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The Modern Technology to Stimulate and Improve Sports Performance for the Paralympic Athletes.

Guebli Abdelkader¹, Reguieg Madani², Sbaa Bouabdellah¹, Nurtekin Erkmen³, Francisco Jeci de Holanda⁴

¹ Laboratory APSSSES, Society, Hassiba Benbouali University of Chlef 02000, Algeria.

² SMAH Laboratory, Faculty of Physical Education and Sports, Abdelhamid Ibn Badiss University of Mostaganem, Algeria.

³ Department of Trainer Education Program, Faculty of Sports Sciences, Selçuk University of Konya 42130, Turkey.

⁴ Department of Physical Education, Center University Palanalto of Distrito Federal – UNIPLAN 71916-500, Brazil.

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ABSTRACT

The purposes of This article examine a number of factors related to Incentives of Technology development for the exercise and improvement of sports performance of the disabled. as well as Psychological and technological considerations for some Paralympic sports will be discussed including; Psychological motivations, Social and interactive, Health, advances in technology and performance measurement for these Paralympic athletes. Our study based on a set of previous research discussed by this topic, addressed by its developments at different levels, also we seek to match these developments with the achievements of the national elite of disabled athletes in various international forums. Where it turns out the athletes with disabilities are trying to narrow the gap in competition in digital level between the impaired and the unimpaired athletes, through training, advancement of technology, and the competitive spirit and ingenuity of the Paralympic athlete. However, the delay in using these new technologies for disabled peoples within Algeria hinders the orientation of this sample towards practice and integration into the community in real form.

التكنولوجيا الحديثة لتحفيز و تحسين الاداء الرياضي لذوي الاحتياجات الخاصة

قبلي عبد القادر¹، رقيق مداني²، اسبع بوعبدالله¹، نورتيكين إركمان³، فرانثيسكو جيسي دو هولاندا⁴.

1 مخبر النشاط البدني والرياضي، المجتمع، التربية و الصحة، معهد التربية البدنية و الرياضية، جامعة حسيبة بن بوعلي بالشلف، الجزائر.

2 مخبر العلوم المطبقة في الحركات الانسانية، معهد التربية البدنية و الرياضية، جامعة عبد الحميد بن باديس بمستغانم، الجزائر.

3 قسم برنامج تعليم المدرب، كلية علوم الرياضة، جامعة سلجوق بقونيا، تركيا.

4 قسم التدريب البدنية، مركز جامعة بلانالتو ديستريو الاتحادية **UNIPLAN**، البرازيل.

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المخلص

ان الرياضة و التأهيل الصحي هما حجر الاساس في كيفية تعريفنا لأنفسنا بأننا بشر ، فالروح التنافسية بارزه لدى الافراد ذوي الاعاقه خلال الحياة اليومية كما هو الحال لدى نظرائهم الأصحاء .(Laferrier et al., 2012) وقد صخرت كل الانشطه البدنية والرياضية الناتجة عن التطورات التكنولوجية الجديدة كأداة لأعاده التأهيل ورعاية مختلف الرياضيين من الرجال والنساء ذوي الاحتياجات الخاصة. وتتناول هذه الدراسة عددا من العوامل المتعلقة بحوافز تطوير التكنولوجيا من أجل ممارسه النشاط الرياضي و تحسينه للمعاقين ذوي الاحتياجات الخاصة، كذلك تتناول الدراسة بعض الاعتبارات النفسانية والتكنولوجية لبعض الرياضات البارالمبية ،كما ستناقش بما في ذلك ؛ الدوافع النفسانية ، الاجتماعية والتفاعلية ، الصحة ، التقدم في التكنولوجيا وقياس الأداء لهؤلاء الرياضيين المعاقين.

الكلمات المفتاحية:

التكنولوجيا.

التحفيز.

الاداء الرياضي.

الرياضي البارالمبي (ذوي

الاحتياجات الخاصة).

ان دراستنا القائمة علي مجموعه من الأبحاث السابقة التي ناقشها هذا الموضوع ، والتي تناولت تطوراته على مختلف المستويات ، تسعى أيضا إلى مواكبه هذه التطورات مع إنجازات النخبة الوطنية من الرياضيين المعاقين ذوي الاحتياجات الخاصة في مختلف المحافل الدولية. حيث تبين ان الرياضيين ذوي الاعاقه يحاولون تضيق الفجوة في المنافسة على المستوى الرقمي بين المعاقين والرياضيين غير المعاقين ، من خلال التدريب ، والنهوض بالتكنولوجيا ، والروح التنافسية وبراعة وتميز الرياضيين المعاقين. ومع ذلك ، فان التأخير في استخدام التكنولوجيات الجديدة للمعاقين داخل الجزائر والمتمثلة في الأدوات المادية المساعدة على تحسين الأداء يعوق توجه هذه العينة نحو الممارسة والاندماج في المجتمع بشكل حقيقي.

1. Introduction:

In the 21st century, more people than ever before are participating in sports. In the words of the former U.N. Secretary-General Kofi Annan, sport has truly become a universal language, bringing people together, no matter what their origin, background, religious beliefs or economic status. With increased interest and participation in sports, and the extensive media coverage of sporting events worldwide, sport has evolved into a global business in billions of dollars, including sports products and services (Fuss, Subic, & Mehta, 2008). As Paralympic sports have seen an exponential increase in participation since 8 Algerian disabled athletes took part in the first Paralympic Games on Barcelona 1992 (Summer Games).

Paralympic Games - A multi-sport event for athletes with physical, mental and sensorial disabilities. This includes mobility disabilities, amputees, visual disabilities and those with cerebral palsy. The Paralympic Games are held every four years, following the Olympic Games, and are governed by the International Paralympic Committee (Bartlett, 2007). More than 60 athletes took part in the Rio de Janeiro 2016 Paralympic Games. These few sporting events have seen such rapid evolution ("IPC Historical Results Archive - Country Web," 2019.). The number of people with disabilities involved in sport and physical recreation is steadily increasing around the world with organized sports for athletes with disabilities divided into three main disability groups, sports for the deaf, sports for persons with physical disabilities, and sports for persons with intellectual disabilities (Abdelkader, Madani, Adel, & Bouabdellah, 2018). This rapid pace of change and development also has meant challenges for understanding the injury risks of participation, not only because of the variety of sports, the evolution of adapted equipment but also because of the inclusion of additional impairment types and development of new sports over time. Where the early studies were limited in scope but patterns of injuries are slowly emerging within Winter and Summer Paralympic sports (Webborn & Emery, 2014).

Technology affects many aspects of the sport from performance on and off the field to the spectating and public profile. Increasingly, advances in technology influence grass-roots as well as elite's Paralympic sport, where technology is used to enhance athletes' performances at all stages – before, during and after events. It may be used by the athletes' support teams, such as coaches, medics and technicians, as well as by the Paralympic athletes themselves in training, Rehabilitation and psychological stimulation ("Technology in sport - WJEC - Revision 4 - GCSE Physical Education," 2004.). The sports industry has diversified to accommodate the different interests and needs of the broader stakeholder base. The attributes described by the Olympic motto 'Swifter, Higher, Stronger' (in Latin *Citius, Altius, Fortius*) are very much complemented today by additional aims that include, for example, safety, equity, and access. Over the years, the industry has promoted and helped develop new sports that have in turn served as catalysts for new types of products (Fuss et al., 2008).

The quest for new markets, records, and sports supremacy has led to millions of dollars being spent on research in and development of sport techniques and equipment. As a

consequence, both athletes and coaches are now involved in increasingly complex systems that rely heavily on advanced technologies (Chi, Borriello, Hunt, & Davies, 2005). Although advanced sports technologies are frequently enabled by novel design, advanced materials and processes, they derive from a deeper understanding of the particular needs of athletes and associated product attributes, including performance, aesthetics, ergonomics and sensory perceptions (Christine, 2017).

2. Modern Technology and Algerian Paralympic Sports:

The achievements of elite athletes of Algerian in sports Paralympic have recently evolved remarkably (Table.1), as the practitioner's number of various Paralympics sporting activities has also risen (Table.2). This is illustrated by the digital levels achieved in the recent Paralympics Games. This has stimulated and encouraged people with disabilities to engage and practice of various sporting activities. However, this progress in motivation the psychological factor towards the practice of sports objected by many obstacles, the most important lack of material means and sports equipment for practice, as the equipment used in practice has recently development significantly at the global level. This encouraged the most people disabled for practicing of the sports activity in different games.

In Algeria, disabled people suffer in a lack of sports equipment, as this group of society has been eliminating the psychological problems That impede their exercise of sport and their integration into society. and that's a very important incentive, but the technological means used to practice sports has become an impede for people with disabilities in Algeria, including the general technological means like specific Wheelchair sports seating (basketball, tennis ...etc).

Table.1: IPC Historical Results Archive for Algerian NPC.

<i>Medals by Sport - Summer Games</i>				
Sport	Gold	Silver	Bronze	Total
Athletics	20	18	27	65
Judo	3	0	5	8
Total medals	23	18	32	73
<i>Medals by Year</i>				
Games	Gold	Silver	Bronze	Total
1996 Atlanta	2	2	3	7
2000 Sydney	3	0	0	3
2004 Athens	6	2	5	13
2008 Beijing	4	3	8	15
2012 London	4	6	9	19
2016 Rio Janeiro	4	5	7	16
Total medals	23	18	32	73

Table.2: All-Time Participants - Summer Games for Algeria NPC.

Para N° Games	Athletics	Powerlifting	Total
	106	15	121
	Men	Women	Total
1992 Barcelona	8	0	8
1996 Atlanta	9	0	9
2000 Sydney	7	1	8
2004 Athens	14	4	18
2008 Beijing	21	7	28
2012 London	24	7	31
2016 Rio Janeiro	34	26	60

Since the equipment among unimpaired athlete varies widely depending on which sporting activity and This should be unsurprising. because Besides applying the latest technologies to sports equipment to compensate for decreased function, customized equipment attempts to fit each athlete intimately so that the participant may utilize that equipment as an extension of his/her body (Blauwet & Willick, 2012). Individual differences in body structure and physical ability are emphasized in designing sports equipment to gain mechanical advantage and prevent wasted energy. Failure to fit the equipment to the athlete may result in poor performance and predispose the individual to accidents or injuries (Laferrier et al., 2012). Below we discuss the key principles in sports Paralympic equipment for some popular Paralympic sports taking into consideration aspects of Performance Kinetic, mobility, and pressure relief.

3. Discussion:

The positive association of education and practice on sports participation could indicate that these Paralympic Athletes of the elite team have more experience in coping with barriers. People with higher education (high school or more) might have learned more skills in terms of coping with problems or are readier to become active in sports, despite possible barriers (Kaplan et al., 2003; Kinne et al., 1999). It's no surprise that technology is reshaping the world in which we live, as might be surprised how it's changing the world of sports. technology has led to the development of better safety equipment and the testing of that equipment. For example, Wheelchair Sports, biocompatibility, and dozens of other factors. Collectively, this helps to reduce the total number of player injuries sustained during a game. it also helps to facilitate the practice of sports for Paralympic athletes (Christine, 2017).

Intensive data analysis can also help athletes understand when they are at risk for injury, by tracking their physical motions. Modern technology may be able to Protect Athlete and therefore prevent this from happening.(Can, Lu, & Gan, 2011). technology is making sports more available to fans than ever before. disabled people now have the option to stream their favourite games at home or on mobile devices, live or as an archived recording, and can use social media as a way to express their love or hate for whatever teams are playing (Cooper & Luigi, 2014). That level of accessibility is transforming the way that disabled people enjoy sports, and it's only going to grow more immersive from here especially with the development of equipment technology (Haake, 2009).

Figure.1: Wheelchair basketball, Tennis, Wheelchair racing



Wheelchair sports; The goals of seating systems in wheelchair sports extend far beyond the postural and pressure relieving of a seating system in an everyday chair and can vary widely across different wheelchair sports. A sports wheelchair enables mobility challenged athletes to participate in their desired sporting activities with decreased restriction. Appropriate wheelchair selection and settings will contribute to optimizing sports performance as well as protecting the athlete from possible negative effects including blunt force and repetitive strain injury. Wheelchair basketball like its standing counterpart is a fast-moving and exciting sport. Agility (achieving rapid responses in acceleration, braking, and turning), overall speed, and stability are keys to gaining the advantage in wheelchair basketball games (Vanlandewijck, Theisen, & Daly, 2001). **Seating for wheelchair basketball** is intimately related to the desired outcome, which is to have fun, be competitive, and more often than not, win. In general, decreasing rolling resistance when moving forward, turning and improved wheelchair response are the goals when setting basketball wheelchairs.(Nosal, n.d.). **Wheelchair tennis** has a very fast tempo, even when the two-bounce rule is applied. Because players have to do their best to cover the entire court, it is important that the wheelchair is fast and responsive .The goal of seating in wheelchair tennis is to permit a full range of motion of the trunk (in all directions) to increase the athlete's ability to reach and hit the ball(Burkett, 2010). **The wheelchair racing** and user interface remain critical issues, even with the significant advances in the availability and design of commercial racing wheelchairs (Cooper, 1990; Robertson, 2000). The seating interface should fit tightly to the user. the seat should be silent when pushing at maximal speed and force (Figure.1).

Throwing chair; Paralympic athletics include four throwing sports: shot put, discus, club throw and javelin (Figure.2). While both ambulatory and seated athletes participate in all throws, this focuses on the seated thrower or classifications F31-34 and F51-58. There are few regulations on the frames used for seated throwing and several styles of frame designs have proliferated (Hellwig, 2010). Previous literature on throwing events for athletes with disabilities has mainly focused on the biomechanics of the throwing (Chung, 2003). current throwing chair designs are: difficult to secure to the ground, provide little support of for the legs and feet, have few adjustable features, are easy to misalign with the sector when securing to the ground, and can be difficult to transfer from and back to the athletes' wheelchair. Recent efforts at the Human Engineering Research Laboratories have led to the creation of a highly adjustable throwing chair design that addresses these shortcomings (Chung, 2010).

Figure.2: Design of throwing a chair

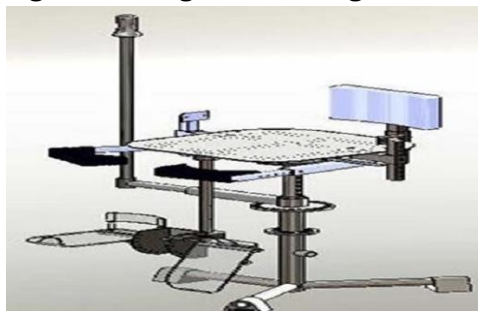
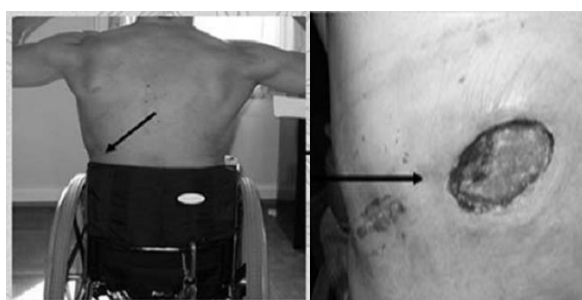


Figure.3: Ulcer due to improper adaptive seating



The adaptive sport continues to break down social, conceptual, and physical barriers through the advancement of technology, and the competitive spirit. Consideration should always be given to proper equipment selection, maintenance, and fitting in order to maximize functional capacity, improve performance and prevent injury (Faupin, 2004). Further to Performance enhancement by identifying ways to optimize training and provide sound coaching at all levels. add that, improving equipment design to provide superior strength whilst decreasing weight and increasing maneuverability, and Providing protection from repetitive trauma which could lead to pressure sores and various other injuries (Figure.3) (Frank, 1993).

In the past decade, there have been a number of new technologies introduced to facilitate research and advance sports performance for people with disabilities. As these technologies become more widely available, their impact should grow to increase the understanding of the mechanisms that influence adaptive sports performance. This study focused on determining factors motives to sports participation with modern technologies for Algerian athletes disabled. where Today, sports are still part of the rehabilitation program, to familiarize patients with physical disabilities with different sports possibilities and increase their physical fitness and quality of life (Notté et al., 2011). With more (international) interest in Paralympic sports than ever, one would expect that the sports participation of people with physical disabilities, in general, might also increase (Dlugonski et al., 2011). despite the presence of sports in the rehabilitation program and the growing attention for Paralympic sports, the majority of people with physical disabilities still are not physically active (Nulty DD, 2008). And the multiplicity of reasons between the psychological incentives and the simple means and equipment adopted in practice (non-modern technologies).

However, the results of the national elite confirm the continuation of its efforts during the training, in light of obstacles encountered by material means of modern technology. The benefits of sport and physical activity for disabled people can certainly go beyond the exercise itself. It can provide a gateway to social wellbeing by opening-up further opportunities for friendship-building and meaningful interactions through complementary activities, including time shared with others.

4. Conclusions:

People with different physical disabilities experience several generic, but also specific barriers and facilitators of sports participation Both generic and specific barriers and facilitators should be included in sport stimulation programs to increase sports participation of people with physical disabilities. and for trying to increase sports participation for people with physical disabilities, it is important to understand what withholds them from sports and how they can be stimulated to become active in sports. It is also important to establish whether active and inactive people with physical disabilities experience different barriers and facilitators of sports

participation. In order to do so, the following considerations should be kept in mind: * Persons with a physical disability should have a positive attitude towards sports participation and have to (internally) motivating to become active. *Rehabilitation professionals should emphasize health and psychosocial benefits of sports participation. *Algerian Paralympic committee should be also improving disability sports knowledge, and technology equipment used in the practice to fully integrate sports participation of people with and without physical disabilities. *improve the infrastructure such as sports facilities, and collaborate with other health. In addition to opening a national market for sports equipment for the disabled with modern technologies.

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