a certain period of time and provide for a high number of repetitions.

**Conclusions**

Volleyball is a very technical sport where good control is required in the fundamentals. Improving and perfect a learning is the main purpose of any teaching, both for motor and cognitive learning (Sanchez and

Reber, 2013). The results show how the role of the distribution of the practice, for the formation of effective and consolidated motor learning, is based on careful timing distribution of training sessions and on a large number of repetitions in order to achieve great precision and a high level of performance. It is clear that there is a need for practice, giving the time to repeat what is necessary during the motor learning phase, which has been defined as the associative stage, that is, the time the student gains orientation towards the association and setting each element necessary to refine and perfect the skill. And it is precisely in this view that the results of the present study should be read out, the boys who utilized a concentrating the practice in 2not consecutive days (group B), at the end of the training period (4 weeks) showed a slight improvement, resulting in a 6.13%.

The results of group A, with a frequency of distributed workouts on four consecutive days, showed a higher improvement than group B, resulting in a significant percentage increase of the 10.43% at the end of the four weeks of training. Finally, and in line with the data of the present study, the extensive method and a high repetition number are recognized as a determining factor for the acquisition and the stabilization of a new motor skills. Furthermore, coaches and anyone involved in training of young player should account for these methodological indications with the aim of program a technical-tactical training specific. Probably the theoretical basis of motor learning is in the different approach to teach: cognitive approach and ecological dynamic one (Guetano et al., 2015); specifically, the heuristic learning underlines in the freedom degrees theory (Bernstein, 1967).

## References

- Adams, J. A. (1971). A closed- loop theory of motor learning. *Journal of Motor Behavior*, 3, 111-150.
- Altavilla, G., Di Tore, P.A. (2016). Physical education during the first school cycle: A brief social psychopedagogical summary, *Journal of Physical Education and Sport*, 16 (2), pp. 340-344
- Altavilla, G., Raiola, G., (2015). Sports game tactic in basketball, *Sport Science*, 8 (1), pp. 43-46
- Altavilla, G., Raiola, G., (2014). Global vision to understand the game situations in modern basketball, *Journal of Physical Education and Sport*, 14 (4), art. no. 75, pp. 493-496
- Altavilla G., Manna A., Perrotta F., (2013). An experience of Minibasket methodology for the improvement of motor learning. *Acta Kinesiológica*, Vol 7 (2), pp. 46-51
- Bernstein, N.A. (1967). *The co-ordination and regulation of movements*. Oxford: Pergamon Press.
- Bompa T, (1999). *Periodization training for sports* (third edition), Human kinetic - USA
- Bompa T., Buzzichelli C., 2016. *Periodizzazione dell'allenamento sportivo*. 3a Edizione, Calzetti & Mariucci Perugia
- Čuljak Z., Delaš Kalinski S., Kezić A., Miletić D., (2014). Influence of fundamental movement skills on basic gymnastics skills acquisition, *Science of Gymnastics Journal*, Vol. 6(2): pp. 73 – 82
- Delaš S., Miletić A., Miletić D., (2008). The influence of motor factors on performing fundamental movement skills – the differences between boys and girls, *Physical Education and Sport* Vol. 6 (1), pp. 31 – 39
- D'Isanto, T. (2016). Pedagogical value of the body and physical activity in childhood *Sport Science*, 9, pp.13-18
- Di Tore, P.A., Schiavo, R., D'Isanto, T. (2016). Physical education, motor control and motor learning: Theoretical paradigms and teaching practices from kindergarten to high school, *Journal of Physical Education and Sport*, 16 (4), art. no. 205, pp. 1293-1297
- Gaetano, A. (2016). Relationship between physical inactivity and effects on individual health status, *Journal of Physical Education and Sport*, 16, pp. 1069-1074
- Gaetano A., Domenico T., Gaetano R., 2014. Some aspects on teaching and learning by physical activity, *Sport Science*, Vol. 7, 1
- Gaetano, R., Rago, V. (2014). Preliminary study on effects of hiit-high intensity intermittent training in youth soccer players, *Journal of Physical Education and Sport*, 14 (2), pp. 148-150
- Guetano, R., Lipoma, M., Tafuri, D. (2015) Postural control in young soccer players: Differences between the cognitive approach and ecological-dynamic one, *Journal of Human Sport and Exercise*, 10 (Special issue), pp. S385-S390
- Gaetano, R. (2012a) Motor learning and didactics into physical education and sport documents in middle school-first cycle of education in Italy, *Journal of Physical Education and Sport*, 12 (2), pp. 157-163
- Gaetano, R. (2012b) Didactics of volleyball into the educate program for coaches/trainers/technicians of Italian Federation of Volleyball (FIPAV), *Journal of Physical Education and Sport*, 12 (1), pp. 25-29
- Lee T.D., Genovese E.D. (1988). Distribution of practice in motor skill acquisition: Learning and performance effects reconsidered. *Research Quarterly for Exercises and Sport* 59: 277-287

- Masclet N., Ibáñez-Gijón J., Bréjard V., Buekers M., Casanova R., Marqueste T., Montagne G., Rao G., Roux Y., and Cury F., (2016). The Influence of the 'Trier Social Stress Test' on Free Throw Performance in Basketball: An Interdisciplinary Study, *PLoS One*. Vol 11(6): e0157215.
- Parisi, F., Raiola, G. (2014a) The serve in under 12-13 Italian volleyball team, *Journal of Human Sport and Exercise*, 9, pp. S588-S591
- Parisi, F., Raiola, G. (2014b) Video analysis in youth volleyball team, *Journal of Human Sport and Exercise*, 9, pp. S584-S587
- Petracovschi S., (2012). Learning and developing motor skills in the case of secondary school pupils with mild mental impairment. *Journal of Physical Education and Sport*, 12 (4), art 76, pp. 526-530
- Rago, V., Pizzuto, F., Raiola, G. (2017). Relationship between intermittent endurance capacity and match performance according to the playing position in sub-19 professional male football players: Preliminary results, *Journal of Physical Education and Sport*, 17 (2), pp. 688-691
- Raiola, G., Di Tore, P.A. (2017). Motor learning in sports science: Different theoretical frameworks for different teaching methods, *Sport Science*, 10, pp. 50-56
- Raiola, G., D'Isanto, T. (2016) Descriptive shot analysis in basketball *Journal of Human Sport and Exercise*, 11 (Proc1), pp. S259-S266
- Rago, V., Leo, I., Pizzuto, F., Costa, J., Angelicchio, G., Tafuri, D., Raiola, G. (2016). Variation of oxidative stress of elite football players during pre-season and inseason *Journal of Physical Education and Sport*, 16 (2), pp. 326-329
- Raiola G., Altavilla G., Tafuri D, Lipoma M, (2016). Analysis of learning of shot in basketball, *Journal of physical education and sport*, Vol 16 (1), pp. 3-7
- Raiola, G. (2015). Basketball feint and non-verbal communication: Empirical framework, *Journal of Human Sport and Exercise*, 10 (Special issue1), pp. 360-368
- Raiola, G. (2014). Teaching method in young female team of volleyball, *Journal of Physical Education and Sport*, 14 (1), pp. 74-78
- Sampaio, J., Janeira, M. (2003). Importance of Free-Throw Performance in Game Outcome During the Final Series of Basketball Play-offs. *International Journal of Applied Sports Sciences*, 15(2): 9-16.
- Sanchez, D.J., Reber P.J., (2013). Explicit pre-training instruction does not improve implicit perceptual-motor sequence learning, *Cognition*, 126(3): 341–351.
- Schmidt, R. A., Wrisberg C. A. (2000). *Motor learning and Performance*. (2nd ed.) Champaign, IL.: Human Kinetics.
- Schmidt, R.A. (1975). A schema theory of discrete motor skill learning. *Psychological Review*, Vol. 82, pp. 225-260.
- Struzik A., Pietraszewski B., Zawadzki J., (2014). Biomechanical Analysis of the Jump Shot in Basketball, *Journal of Human Kinetics* Vol. 42, pp. 73-79
- Tiziana, D., Antonetta, M., Gaetano, A. (2017). Health and physical activity, *Sport Science*, 10 (1), pp. 100-105