Future perspectives for physical education, sports and fitness

DOI: 10.46981/sfjvh2n1-006

Received in: November 1st, 2020

Accepted in: December 30th, 2020

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ABSTRACT

There is increasing discussion on the accelerated pace of change in contemporary society. The aim of the present study was to examine the future perspectives of physical education, sports and fitness. Society 5.0 is humanity's response to achieve the Sustainable Development Goals. The initiatives presented here potentially reflect the transformation of the world we live in, ensuring a more just, sustainable and viable future.

Keywords: Physical Education, Society 5.0, Sustainable Development.

1 INTRODUCTION

Recent years have been characterized by an exponential growth in scientific knowledge and information technology. These factors are causing significant transformations in society, the job market and means of production (Cunha, Cunha, Costa, & Cunha, 2017).

Although it is increasingly common to discuss the accelerated pace of changes in contemporary society, an American thinker, Alvin Tofler (1928 - 2016), perceived this trend in the 1960s, when he disseminated innovative political, economic and technological concepts, in addition to futuristic ideas based on his thoughts regarding scenario planning (Tofler, 1973).

Tofler (1973) claimed that human society evolved in three large transformation waves: the first, which occurred in the Neolithic period, around ten thousand years before Christ, was the discovery of agriculture and domestication of animals. This transformed us from nomadic hunters and gatherers into farmers and breeders.

This first wave in the Neolithic period was even more marked five thousand years later, with the invention of the plow, which enabled food storage, giving rise to cities and later, civilizations (Santos, Veloso, & Oliveira, 2017).

The second wave, which occurred in the early 18th century, was the Industrial Revolution resulting from the invention of the steam engine. Until that event, all civilization's accomplishments, including the pyramids of Giza, the Great Wall of China, and Chichén Itzá, depended on human strength or animal labor for their construction (Sachs, 2018).

The third wave, in 1980, was telematics, a combination of telecommunications and informatics, which radically transformed work organization and diffusion of interactive media through the popularization of information technologies, leading to increased social alienation, family crises, increased illicit drug use, electronic terrorism against countries, banks and companies (Azevedo & Santos, 2017).

Due to the growing technological evolution and hyperconnectivity, a new society must emerge to adapt to the socioeconomic changes and personal relationships, that is, a smart society, with the implementation of artificial intelligence (AI) using intelligent management that guarantees the quality and sustainability of human needs and optimizes human-machine interaction (Foresti et al., 2020).

The paradigm of the new Society 5.0 technological system is based on management centered on the essence of human existence, physical integrity and interaction with natural resources (Sachsenmeier, 2016).

In 2016, the Cabinet of Japan (the governing body of the Japanese government), consisting of the Prime Minister and 19 Ministers, adopted a 5-year national strategy denominated the 5th Basic Science and Technology Plan, formulated by the Science, Technology and Innovation Council. This plan proposed that Japan implement Society 5.0 by 2021 (Man, 2018).

A super smart society, Society 5.0, in its broadest concept of a complete lifestyle transformation via artificial intelligence and robotics, is an economic system that, in addition to being sustainable and inclusive, is strongly dependent on advanced cyber-physical technologies, with a view to overcoming chronic social problems such as human aging, traffic stress, growing society polarization, restrictions on clean energy sources, poor access to low-cost medical technologies and environmental problems (UNESCO, 2015).

Society 5.0 results from the evolution of society over time, starting with a nomadic, hunting and extrativist society (Society 1.0); the agrarian and pastoral society (Society 2.0); the industrial society, (Society 3.0); and the information society (Society 4.0). Thus, it will be a post-social evolution society envisioned by Tofler (Shiroishi, Uchiyama, & Suzuki, 2018).

Figure 1: Societal evolution according to the 5th Basic Science and Technology Plan of Japan.

Source: Maeda, 2019

The assembly lines of this new society lead to the rapid production of personalized innovations and artefacts. This trend away from the standard assembly line to the manufacture of articles customized according to the customers' desires is the new industrial logic. In order to characterize this innovation, the term Industry 4.0 was created in Germany in 2011, during the Hannover Trade Fair. A study published in 2013, led by Siegfried Dais (Robert Bosch) and Kagermann (German Academy of Science and Engineering), aimed at implementing a new industrial model for the Federal Government of Germany that addresses the connection between machines, systems and assets that can promote control of each stage of the value chain, in order to make their factories smart, as publicized at the annual Hannover Fair (Hnát, Herko, & Gregor, 2018).

The new Industrial Revolution phase, Industry 4.0, also known as the Internet of Things (IoT) or smart manufacturing, is governed by interconnectivity, automation, machine learning and real-time data, interconnecting physical production and operations with smart digital technology, machine networks and devices. Cloud computing centralizes information to create a better-connected ecosystem for manufacturing and supply chain management companies, in order to promote a sustainable industrial evolution for humans and their social, environmental and economic dimensions. Despite operating in different ways, the companies and organizations commonly face the challenge of connectivity and real-time access to insights between processes, partners, products and people (Garcia-Muiña, González-Sánchez, & Ferrari, 2018).

Industry 4.0 resulted from an evolution that started in the Industrial Revolution, progressing as illustrated in Figure 2.

Figure 2: The four stages of the industrial evolution, according to the German Government.

Source: Adebayo, Chaubey, Numbu, 2019

Industry 1.0, Mechanization, weaving and steam power, Industry 2.0, Scale production, assembly line, electricity and combustion, Industry 3.0, Automation, robotics, internet and electronics, Industry 4.0, Cybernetic systems, internet of things, artificial networks and intelligence

In this new concept of industry, repetitive activities are performed exclusively by machines, creating new professions that will be consolidated in the job market in the next five to ten years.

A study conducted by the National Industrial Learning Service (SENAI) forecasts 30 new mid and high-level occupations in eight areas: automotive; food and beverage; machines and tools; oil and gas; textile and clothing; chemical and petrochemical; information and communication technologies, and civil construction (SENAI, 2018).

These new professions, which will involve specialists with competencies updated according to the future needs of companies, will be qualified to innovate, conduct business, solve problems and master digital technologies. The new trends are technological tools that replace repetitive jobs; more data interpretation opportunities; and more advanced decision making based on artificial intelligence (SENAI, 2018).

Another factor that affects society and the job market is the decline in human resources due to the aging population worldwide. Known as “demographic transition”, this phenomenon is characterized by profound behavioral changes in fertility levels, lower mortality, increased life expectancy and a marked rise in older adults (Oliveira, 2019).

In Brazil, according to the UN Population Division’s projections on the demographic transition between 1950 and 2100, mortality rates started to decline at the end of the 20th century and birth rates remained high throughout the country’s history, until they began to fall in the 1960s. Between 1950 and 1975, the average age of Brazilians was around 20 years, which means that half the population was

younger than 20 years old, and people older than 60 years accounted for only 5%, that is, Brazil was considered to be a country with an extremely young population (Alves, 2019).

This scenario will change completely by the end of the 21st century, when median age will be around 50 years, meaning that half the population will be older than 50 years. Adults aged 60 years and older will account for around 40% of the total, a situation that will require adequate political, economic and social policies to address the new population structure (Alves, 2019).

Figure 3: The demographics of aging in Brazil: median age, 1950-2100.

Source: UN/Population Division: World Population Projections, 2019.

Considering this picture, population aging is related to changes that impact age structure and consubstantially increase the relative percentage of people above a certain age such as the onset of old age, which varies in different societies and considers biological, economic, environmental, scientific and cultural factors. Thus, the social phenomenon of demographic and epidemiological transition and an aging population represent the outcome of actions taken by public health to promote preventive and curative care, changing the mortality scenario and increasing life expectancy (Borba-Pinheiro, Dantas, & Figueredo, 2016).

With the increase in life expectancy worldwide, including the older population, one study found a decline in their cognitive abilities, which may be prevented or delayed through physical exercises, which also promote psychosocial and behavioral benefits in the activities of daily living, reducing the risk of falls and fractures and, in turn, the number of hospitalizations (Doine; Martelli; Hunger, 2020).

Thus, prevention involves not only promoting physical fitness, but also social, psychological, socioeconomic, sociopolitical, sociocultural and psychosocial aspects (Vale, Pernambuco, & Dantas, 2016).

Whereas physical educational professionals previously worked largely with children and adults, their current clients are predominantly older individuals. In order to address all these rapid transformations and preserve human values, the World Health Organization published Agenda 2030 in September 2015, containing 17 Sustainable Development Goals (SDGs), divided into three levels: personal, ecological and spiritual, as presented in Figure 4 (UN, 2015)

Figure 4: Sustainable Development Goals (SDGs)

Source: Bali, 2016.

This agenda provides a historic opportunity to improve the rights and well-being of human beings, especially the most vulnerable such as children, older adults, the disabled and the underprivileged. The aim is to guarantee a healthy planet for future generations that will be experiencing marked social, technological and economic transformations of this new millennium.

At the so-called “bottom of the pyramid”, the UN’s main concerns are poverty, hunger, health, education, gender, water, energy, work, infrastructure and inequality. In addition to being directly responsible for health and education, physical education professionals need to tailor their work to the other goals. This same adaptation must be adopted for goals related to ecology (sustainability, waste, climate, diversity and the environment) and spirituality (peace, justice and participation).

2 DEVELOPMENT

At the start of the millennium, economic and social transformations, driven by technology and innovation, are occurring exponentially at a scale never before seen in human history, producing significant changes in health, education and the job market.

Figure 5 shows the interaction between the virtual and physical world, which is increasingly present in our reality. The manufacture of physical products and articles will be increasingly automated,

a large portion of them by 3D printers, and services will be provided by robots. All the objects and beings will be sources of virtual information, thanks to the chips and sensors contained in them. Cyber Space will be governed by an enormous volume of information (Big Data), effectively analyzable only by artificial intelligence.

Figure 5: The relationship between virtual reality and the physical world

Source: Martynov, Shavaleeva, Zaytseva, 2019

As expected, the job market will undergo significant transformations caused by these new trends. All the studies conducted by the Singularity University and other organizations involved in innovation, propose the preservation and expansion of professions that cannot be well performed by machines or artificial intelligence, notably those that depend on creativity, care and human attention (Bersin, 2016).

Thus, significant development can be expected in the coming years in the following professions: creation of digital content; software development; care provision (nurses, physiotherapists, occupational therapists); and personal care (baristas, enologists, personal trainers, etc.). (TIDD & BESSANT, 2018).

The impact of the technological revolution on the job market for physical education, sport and fitness results in the assimilation and adjustment to the new realities and innovations presented here.

Every year, the American College of Sports Medicine (ACSM) conducts a global survey on fitness market trends. The 2019 survey is presented in Figure 6 (Thompson, 2019).

Figure 6: Fitness market trends in 2019

Rank	Top 20 Worldwide Fitness Trends for 2019
1	Wearable technology
2	Group training
3	High-intensity interval training (HIIT)
4	Fitness programs for older adults
5	Bodyweight training
6	Employing certified fitness professionals
7	Yoga
8	Personal training
9	Functional fitness training
10	Exercise is Medicine
11	Health/wellness coaching
12	Exercise for weight loss
13	Mobile exercise apps
14	Mobility/myofascial devices
15	Worksite health promotion and workplace well-being programs
16	Outcome measurements
17	Outdoor activities
18	Licensure for fitness professionals
19	Small group personal training
20	Postrehabilitation classes

Source: Thompson, W. R., 2018

Figure 6 shows some of the goals that have changed over time, such as the progressive use of technology; the search for quality services; the need for greater personal care; and the promotion of exercise models as a way to enhance health.

In the last century, physical education jobs were primarily in a school setting, sports and the body esthetics market, but the current trend is towards market segments with greater factorial development potential, as presented by Tidd & Bessant (2018).

1) Creation of digital contents – notably in high-performance sports and in associated areas: training, event promotion, talent discovery, sport career counseling etc.;

2) Care provision – execution of health-related services, such as the physical fitness of older adults, hospital-based physical education and outpatient care for special groups, the obese and people with chronic diseases (metabolic syndrome, hypertension, diabetes, cancer, AIDS etc.);

3) Personal care – providing services tailored to individual needs, such as individualized training, personal training for small groups and in gyms.

As in medicine, nutrition, law and many other professions, some of the tasks of physical education professionals will be extinguished by technology (Maddox, Rumsfeld, & Payne, 2018). Like telemedicine, digital nutritional prescription and online petitions, training plans and workload quantification will be increasingly more prominent, more accurate and faster through smartphone applications (Zhu & Zheng, 2018).

This trend has also been observed in the monitoring and control of physical training. The incorporation of accelerometry sensors in smartphones and smartwatches, associated with freeware

applications for these instruments, mean that the work performed, calorie expenditure and energy output will be controlled primarily by these technologies, instead of calculated by a professional.

3 CONCLUSION

As Doctor William Pollard (1911 – 1989) said: “To change is difficult. Not to change is fatal!”. It is natural for human beings to become attached to their habits, customs and paradigms, but the drastic changes that our society is undergoing requires, more than ever, rapid and substantial adaptation.

Society 5.0 is humanity’s response to achieve the Sustainable Development Goals. These two initiatives will potentially transform the world in which we live, ensuring a more just, sustainable and viable future.

However, “you cannot make an omelet without breaking eggs”. Meeting individualized demands, work automation, e-learning, as well as job market trends presented throughout this article, will significantly transform the world of labor.

To that end, social relations, work and the *modus vivendi* of everyone will be markedly and irreversibly affected by this “technological revolution”, as depicted in Figure 7.

Figure 7: Sustainable Development Goals and Society 5.0

Source: Tetsu M., 2019.

According to Richard Buckminster Fuller (1895 – 1983):

“We are faced with an entirely new relationship to the universe. We are going to have to spread the wings of intellect and fly or perish; that is, we must dare immediately to fly by the generalized principles that governing universe and not by the ground rules of yesterday’s superstitious and erroneously conditioned reflexes” (Fuller, 2001).

We therefore embrace these new paradigms with enthusiasm and determination.

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