Proceeding

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Self-directed learning: An innovative strategy for sport and physical education

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ABSTRACT

A rapidly developing research area focuses on the study of Self-directed learning (SDL) applied to sport and physical education. The hypothesis is that this methodology can, in extracurricular contexts, improve development and athletic performance in an effective and efficient way. The data were collected by 20 secondary school students, engaged in an 80 m fast running performance, divided into two groups: the first group followed the SDL methodology (n = 10; age = 16.7) and the second group (n = 10; age = 16.9) followed traditional training programme led by a schoolteacher. At the same, initial conditions were evaluated by an entry test (speed test) and at the end of the two treatments, which lasted for 3 weeks, the test was re-administered to evaluate the results and individual interviews were conducted to evaluate perceptions and self-efficacy. In addition to fast running, arms and legs were assessed with isotonic exercises. The monitoring of the two treatments was self-directed in the SDL and conducted by the teacher in the traditional training. The results obtained demonstrate the SDL in sports performance, if not performed by professionals in which the practice is already validated, obtains poor results in terms of both outcomes and perception. The result of this experimental work provides the basis for the interventions that promote the SDL methodology applied to sport and physical education within formal school contexts, still used today in informal and sporting contexts. **Keywords**: SDL; Performance; Sport science; Physical education.

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INTRODUCTION

The model of the "self-direction in learning" of Brockett and Hiemstra in 1991, was structured on two main dimensions: the first dimension concerns the teaching method, that is the modalities of organization of experience and learning processes; the second is related to the personality characteristics of the student, defined programmatically, in fact, self-directed learner. The model also provides for the assumption of personal responsibility and the achievement of a condition of empowerment, through the coexistence of these two dimensions. Personal responsibility guides the subject in making decisions, in taking control of himself and his own thoughts and, again, in the awareness of his own ideas and beliefs (Hiemstra, 1994).

The union between SDL and sports performance is affected by the slow development of a research program organized on SDL. In general, widely documented in contemporary international literature (Merriam et al., 2007), since the tools and empirical studies up to 2007 (at least) are very discussed and contested. A change of perspective took place a study in 2011, in which the self-direction in learning was re-proposed in relation to the two constructs of (1) motivation and (2) students self-control (Stockdale, & Brockett, 2011).

Self-centred learning on the student is a didactic-pedagogical process that is characterized by the primary responsibility of the student in relation to the planning and evaluation of his training experience. The teacher is involved as a facilitator, even if its function is mainly external, since autonomy is the goal to reach the learner to exercise control on the social environment and their actions. Finally, contemporary research has shown that the personal control of the SDL (self-direction in learning) is a skill transferable to the academic success of university students producing positive effects on stress and sense of failure. The autonomous choices of students in education reinforce their self-determination, so more they feel the responsibility of their learning needs and objectives, identifying the necessary resources and encouraging the implementation and evaluation of learning outcomes (Toto & Limone, 2019).

According to the didactic model of training followed by the teacher, physical activity must experience fun and wellbeing. Both these dimensions can be achieved only with different devices or didactically constructed obstacles. Motor skills feed on communicative and expressive dimensions and for real success cannot be disconnected from these (Rodriguez Aceituno, & Pina, 2018). The discourse is complex because many variables are involved in the didactical methodology, from the biomedical approach to sports performance, from self-determination theory to goal-oriented theory.

Sports training is characterized by an integral development of boys and girls, thanks to their active participation. In the international debate of the last few years the awareness of the improvement in teacher training and of the quality of educational programs are clearly in order to improve the effects in terms of sports performance in students. Didactical evolution in the last 50 years has underlined the importance of higher cognitive processes in the experience of physical education, since it concerns both sporting practices and motor intelligence involved (Gardner, 2011). Specifically, the interaction between teacher-learner and alone learner in areas such as learning, planning, evaluation, communication and reflection (Grossman et al., 2009b) plays a key role. The construction of the body image has a fundamental value both in the growth path of the child and in the psychophysical well-being of the adult. According to this approach, therefore, in which the training is entrusted to the teacher, a training in motor skills requires an empathic attitude and centred on interaction, always paying attention to personal autonomy, avoiding mechanical practices in the exercises.

The aim of this paper is to focus on the use of the SDL in relation to physical education and to deepen a study theme present in several still unorganized contributions. Precisely because of the lack of

systematization, the present study attempts to compare two didactic methodologies applied to physical education by comparing models and results.

METHODS AND MATERIALS

The study sample (n = 20) was divided into 2 groups: A and B. The first group followed the SDL methodology (n = 10; age = 16.7) and the second group (n = 10; age = 16.9) followed traditional training program led by a schoolteacher. Both groups had the task of individually achieving the best result in the 80 m run. The two groups followed two different training methods, but the training structure, the exercises and the objectives to be achieved were the same. Group A was trained with the SDL method, while group B was followed by a physical education teacher.

Participants

The study was conducted on a sample of 20 young male students who practicing sport during the school hour, of ages of 16 and 17 years. They have voluntarily participated in the study. Nobody child had previously performed sport activities concerning to the motor task of the research. Participants were initiated to learn the new motor task (race 80m), however using different ways of distributing the practice, with the aim of assessing whether and to what extent a different methodological approach (Classic training and SDL) is able to influence the learning of a new motor skill. In the tables 1 summarizes age, height and weight of the 20 children, showing that the mean age, height and weight of the two groups was similar.

Table 1. Mean and SD of two groups

Experimental group A				**Experimental group B**		
Subject	**Age**	**Height**	**Weight**	**Age**	**Height**	**Weight**
1	16.3	163	62	16.5	167	60
2	17.5	174	66	16.3	163	59
3	17.5	173	67	16.5	168	61
4	16.8	169	64	16.4	169	62
5	16.7	171	65	16.7	170	64
6	15.9	163	63	17.3	172	59
7	16.6	168	62	17.6	173	62
8	17.2	174	68	17.6	172	63
9	16.8	168	63	17.8	175	62
10	16.4	165	60	17.2	170	61
Mean	**16.7**	**168.8**	**64.0**	**16.9**	**169.9**	**61.3**
DS	**0.49**	**3.98**	**4.64**	**0.55**	**3.23**	**1.55**

Statistical analysis

Measures of central tendency and dispersion (mean ± standard deviation) of age, height and weight of two groups: Group A; age: 16.7 ± 0.49; height: 168.8 ± 3.98; weight: 64.0 ± 4.64; Group B; age: 16.9± 0.55; height: 169.9 ± 3.23; weight: 61.3 ± 1.55). Speed is an instinctive and innate specialty, in which subjects from childhood challenge to overcome themselves to overcome their limitations. The distance used is modelled on that of student sports games. This test also allows the speed resistance to be checked. The scores attributed to the performances follow the evaluation table shown in table 2:

Table 2. Evaluation table

Time	Scoring	Assessment
< 12'' 30	5	excellent
13'' 20 – 12'' 31	4	very good
14'' 10 – 13'' 21	3	good
15'' 00 – 14'' 11	2	sufficient
> 15'' 01	1	no sufficient

For a proper training a common three-week course is needed in which three actions have been modulated: (1) resistance, (2) a series of jumps and (3) speed over short and long distance. The groups performed the training in the following ways:

Both group A and group B, of 10 adolescents, performed a three-week training session on six consecutive days (Monday to Saturday), which lasted 1.5 hours a day. After administering an entrance test to evaluate the starting characteristics of the subjects and to create two homogeneous groups (tab. 1), the training was structured according to a common path as reported in table 3:

Table 3. Training for three weeks

Activities	Week
Resistance + recalls speed (2000 m and 300 m)	1
Series of leaps	2
Short and long distance speed series	3

To monitor the starting situation, the reference evaluation table was used (tab. 2) over a distance of 80 m, the same used at the end of the two treatments. The results of the initial monitoring are shown in the following table:

Table 4. Mean and SD performances of two groups

Experimental group A			Experimental group B		
Subject	**Time**	**Scoring**	**Subject**	**Time**	**Scoring**
1	13'' 11	4	1	13'' 58	3
2	13'' 32	3	2	13'' 23	3
3	13'' 03	4	3	13'' 11	4
4	12'' 48	4	4	13'' 33	3
5	13'' 58	3	5	12'' 51	4
6	13'' 47	3	6	12'' 59	4
7	12'' 56	4	7	12'' 38	4
8	12'' 45	4	8	13'' 31	3
9	13'' 17	4	9	12'' 58	4
10	14'' 01	3	10	13'' 37	3
Mean	**13''.11**	**3,6**	**Mean**	**12''.80**	**3,5**

While carrying out the same activities the group that followed the SDL methodology had the timed, scheduled and timed activities from the guide voice present on the smartphone, on which the same activities carried out by the group b were programmed. The second group (b) was followed, encouraged and monitored with the help of a physical education teacher. At the end of each week the times for each group were monitored (table

5 and 6):

Table 5. Improvements in running seconds for each week (group A)

Experimental group A				
Subjects	First week	Second week	Third week	Tot.
1	0'' 07	0'' 10	0'' 11	0'' 28
2	0'' 06	0'' 08	0'' 09	0'' 23
3	0'' 05	0'' 09	0'' 08	0'' 22
4	0'' 05	0'' 07	0'' 07	0'' 19
5	0'' 06	0'' 06	0'' 05	0'' 17
6	0'' 06	0'' 05	0'' 06	0'' 17
7	0'' 06	0'' 06	0'' 07	0'' 19
8	0'' 05	0'' 05	0'' 06	0'' 16
9	0'' 07	0'' 10	0'' 07	0'' 24
10	0'' 06	0'' 06	0'' 07	0'' 19
Mean	0'' 06	0'' 08	0'' 08	0'' 21

Table 6. % Seconds and mean for each week (group B)

Experimental group B				
Subjects	First week	Second week	Third week	Tot.
1	0'' 04	0'' 10	0'' 10	0'' 24
2	0'' 05	0'' 12	0'' 09	0'' 26
3	0'' 05	0'' 14	0'' 10	0'' 29
4	0'' 04	0'' 11	0'' 08	0'' 23
5	0'' 06	0'' 15	0'' 09	0'' 30
6	0'' 05	0'' 10	0'' 07	0'' 22
7	0'' 04	0'' 10	0'' 08	0'' 22
8	0'' 04	0'' 11	0'' 09	0'' 24
9	0'' 05	0'' 13	0'' 07	0'' 25
10	0'' 04	0'' 12	0'' 06	0'' 22
Mean	0'' 05	0'' 12	0'' 08	0'' 25

RESULTS

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 analyses were conducted using SPSS statistical software.

Table 7. T-test groups A and B (treatment initial-final).

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
week3	20	.0785	.01565	.00350
week1	20	.0520	.00951	.00213

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
week3	22.429	19	.000	.07850	.0712	.0858
week1	24.442	19	.000	.05200	.0475	.0565

Group Statistics

	treatment	N	Mean	Std. Deviation	Std. Error Mean
week3	SDL	10	.0740	.01713	.00542
	TRAIn	10	.0830	.01337	.00423
week1	SDL	10	.0590	.00738	.00233
	TRAIn	10	.0450	.00527	.00167

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
week3	Equal variances assumed	.208	.654	-1.310	18	.207	-.00900	.00687	-.02344	.00544
	Equal variances not assumed			-1.310	17.001	.208	-.00900	.00687	-.02350	.00550
week1	Equal variances assumed	.073	.791	4.882	18	.000	.01400	.00287	.00798	.02002
	Equal variances not assumed			4.882	16.287	.000	.01400	.00287	.00793	.02007

A t test for independent groups (Table 7) was conducted to assess any significant differences between the experimental sample A and the experimental sample B after the first week in relation to the fast run performance on 80m. Tables 1-4-5-6-7-8 and diagrams 1-2 summarize the results obtained in the present study. The results show the absence of significant differences between the two groups in the examination in the final performance, in fact both treatments produced an improvement in MD 0.08 ". A further t-test for independent groups (table 7) and a comparison of the percentages (table 8) was carried out, on the data collected after a week, between group A and group B, in relation to the same fast running performance on 80m. The results indicate a significant difference between the two groups in the examination: The boys of Group A obtained a superior improvement in number of 0.06 "compared to 0.05" of group B; However, analysing the performance over the entire training period even if initially group B reached a lower improvement of 0.01 "compared to group A at the end of treatment the improvement is 26.27%. Diagram 1 shows the timed results for the two groups over the three weeks of the training effect depending on the type of method used (SDL and training with teacher). If in the first week of training, group B had a lower improvement than the SDL group in the second week the improvement is significant of 0.04 "to return equalized in the third week to the SDL (slight stabilization). Significant differences were observed at the end of the training for the two groups (Table 8) with a percentage increase of group A in learning of 33.33%, while Group B achieved an increase of 60% with a difference of 26, 27% between the two groups (Diag.2). In both treatments with different percentages and detections there is an improvement in the initial performance (table 4).

Table 8. % Estimating of training effect in the two groups

Estimating of training effect	
Group A	**Group B**
MD = 0.08-0.06 = 0.02	MD = 0.08-0.05 = 0,03
% increas.=(MD/0.06)*100	% increas.=(MD/0.05)*100
% increas.=(0.02/0.06)*100	% increas.=(0.03/0.05)*100
% increasement = 33.33 %	% increasement = 60%
Difference % between two groups=60 - 33.33= 26.27%	

DISCUSSION

The results of the present study reveal that both methodologies produce improvements using both the SDL methodology and the training with the teacher; A distributed and extended in time but constant involves undoubted significant advantages, even greater numbers and experiments allows a greater standardization of results. Both groups consist of adolescents (20 males) aged 16-17 attending high school who are strongly motivated to practice sports and are interested in participating in competitive competitions. This element is not to be underestimated and is a possible variable intervening in the success of both methodologies. The learning of a new motor task requires a stabilization phase (as was graphically demonstrated in diagr. 1 at the second week), therefore a constant repetition is functional. In addition to the motivation, the initial motor skills and abilities have influenced the success of the training process. In fact, in the teacher training methodology the relationship between teacher / student and between students has had a specific influence. The achievement of the success of both methodologies and the results obtained allow some considerations. The positive result of the use of SDL in sports or physical education shows that the deepening of the use of this methodology in sports performance has significant success. The lack of studies and in-depth analysis on the subject requires further experimentation supported by the positive results achieved. As for the second methodology, the training with the teacher, the educational success (+ 26.27%) demonstrates how this "classic" methodology has so refined the tools and practices that are still the best learning strategy. In

conclusion, the results show how the role of the temporal distribution of the practice and of the specific typology of the activities to be carried out, is fundamental for an effective motor learning and the high quality of sports performance.

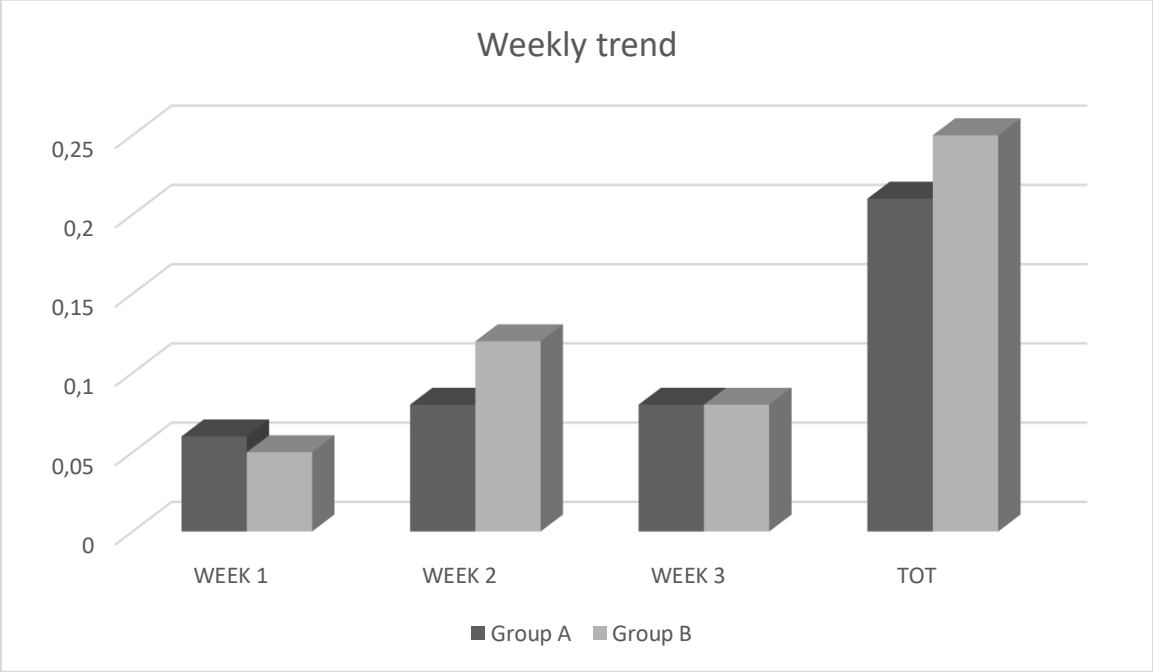

Figure 1. Differences between two groups for time done.

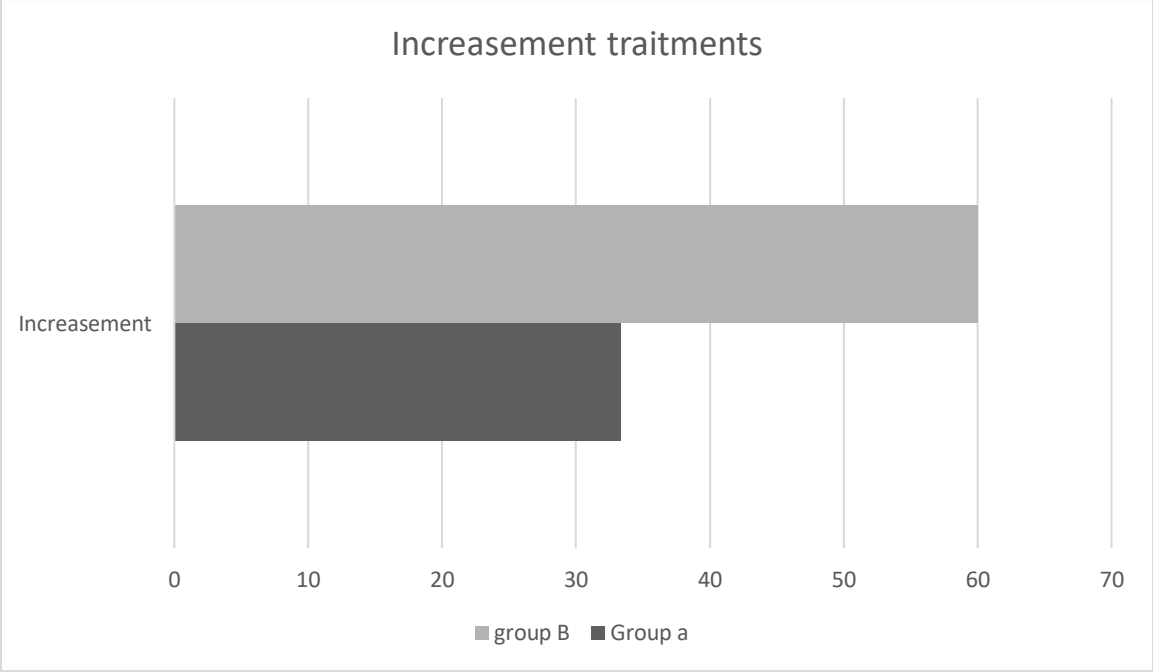

Figure 2. Increasement final percentage between two groups.

CONCLUSIONS

Achieving improvement in sports performance is one of the aims of both sports and physical education teaching. The results of the present study have shown that both methodologies (SDL and training with teachers) achieve educational success if practiced with motivated students and interested in participating in competitions. The joint training structured on different activities for a three-week training period produced different results. The SDL produces improvements in the first and third week, differently from the training with teachers that has an exploit the second week (with a slight stabilization in the third week). In the final relationship between the two types of methodology, the training with teachers is 26.27% higher than the formative success of the SDL.

The sports declination of self-directed learning focuses attention on the process rather than on the evaluative dimension of learning. Self-centred learning is achieved through a series of fundamental components: the realization of each learner passes through the learning that takes on different grades in each individual, the responsibility to make decisions related to the learning path belongs mainly to the students, the transfer of cognitive skills and behaviours learned by students to conduct and manage any activity, even in extra-school contexts; self-control or self-direction does not necessarily mean independent learning, individual or in isolation. On the contrary the SDL can arrange group activities or in cooperative learning and through the scaffolding of the teacher, and finally, awareness requires the student to self-control the learning process for direct or redirect one's actions towards the set learning objective (Dabbagh, & Kitsantas, 2012).

The process of change and innovation has had some resistance on teachers side strongly linked to the cultural visions of the profession (Ávalos, 2005), even though contemporary generations are more open to innovation processes as the perception of identity is oriented to the teacher professional (Danielson, 2010). The new socio-cultural context in which school contexts are immersed require new skills such as the recognition of the social and cultural diversity of students. Compares to the past, the role of emotions and personal beliefs, assumes a fundamental function in the success of sports performance, since a learning disconnected from the factual and existential reality of the students does not produce effective actions in terms of learning.

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