Training Methodologies and Technological Tools for Sport

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Abstract
The aim of this paper is to introduce the importance of the sport-technology pair to support the possibility to generate the psycho-physical, inclusive and athletic benefits for non-disabled and, especially, disabled athletes.
In the school context, the technological innovations represent an excellent tool to develop inclusive education policies, and it is believed that they can be developed in the sports context too. Sport has always carried an important and inclusive value and, through an appropriate and efficient management of the technological potential available, it is possible to break down further barriers.
In this regard, a research analysis on some athletes of an amateur football club composed of 4 subjects with disabilities was carried out to assess the differences in terms of final performance, a training strategy carried out through a technological support (Powersprint), and a traditional one.

Keywords: *Sport; Training Methodologies; Disability; Technology.*

Introduction

Over time, the development of technologies, especially in the field of information and communication, has changed and affected almost all the activities of the human being. At the same time, their effective and efficient management has generated a number of opportunities able to promote inclusive processes for weaker subjects, such as people with disabilities (Baroni & Lazzari, 2013; Foley & Ferri, 2012).
In the school context, the adoption of technological innovations is increasingly consolidating as a reality able to positively stimulate an inclusive learning approach in order to enhance and empower also the disabled resources (Guglielman, 2011; Lage, Platt & Treglia, 2000; Starcic, 2010).

In close correlation with what we have just said, the management of technological innovations in sports context, like at school, is supposed to be implemented. This would allow amplifying the inclusive value for disability and diversity in general, which sport has always held (Di Palma et al, 2016).
In this regard, in the context of sports equipment for non-disabled and disabled athletes, a research carried out through a recently introduced technological device, called "Powersprint", is proposed. The use of this technology allows to investigate simultaneously both the improvement in the athletes' muscle tone and their morphological-functional assessment, regardless of whether we are dealing with a non-disabled or a disabled person.
The functional and physiological assessment and the continuous monitoring are essential prerequisites to plan and manage any training methodology, establish the appropriate intensity of the workloads and ensure the effectiveness and efficiency of rehabilitation paths, allowing to best adapt to the different disabilities (Barba et al, 2007; Tibaudi, 2009).

In fact, the possibility to assess, through the immediate analysis and comparison of data, the effectiveness and the impact of a training strategy helps improve the provision of sporting activity for any subject.

Sports, technology and inclusive didactics

New technological tools are rapidly becoming part of our everyday life, both in the social and professional relationships. At the same time, they involve the life plans of people with disabilities, and also/especially in education/training contexts and in those sports ones. The high-tech solutions have expanded the possibilities offered by the Assistive Technologies (AT) to the development of autonomies (Besio 2005; Salend, 2015).

In sports, like at school, the effective management of technological innovations and the related hardware and software can encourage the participation of the disabled athletes and students in learning paths, allowing for the elimination of those barriers of access that increase the gap with the fellow students.

The use of technologies for disability in educational contexts addresses simultaneously didactic-methodological and technical-management issues concerning the choice and use of the devices. These seem to be strong at least in three aspects (Pavone, 2010; Starcic, 2010):

- Motivation;
- Accuracy;
- Adaptability.

In fact, the use of technological devices, thanks to the flexibility that characterizes them, allows for the customization of the educational processes and of the training techniques, playing on everyone's learning styles and rhythms (Besio, 2005; Calvani, 2012; Lage, Platt & Treglia, 2000).

In addition, the European Commission itself finds in technology an effective instrument to support educators in the difficult task of customizing learning, making the teaching activity cooperative, focusing on autonomy and on the development of skills, also in extremely heterogeneous contexts and in the presence of students and athletes with special needs (European Commission, 2011).

The literature shows how inclusive didactics provides an important basis for guaranteeing equal opportunities to people with special needs in all aspects of their lives; It requires flexible didactic systems that can satisfy the different, and often complex, needs of every athlete. The types of practices in social contexts supporting the inclusion of individuals with special needs, such as people with disabilities, include (Foley & Ferri, 2012; Salend, 2015; Starcic, 2010):

- Cooperative Teaching;
- Cooperative Learning;
- Problem solving through cooperation;
- Heterogeneous groups;
- Systematic monitoring and assessment;
- Programming and assessment of the work of every student.

The initiatives aimed at the inclusion of people with special educational and sports needs can be considered an extension of the principle according to which school and sport should frame the special needs of every student and athlete. Requests addressed to teachers and educators are increasingly demanding: they work with groups of students that are much more heterogeneous than before (in terms of mother tongue, gender, ethnicity, religious membership, ability etc.); therefore, educators are required to manage their didactic approach by taking advantage of the opportunities offered by new technologies, so to meet the needs of

a teaching and training strategy adapted to help students become autonomous in lifelong learning.
Technologies have enormous potential to support the autonomous learning, the collaborative construction of knowledge and the skills development; they represent an important reality in the inclusive education process of the main social contexts such as school and sport (European Commission, 2011).

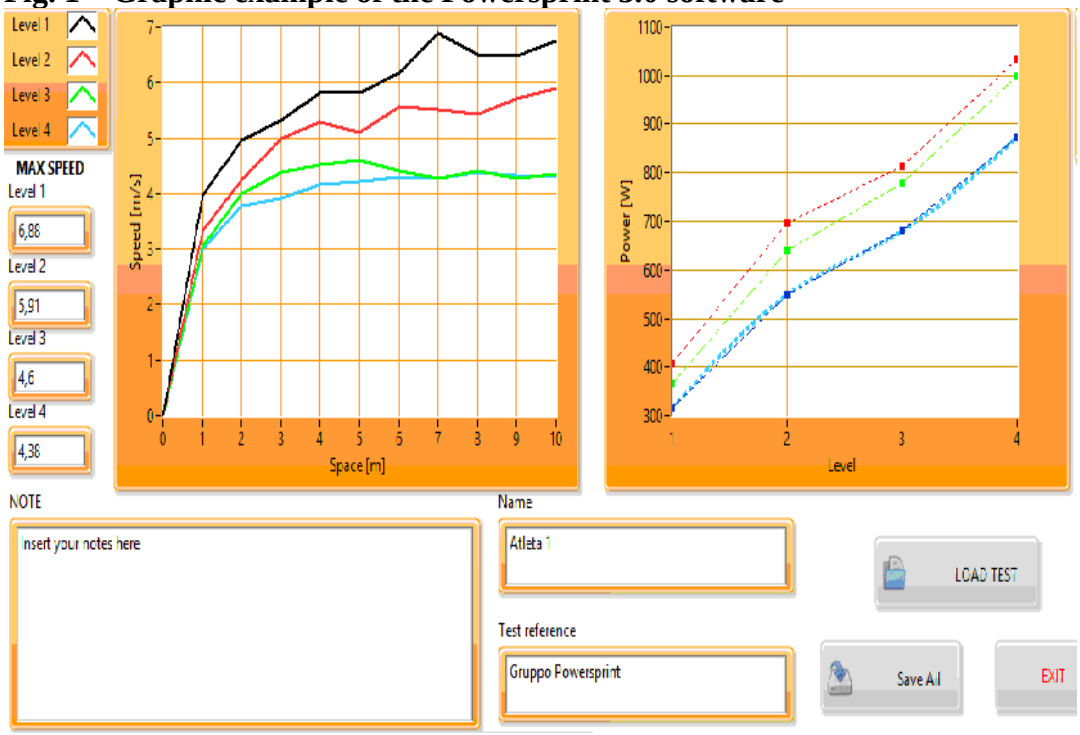
Materials and Methods

The study analysis carried out investigates the conditional aspects of sports training related to the use of a technological instrument called Powersprint, which has subsequently allowed to structure training methods adapted to the different forms of disability. For a complete understanding of the research, it is important to specify that Powersprint was created with the intent to reproduce, in the field where the sports activity takes place, a training methodology used exclusively in the gym.

Powersprint is a machine that allows the athlete to replicate the various upper and lower limbs movements, with the possibility of adding an overload that can be modulated according to the different disabilities. It has a cubic structure from which emerges an adjustable cable in space and can be easily connected with the athlete through a belt on the bust and a rigid stiff band for the upper or lower limbs. So the technology of isotonic instruments for gyms is coupled with an amazing practicality, which allows for their easy use and transport in the spaces and situations accessible also to people with disabilities.
Sports trainer specialized in using this technological tool can adapt the training model to every disabled and non-disabled athlete, through an integrated tester that provides fundamental information for the planning of specific physical and athletic exercises.
More specifically, the research methodology used involved the testing of the technological support described above on two groups of athletes of the same amateur football team, which included also 4 persons with disabilities. In both groups there were two people with disabilities and the research protocol imposed a diversified athletic training using the Powersprint for a group, and a traditional training for the other. Subsequently, an appropriate assessment of the conditional objectives achieved in connection with the initial parameters was carried out. In this regard, it is important to specify that the 4 disabled athletes suffered from physical disability of mild type, which allowed for an equal performance of the physical activity proposed.

The focus of development of the sports performance was the improvement of the strength ability expressed during the movement over short distances (Del Fosco, 1999; Oneto, 2009; Zanetti, 2014). This methodology can be developed on athletes of various disciplines and by selecting several and more specific conditional targets for disabled athletes too (Sports on wheelchairs, football for the blind, basketball, athletics etc.).
The test of this research consisted in running four times the distance of 10 meters at maximum speed with a pre-determined load variation of 6-12-18-24 kg and indicating, at the end, the maximum strength expressed in Watts during the test, with the aim to understand whether there were significant differences between the two groups (Baker, 2009; Clarkson, Nosaka, Braun, 1992; Greenwood et al, 2007; Makhlouf et al, 2015).
The data obtained were processed through the software inserted in the inner section of the tool, and the results were displayed in a graphic box on the side of the device. The data collected at the end of the test could be stored on an SD card previously inserted into the instrument. The software provided the indications concerning the test through the display of a chart as shown below (Fig. 1).

Fig. 1 – Graphic example of the Powersprint 3.0 software



Source: Our elaboration

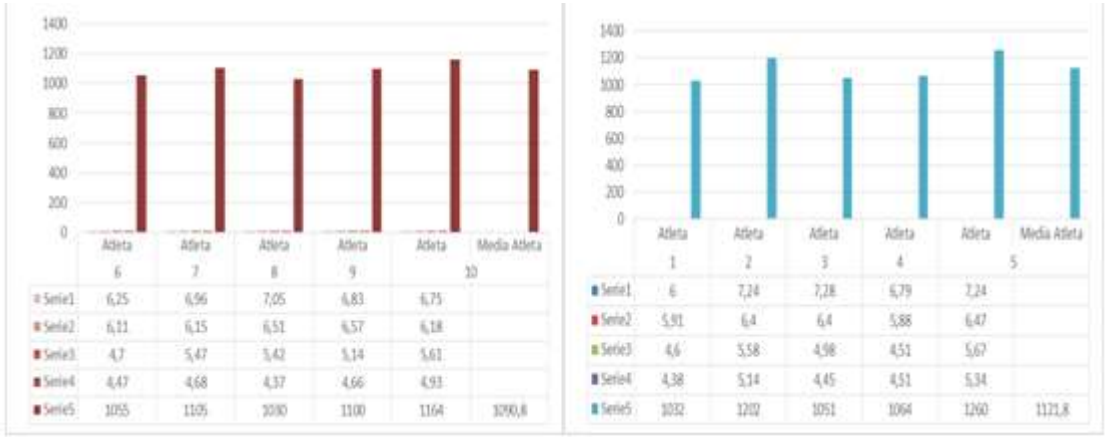
In the chart, for each athlete, the speed at different running levels and the power in relation to the load are highlighted. Generally, the maximum power is expressed by a subject at the fourth level of the test, i.e. with the maximum load (Campos et al, 2002; Russel et al, 2014; Young, 2006).

Results

The main results are shown in the graphs in the following figure, and are differentiated by the control group and the Powersprint group.

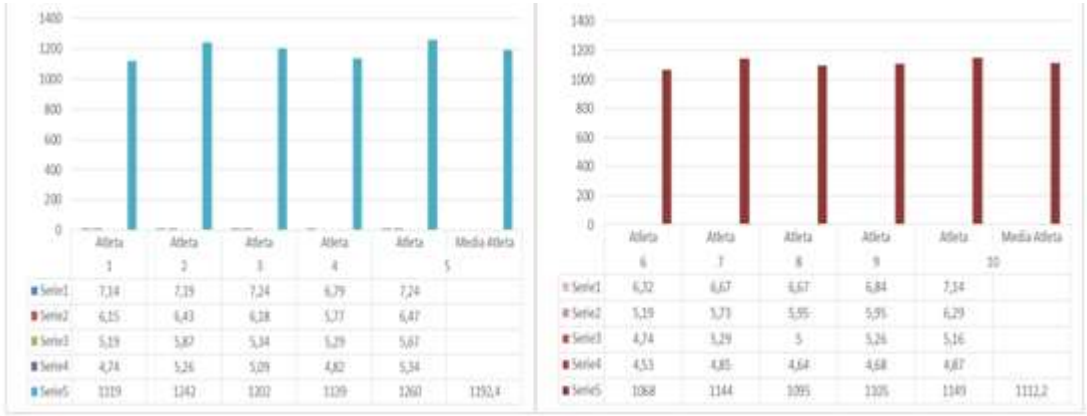
Fig. 2 - Groups assessment

Powersprint – Initial assessment - Powersprint group	Powersprint – Initial assessment - Control group



Source: Our elaboration

Powersprint – Final assessment - Powersprint group	Powersprint – Final assessment - Control group



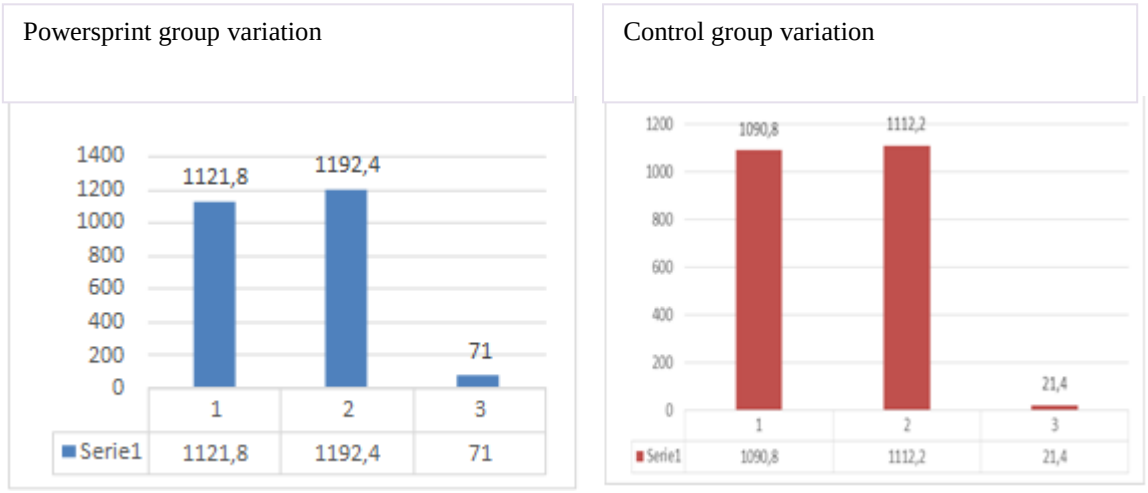
Powersprint – Final assessment Powersprint group

Powersprint – Final assessment Control group

Source: Our elaboration

The average power calculated in the group that carried out the training Protocol with Powersprint is of 1121.8 in the initial assessment, and of 1192.4 in the final assessment. The average power of the control group is of 1090.8 in the initial assessment, and of 1112.2 in the final assessment. The power variation expressed by the Powersprint group is of +71. The power variation of the control group is of + 21.4.

Fig. 3 – Final assessments



Source: Our Elaboration

Discussion: the importance of sports training supported by technology

The interpretation of the data allows us to understand which elements of technological innovation proposed, understood as sports equipment functional to training of the athlete, can determine the variation, in positive terms, of the parameters of conditional nature. Therefore, the development of the power conditional abilities implementation expressed during the movement are facilitated.

This newly designed instrument, connected to the methodology of muscle strength training, has provided significant results that predict the possibility to introduce in the market sports equipment designed with this new technology supporting physical activity.

In addition, the methodological-didactic process providing for the implementation of the technological support in physical and sports activities is manifested in the practice through a more efficient and effective practical training, both for the disabled and the non-disabled subjects (Ambrosio et al, 2011; Bosco, 2000; Shogan, 1998; Tous-Fajardo et al, 2006; Wilson & Clayton, 201). Not surprisingly, also for the two disabled athletes belonging to the Powersprint group, the final athletic and sports benefit was greater than for those in the control group.

Among the transversal application fields of special didactics there is also the topic of the development of new technologies and training tools and, in this perspective, Powersprint is linked to the development of new forms of didactic communication and learning of motor skills, in order to improve the physical conditions also in individuals with disabilities and/or medical pathologies. This is done through the opportunity to express new specific movements that the technological tool allows to perform by involving various muscle groups and consolidating the movement patterns that the athlete has available while practicing the sports activity.

Finally, it is important to consider that, especially in the case of subjects with disabilities, the opportunity to enhance the athletes' sport performance helps amplify, as a consequence, the

known benefits on the psycho-physical state and on the social inclusion that sport can provide (Di Palma et al, 2016).

Conclusions

An appropriate and efficient use of the technological innovations grants the opportunity to foster the development of the inclusion phenomena for disabled people, and for any category in a socially disadvantaged situation.
Through the use of technological tools in the main social contexts, such as school and sport, it is possible to break down exclusive barriers which have always represented a considerable limit to the spread of inclusive didactics.

Moreover, at sports level, the support of the technological tools allows for a marked improvement in performance, as shown in the research analysis carried out through the implementation of the Powersprint. This increase in the athletic and sports results generated benefits both for the disabled and the non-disabled athletes, allowing to analyze that technology, if properly developed and used, is a non-discriminatory factor.
In addition, the potential inclusive value of sport and the ability to increase the state of physical and mental wellbeing can be amplified through the adoption of the currently available technology.

Therefore, we all hope that scientific research will focus on the sport-technology pair in order to promote the spread of effective and efficient tools in sports activities to improve athletic performances, health status and conditional abilities of athletes without any discrimination, in accordance with the principles of the inclusive didactics.

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