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IMPROVEMENT OF COGNITIVE SKILLS IN CHILDREN THANKS TO MOTOR ACTIVITY

IL MIGLIORAMENTO DELLE CAPACITÀ COGNITIVE NEL BAMBINO GRAZIE ALL'ATTIVITÀ MOTORIA

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Abstract

Today, regular physical activity and a healthy lifestyle are common and predisposing factors for prevention and health. This contribution aims to intertwine these conditions, considered by the scientific community as the basis of psychophysical well-being and predisposing to the improvement of cognitive functions and learning processes. This work provides through an experimental study, the understanding of this connection, for the possible relationship between physical activity and the improvement of cognitive learning abilities of children. Then, we used two groups of primary school students to research the relationship between improvement in achievement and controlled physical activity. This contribution aims to provide an impetus for discussion and an invitation to more holistic approaches to support the healthy and balanced development of the child.

Oggi, una regolare attività fisica e uno stile di vita sano rappresentano i fattori comuni e predisponenti alla prevenzione e alla salute. Il presente contributo si propone di intrecciare queste condizioni, considerate dalla comunità scientifica alla base del benessere psicofisico e predisponenti al miglioramento delle funzioni cognitive e dei processi di apprendimento. Questo lavoro fornisce attraverso uno studio sperimentale, la comprensione di tale collegamento, per la possibile relazione tra l'attività fisica e il miglioramento delle capacità cognitive di apprendimento dei bambini. Abbiamo utilizzato due gruppi di studenti, della scuola primaria, per ricercare la relazione tra attività fisica controllata e miglioramento del profitto. Questo contributo mira a fornire uno slancio per la discussione e un invito ad approcci più olistici per sostenere lo sviluppo sano ed equilibrato del bambino.

Key-words

Physical Activity, Learning, Function Cognitive.

Attività fisica, Apprendimento, Funzione Cognitiva

Introduction

Motor activity and its implicit educational potential, is undeniably also a powerful tool for the promotion and dissemination of healthy values and behaviors . In fact, the educational potential of the movement is in its means, as an effective tool and for the strategic, creative and interpretative possibilities that the methodological action allows. Physical activity, understood as a means, is applicable in different contexts to integrate the knowledge and skills derived from different socio-cultural fields. So the behaviors organizational and organic and integrated interventions can be in favor of the development of the individual's resources. These considerations led De Coubertin himself, at the end of the nineteenth century, to consider the dual face of sport: Its beneficial effect depends on how it is handled, can stimulate the noblest passion, as the most cowardly. It can foster altruism as well as love for personal advantage. It can be chivalrous or corrupt, used to support peace or prepare for war». Therefore, participation in sports activities alone is not enough, but in order to reach the educational objectives it is necessary to consider carefully the strategies and the pedagogical proposals (Carraro, 2004a; 2004b); (Koh & Camiré, 2015).

Physical activity is educational when there is the freedom to apply the multiple heterogeneous approaches of the experimental method, when the observed variables are taken into account, when the educational components on which the interventions impact are identified, and finally when interventions are characterized to fill gaps in education to sporting values. Therefore, if educational didactic planning, considers and uses motor activities efficiently, for the values we have introduced, we could exploit the experimental pedagogical potential, able to give back to young people, as well as adults, the potential longevity of lifelong learning, suitable for everything and especially for everyone. Therefore, this educational action of the movement, in an ecumenical formula, would push the new generations to be protagonists and not submissive, proactive and not renounced, in trust and willing of new communicative research and relational development. The idea of movement for its own sake, aimed only at the result, is now obsolete. It is clear that the practical importance of a motor and educational didactic strategy, which aims at sports culture, enhancing the educational and social well-being, both individual and collective, also aiming at new prospects of success, of opportunities for health and psychophysical well-being and finally also for economic development. The educational systems of a society and the related tools and processes of development, have a foundation in their heritage of knowledge, values, beliefs and behaviors. In fact, the word "education", in its double meaning of édere (food) and ex-dúcere (take out), is composed of terms whose meaning is aimed at enhancing the value of the individual. The education of the individual and his virtues is possible through the behaviors shared and accepted by the social context of reference. In fact, Bruner says: «Education is a complex activity, which aims to adapt a culture to the needs of its members and to adapt its members and their ways of knowing the needs of culture», (Bruner, 1996). Therefore, education equips the individual with the tools to make the best use of personal skills, thus reproducing the culture from which it is supported. In the same way, sport, an essential part of the social reference systems, is capable of transmitting rules and fundamental values for social life and of reproducing its own behavioural models. The presence in the sporting environment of multiple subcultures, makes the cultural structure always sensitive and multifaceted, whose segments of society embrace particular and distinctive

cultural elements of their own (Donnelly, 1981). The disciplines and the various sports groups within them have different characteristics and all guide the formation of different subcultures. The interactions with the sporting environment, not limited only to the practical activity, are useful to the different training contexts already rich in communication of values and shared beliefs. Each type of social interaction contributes to the formation of shared pedagogical models. Therefore it is useful to think of education through sport, as a practice that tends to communicate positive behaviors and values, and that is why sport uses a system in which the environment and societies are identified.

1. Motor activity in primary school

Training opportunities through physical activity cannot fail to consider the cultural issue that passes through physical activity and how it goes further. The way in which we think of the movement must concern society and the economic world, but above all it cannot ignore the authoritativeness of the golden rule constituted by the elements of education, training, corporeity and young generations. One of the cultural approaches that we have of the movement, which necessarily influences the management approach is: considering physical activity above all as a commercial activity, only for adults, thus totally sacrificing the interest in young people. In this mode, the sport is qualified only according to the result, the show, the affirmation of those who are strong and talented in business value, (Westerbeek, 2013); (Garner et al., 2016). A different criterion, however, is based on the idea that motor activities must be in function of the person, his well-being and his human valor growth. To improve and overcome oneself, in harmony with the community, maturing positive results for the individual good and for the ethical development of society. Often this model based on moral and civil solidarity is silent, practiced in many humble realities, but almost without a voice and without words. This archetype is constant to the idea of educating for sport and through it the whole surrounding context (Isidori, 2012). Therefore, it is fundamental, the educational approach to movement, applied to design, which enhances the dimension of play, which will be accompanied subsequently to the sporting activity and the aspect of gratuitousness, already inherent in the activity of play. This is the basis of our research, accepting the challenge of proposing the movement in the primary school for all, to improve not only the movement, but learning and cognitive processes. A modus operandi that means physical activity at the center of the person, aimed at every child. From the basic school must start the confrontation and involvement of all, from demotivated people considered weaker from an economic and social point of view, to those who are conditioned by a more sedentary lifestyle, not for work causes, but for health problems. The culture of the sciences of the movement and the relative planning modality, in order to have much formative success, must find place in a media interest, especially the new frontiers of communication, such as social networks, in order to "be heard by all" (Riva, 2016). The possible actions of development of this culture of change must be open to dialogue with those who have a different vision of motor activities. Through a dialectic of sport achieve the promotion of common interests and the growth of culture and educational potential not only sports of our country. Therefore, physical activity can improve through educational processes, to the advantage of the enhancement of the resources of sports practice which embodies the growth of younger people. Motor activities, although it has always cooperated in the training and individual growth of young people, from the most popular sports, such as football, to minor sports, all have joined, for several generations, the family and the school in the construction of the "community of people (Sibilio, 2005). In addition, other

training agencies, endless sports associations, gyms are also worth considering. They, through the many and multifaceted fitness activities improve the motivation to the movement. The above-mentioned cultural and managerial approach, of sport as a business, certainly fascinates more, but it remains for a few and these few, the selection is ruthless. Today, sports, especially popular ones, have an unaware attraction and propulsive force, to the point of affecting the emotions of millions of people and especially of all ages. This is also why sport is a great opportunity for education, an internship that can help build champions for life (Farinelli, 2005). Therefore, it is also important that young people, remain the culture of the movement, learned in school and supported as a lifestyle. Subsequently, thanks to the knowledge and skills learned, it will be possible to consciously choose a gym or a sports group, since it is able to continue, through sport, the educational and training process started already in the school. Such choices could also be useful to improve communication with the new generations, to improve the acceptance to the changes always so fast and deep, such as to invest our society to the point of overwhelming it.

2. Methods

Experimental Approach

We researched the effect of physical activity led by a motor science teacher, in a homogeneous group of children of a primary school of the Campania Region, through a randomized study and with two experimental groups. The following criterion was adopted: Group A, in which a motor science teacher guided children in physical activity, and Group B, control. All children were given the opportunity to interact and play freely in the school playground;

Participants

60 children belonging to the fifth class of a primary school in the Campania region, divided into 2 homogeneous groups (A and B). The two groups of children had the same social and economic background and the same age (9-10 years); (10 1 year; 137.25 3.12 cm; 31.24 3.24 kg) all belonging to the same school. All participants had 4 years of primary school education, and practiced at least one hour of recreational activity per week. Participants were randomly assigned to one of two groups: Group A (n=30 with motor science teacher) and Control Group B (n=30 without teacher). During the study participants did not engage in any other physical activities other than the one proposed. Prior to participation, all parents provided informed consent.

Experimental Sessions

• The goal of the activity was the Assessment of Motor Skills through the motor test slalom:
1. the slalom between the skittles with dribble for a distance of 10 meters (dribbling and dribbling with a ball with the dominant hand) to be covered in a maximum time of 30 seconds;
• Both groups (A, B) practiced the two activities for 15 minutes, repeated two days a week for 8 weeks;
• The ability to perform the coordination exercise (number of errors) was measured at the beginning (pre-test) and end (post-test) of the study;
• Group A was supported by a motor science teacher, who structured and organised the activity;
• Group B practiced the final test independently, finding alone the strategy for the execution.

• Another objective was the Cognitive Evaluation
• The observation made by the teachers in the classroom and their assessment have been taken into account;
• Teachers' observation of the specific ability in Mathematics took place before Test and post Test of physical activity;
• Objective of the assessment of Specific Competence in Mathematics was:

1. Rilevare dati significativi, analizzarli, interpretarli, sviluppare ragionamenti sugli stessi, utilizzando consapevolmente rappresentazioni grafiche e strumenti di calcolo.

Measures

• The evaluations, carried out through the motor test slalom, were carried out at the beginning and after 8 weeks of training;
• The participants performed three tests for each motor test slalom, and we thus, used the average of three consecutive measurements;
• The Cognitive Evaluation took place by the discipline teacher (Mathematics), through the implementation of the Institute grid (Figure 1).

Fifth grade **Discipline: mathematical**	
Specific competence: collecting significant data, analyzing them, interpreting them, developing reasoning on them, consciously using graphical representations and calculation tools	
VOTE	**DESCRIPTOR**
10	In situations of uncertainty it is oriented with probability assessments. has strengthened a positive attitude towards mathematics through meaningful experiences and uses with confidence the mathematical tools learned in situations to operate in reality. knows how to derive: frequency, percentual, average, moda, median from the analyzed phenomena.
9	In situations of uncertainty it is oriented with probability assessments. has strengthened a positive attitude towards mathematics through meaningful experiences and uses with confidence the mathematical tools learned in situations to operate in reality. knows how to derive: frequency, percentual, average, moda, median from the analyzed phenomena.
8	in situations of uncertainty, it is appropriately oriented with probability assessments. He consolidated a positive attitude towards mathematics through significant experiences and understood how the mathematical tools learned are useful to operate in reality. is able to obtain the frequency and median of the analyzed phenomena in an appropriate, medium and moda way and with the guidance of the insegant.
7	in situations of uncertainty, it is appropriately oriented with probability assessments. is starting to consolidate a positive attitude towards mathematics through meaningful experiences. Only with the guidance of the teacher can derive media and moda.
6	in situations of uncertainty with the guidance of the teacher orients with probability assessments. He has yet to consolidate a positive attitude towards mathematics through meaningful experiences. only with the guidance of the teacher can derive moda and median

Figure 1 (Grid of Observation and Evaluation in Mathematics)

3. Results

The results are presented as standard deviation mean. Group A showed significant improvements in the slalom motor test, while group B did not.

• Group A (presence of the motor science teacher) significantly improves the executive function;

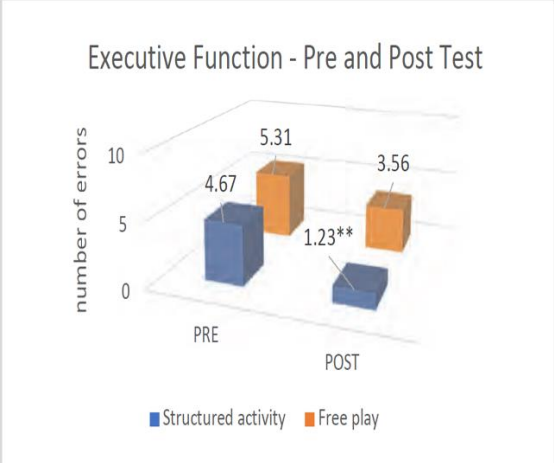
• Group B (without the presence of the motor science teacher) did not improve the executive functions in the post test (Graph 1 and 2;

• Group A (who practiced physical activity with the motor science teacher) significantly improves specific skills in mathematics;

• Group B (who did not practice physical activity with the motor science teacher) did not significantly improve specific skills in mathematics (Graph 3).

STRUCTURED ACTIVITY N. 30 children		FREE PLAY N. 30 children	
PRE TEST	POST TEST	PRE TEST	POST TEST
4.67 ± 1.04	1.23** ± 0.34	5.31 ± 1.00	3.56 ± 0.86
n. errors ± st.dev	n. errors ± st.dev	n. errors ± st.dev	n. errors ± st.dev

Graph. 1 (Result Slalom Motor Test)



Graph. 2 (Result Slalom Motor Test)

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The comprehensive institute " of Campania" in order to initiate increasingly objective and transparent evaluation processes, in compliance with the requirements of current legislation (DPR. 62/2017) In all schools, it has provided itself with tools for observing and evaluating the processes and outcomes of learning. the work resulting from the collegial work of the Departments, the instrumental functions and the staff.

observation and evaluation grid

discipline: mathematical

graph 3

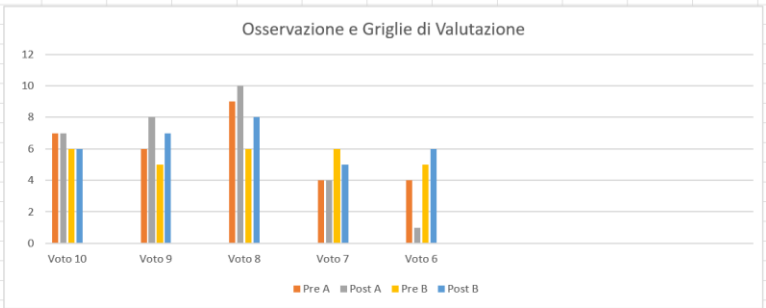
L'Istituto Comprensivo "della Campania" allo scopo di avviare processi di valutazione sempre più oggettivi e trasparenti, in ottemperanza a quanto richiesto dalla normativa vigente (DPR 62/2017) si è dotato in tutti i segmenti di scuola di strumenti di osservazione e di valutazione dei processi e degli esiti degli apprendimenti. Il lavoro frutto dell'operato collegiale dei Dipartimenti, delle Funzioni Strumentali e dello Staff

Osservazione e Griglie di Valutazione

DISCIPLINA: MATEMATICA

Competenza specifica: Rilevare dati significativi, analizzarli, interpretarli, sviluppare ragionamenti sugli stessi, utilizzando consapevolmente rappresentazioni grafiche e strumenti di calcolo.

	Voto 10	Voto 9	Voto 8	Voto 7	Voto 6
Pre A	7	6	9	4	4
Post A	7	8	10	4	1
MEDIA	7	7	9,5	4	2,5
DEV/ST	0	0,816497	0,408248	0	1,224745
Pre B	6	5	6	6	5
Post B	6	7	8	5	6
MEDIA	5,5	5,636083	7,151375	3,833333	3,287457
DEV/ST	0,235702	0,834324	0,819609	0,88541	1,120054



Graph. 3 (Result Slalom Motor Test)

Conclusions

Through our work, we have tried to demonstrate all the educational value of motor activities. It is necessary to fully develop the awareness that children are a privileged tool for involvement

and education. It is no longer enough to proclaim, almost rhetorically, that physical activity is a great resource for education, we must go further and make concrete choices that show its value. Making the physical sciences an educational asset through an effective school design is the first step to ensure that this can, then, represent the tool for a global educational development. This study also demonstrates the importance of effective cooperation between schools and families. Thanks to the consent of the parents and the availability of the school, it has been possible for us to deepen the numerous systematic and meta-analyses that describe the importance of physical activity. To date, academic achievements in the sciences of movement, confirm the educational, cultural, social benefit of the sciences of movement. Finally, from the outset, we considered the following indicators as key indicators:

- the centrality of the individual and its values, rather than its economic interests;
- educational intent;
- an educational method capable of welcoming, guiding, training, accompanying and giving concrete prospects for development;
- a voluntary experience;
- invest in educational places (sports field, stadium, gym, changing room, street, square, school, etc.);
- ongoing training of educators: coaches, animators, instructors, sports managers, referees, operators;
- A collaborative approach with the school and family context.

That said, this experimental research has contributed positively to enhancing the relationship between the improvement of the child's cognitive abilities and the motor sciences. Physical activity is part of a broad educational process. In addition, with this contribution, we have strengthened the already fundamental role of the motor science teacher, as well as ensuring the success of disciplinary objectives, harmonious development and psycho-well-beingphysical, including overcoming one's own limits and a cognitive improvement of learning.

These successes are the guarantors of the pedagogical principles and educational strategies underlying the motor sciences. This, recalls the responsibility of the whole sports world, all technical operators and their trainers, who need to promote the development of educational skills, which will allow not only to be taught responsibly, but also and above all, aware educators, able to use physical activity in order to transmit values, foster the learning of life and soft skills and promote empowerment processes, (Benetton, 2015); (Isidori, 2009); (Jones et al., 2004). It is therefore necessary, as argued by Davi (2008), "redesign the role of the coach starting to think of it also as a director of cognitive/affective scenarios, as a creator of learning contexts, as a processor of globally training situations and above all as a mediator, in educational contexts, between the analytical and the global, between the motor specialization and the human qualities, between the sporting mastery and the emotional intelligence" (Davi, 2008, p. 186). The motor sciences will be able to express their educational vision and become a tool capable of developing in an integrated way the dimensions of movement, psychosocial and physical of the person and affect the construction of active and healthy lifestyles, facilitating the achievement of a harmonious functional, physical and psychological balance, dynamically integrated into the natural and social environment (WHO, 1998, 1986).

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