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Open Journal per la formazione in rete

articoli

Improving personal and social skills through motor activity supported by gaming technology

Miglioramento delle abilità personali e sociali attraverso l'attività motoria assistita dalla tecnologia di gioco

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Abstract

The new educational systems must take on the responsibility to implement innovative forms of learning. International trends such as *Agenda 2030* and the new *Framework on LifeComp 2020* dictate the guidelines for teaching and define how pedagogical research should be oriented towards strengthening personal skills, towards a system that allows the acquisition of skills to learn how to learn, to provide valuable help to be more resilient and to finally manage the challenges and changes that life may present. Educational systems must find solutions to implement new forms of learning, capable of guaranteeing individual and social well-being, but above all, capable of including all subjects, especially those who may be excluded because of some disability.

Keywords: inclusion; LifeComp 2020; serious games; digital natives; physical education.

Sintesi

I nuovi sistemi educativi hanno il compito di integrare e percorrere nuove strade per implementare delle innovative forme di apprendimento. I trend internazionali come *Agenda 2030* e il nuovo *Framework sulle LifeComp 2020* dettano le linee guida perché la didattica e la ricerca pedagogica siano orientate verso un rafforzamento delle competenze personali, verso un sistema che consenta l'acquisizione di competenze per imparare ad imparare, per fornire un valido aiuto ad essere più resilienti e a gestire le sfide e i cambiamenti che la vita possa presentare. In quest'ottica i sistemi educativi devono trovare le soluzioni per implementare nuove forme di apprendimento, capaci di garantire il benessere individuale e sociale, ma soprattutto capaci di includere tutti i soggetti, in particolare coloro che dovessero essere esclusi a causa di qualche disabilità.

Parole chiave: inclusione; LifeComp 2020; serious games; nativi digitali; educazione motoria.

1. Introduction

The game in its motor-sporting dimensions constitutes a learning environment, facilitating the training function of the group, and improving the full use of innovative and effective teaching methodologies. The educational integration of a motor and playful-sporting nature supported by technology lays the foundations for further reflections on both present and future interventions, aiming to innovate by experimenting, and to grow by learning. The objective of this contribution is to analyze the relationship between technology and movement in the educational field, focusing on relational dynamics which effectively contribute to favoring the success of the teaching-learning process and the construction of personal identity (Rivoltella, 2012). The relationship between reality and virtuality, between the concrete and the abstract is centered on a daily participation that can be fully realized by integrating cooperative attitudes of traditional teaching, with innovative styles, hence technological and digital tools. The linear perspective that gives priority to the biological and anatomical-physiological aspects of the body and that enhances the dimensions that contribute to the well-being of the person, are present in the 2010 document *Global recommendations on Physical activity for Health* published by the World Health Organisation (WHO) (WHO, 2022), which lists the physical activity levels for children and adolescents (from 5 to 17 years old). Nevertheless, the WHO reiterates that any physical activity is better than none and recommends starting with small amounts and then gradually increasing their duration, frequency and intensity. On 25 November 2020, the same WHO presented the new guidelines that replaced the previous recommendations of 2010. The new text contains updates on the quantity (frequency, intensity and duration) and type of physical activity that people of all ages should perform to obtain significant benefits and reduce health risks (Epicenter, 2019). The 2020 guidelines do not report quantitative indications relating to sedentary behaviors, but generally recommend a reduction in the time spent in sedentary conditions and a concomitant increase in physical activity. For about two years, the world population has lived in a condition of precariousness and uncertainty due to the *state of emergency*, because of which rules and regulations are constantly changing and, consequently, the possibility of carrying out or not carrying out a series of simple and routine actions. The advantages related to physical activity translate into psychological benefits and social relationships, such as a reduction in the sense of loneliness and an increase in self-esteem, besides an improved quality of life and a better self-image, especially in women. The psychosocial benefits are more evident within team sports activities than throughout individual forms of physical activity. Of particular importance seems to be the fact that, having the possibility of choosing the preferred physical activity increases the component of fun, passion, and intrinsic motivation to participate, thus, contributes to improving health. In 2015, at the 70th session of the United Nations (UN) General Assembly, all countries committed to investing in health with the resolution *Transforming our World: The 2030 Agenda for Sustainable Development* (Kjaerulf et al., 2016), in order to ensure universal health coverage, reducing health inequalities for people of all ages. Political actions aimed at increasing physical activity for all people, of all ages and abilities, are consistent with the assessment of health as a universal right and essential resource for daily life, and not simply the absence of disease or infirmity. Furthermore, the multiple benefits of increasing levels of physical activity among the population, for example, walking, cycling, recreational activities, sport and play, are interconnected and contribute to the achievement of shared goals, priorities, policies and ambitions of the 2030 agenda.

2. Technologies for inclusion

Technology at school has transformed teaching, in fact many of the school subjects are now supported by technological tools such as e-books or interactive online games, which can guarantee a high level of learning. At the same time, it should be emphasized that most of the technologies in use in schools nowadays, don't include the body component, underestimating the role of the body in motion as "the main device through which, by creating experiences, learning is developed and knowledge is produced" (Rivoltella, 2012, p. 109). The current social system needs research and an educational science, whose knowledge is open to possible and continuous epistemological clarifications, which by starting from a multidimensional approach to reality, and truly grasps knowledge's inner essence, considering all aspects, avoiding omitting the elements of uncertainty and variability. The hypothesis of putting into practice new technologies in sport and motor activities and of their use in the school environment is extremely important, especially for the disabled learners in relation to the type of deficit, for their integration and rehabilitation, which can certainly benefit from the union between technology, teaching, and sport. At present, this research area is hardly explored. In fact, this new field of investigation, in the direction of a necessary synthesis between movement and technologies, first requires a complex study of the person and of the unexplored potentialities that characterize him and that technologies can use in a "different and original" form to favor processes of integration. Movement activities, in the complexity of the health, sports, recreational, adaptive and social application fields, represent a training context with strong educational effectiveness. It is an original area of enhancement of the subject even in the presence of psychophysical and sensorial difficulties, but those same movements require technologies and proper aids to guarantee equal opportunity and rightful participation by all. A scientific condition on the body as a "knowledge machine" (Varela, 1990, p. 43), for which "abstraction and generalization can usefully produce learning only if they have been constructed starting from the bodily experience of the world" (Rivoltella, 2012, p. 92), supports a shift in didactic research, in the direction of strategies and enhancement of technologies capable of capitalizing on the embodied dimension of conceptual knowledge (Gallese & Lakoff, 2005). The research on the relationship between corporeality, new technologies and didactics for educational integration, has a complex and varied vision of the physical sciences. This research has the potential to fully express its educational dimension in an integrated and systemic key by combining the corporeal, adaptive and compensatory aspects with the technological ones. The theoretical attempts, which have characterized didactic research over the years, have not fully explored the potential of the movement sciences, thus underestimating the complexity of the human being. Specifically, during the period of childhood and pre-adolescence, primary school had the opportunity to experiment didactic experiences to build skills and competences in favor of inclusion, starting from the consideration of the body and the movement as cognitive, expressive and relational tools, to be supported through effective and personalized methodologies and teaching. This constant experimentation with didactic approaches in the field of school integration has brought out a series of needs and difficulties, highlighting the importance of technological supports and aids to guarantee the right to training in its various forms, including the adapted motor one. Didactic technologies, in order to be defined as *simple*, must therefore be able to recover from the digital context the *simple* properties of acting and the ability of action to create meaning, by admitting as an interface all the mechanisms that the body implements to face the complexity of the environment in which it interacts (Berthoz, 2011), that is, those same mechanisms through which it creates meaning. The definition of *simple didactic technologies* highlights an operational strategy aimed at a

precise perspective of *didactic ergonomics*, a deviation from simplistic strategies of technological selection, towards new forms of implementation, which can effectively combine with the current didactic and pedagogical visions. This is how the body assumes a central role in the technology/learning relationship, favoring not only the action in digital environment, but also the ability to make possible and *exercise* a projective function, because "the projective brain is able to recall a complete scene to interpret the world as it was perceived and experienced, at a given moment in the past" (Berthoz, 2011, p. 126).

3. New technologies for active play

Movement and play are the first tools a child owns to learn about the surrounding world, and through them he acquires motor skills and abilities. Motor skills develop through the complexities of the game, which go through the sensory-motor phase, characterized by primary movements, such as: pulling, rolling, throwing, grabbing, climbing and crawling. Afterwards, the child switches to the symbolic phase marked by pretend play; before getting into more difficult games, made up of very specific rules that contribute to perfecting social skills, a sense of self and the norms of human conduct (Pirrone, Castellano, Amata, & Tienken, 2021). Through the experience of play, the child builds his idea of the surroundings and how his world changes depending on his actions. Playful activity predisposes to new experiences and stimulates in the child his ability to adjust and his capacity to effectively in change the context necessary for his development. It is the moment when the mind is characterized by the most intense synaptogenesis, which lasts up to six years of age and that Montessori calls *creative*, it is a fundamental moment for the human development (Morelli, Colacino, & Gillet, 2021), a moment of greater learning, of stimuli, and malleability of the child's brain. It is through playful doing and structured playing shared with peers, that the child experiences, stores information and determines new goals. Until about thirty years ago, learning by practicing sports happened while sharing moments of game on the street, where children played with the ball, roller-skating or skateboarding. Recently this dimension of play among equals, with a group of friends in the courtyard or in the neighborhood, is no longer in use and even the first approach to sports occurs almost exclusively in structured contexts and places. In fact, in recent years children's free time has increasingly turned to the use of video games. On one hand, these technological and sophisticated means offer great intellectual, technical, and cognitive opportunities, but on the other hand we are witnessing an impoverishment of motor skills. Unfortunately, the tendency of the new generations is to lock themselves up in usual daily habits, from which activities of free movement are increasingly excluded, whilst hyper stimulation through electronic devices is privileged, something that expose them to a language of images so direct and attractive, but a language which requires specific training (Ceccherelli, 2008). The result is that a healthy balance must be found between dedicating time to *concrete* play and time dedicated to *abstract* play instead, to avoid that motor skills useful for the development of natural learning of rules and behaviors in various contexts end up not evolving in competences. Video games, on the other hand, can lead to every game mode, every type of playful participation, representing a general evolved form of playing. It is useful to specify the meaning of the term Exergame, even if there is no universal definition, valid for all. Exergames are defined as "interactive video games that stimulate an active gaming experience for the whole body" (Best, 2013, p. 1), but Gao, Lee, Pope, & Zhang (2016) state that "it refers to video games which require body movement to play and act as a form of physical activity" (p. 318). This constant attention guarantees the possibility for the subject of always reaching an optimal level of training, calibrating both the physical and

the cognitive challenges. From the studies conducted so far, it also seems that exergames successfully promote physical activity and health in children and adolescents thanks to the increase in motivation and commitment, and the ability to reach out to different groups of people. It has been found that greater motivation is also given by fun, and when there are high levels of pleasure, one is also willing to sustain a tighter level of physical activity (Marasso, 2015). It can therefore be assumed that the design features of these games are important in understanding why it is easier to achieve a good level of physical activity when choosing the right game (Mellecker et al., 2013). Most of them use commercial game consoles and can be connected to a TV screen: therefore, exergaming can be applied almost anywhere and at any time. It is very stimulating to evaluate the great opportunity that these games offer: learning can happen both implicitly and explicitly, because it is possible to learn the movements available in a game without formal instructions. This combination of non-instructive playful learning with instructive learning has great potential for children and adolescents, which could be further studied in the future. (Smits-Engelsman et al., 2018). The exergames could actually be useful in helping to connect students, introducing them to physical activity, perhaps engaging especially those less inclined to physical activity or the disabled ones, and building enthusiasm for movement on an intrinsic level (Boes & Krell, 2010). Despite the great opportunities and positive aspects, the exergames also have weaknesses, such as being used by the individual, they favor the motor approach, but also predispose to isolation. They are also fundamentally abstract experiences, which have little to do with the real experience of the game. Also, there are not many cross-referenced searches that have used the same exergame or have investigated related issues or utilities.

In conclusion, to amplify the positive effects of the exergames, a customization is required, but it is almost never realized. In fact, the collected data are not easily accessible, which makes it difficult to fully exploit the advantages that they could have as a monitoring tool (Tanaka et al., 2012). Furthermore, exergaming has rarely been compared or combined with traditional exercises in children (Ye, Lee, Stodden, & Gao, 2018), and it is unclear whether it leads to as many physical activities as traditional exercises, and also how long the potentially positive effects of exergaming last (Gao et al., 2016). The available evidence indicates that exergames possess the potential to improve health through their use, however this potential appears to be underestimated and underutilized. Further research developments appear to be necessary, and it is our intention to put them forward. Future studies could examine other exergames and game systems to investigate whether there is continuity between the hardware systems and the games played. It would be therefore desirable to investigate the feasibility of using exergames as an integral part of the curriculum and see how the availability of equipment, games and Internet connections may affect their success. Besides, further studies are needed to determine whether participants in exergames will continue to choose this type of physical exercise over time (Barnett, Cerin, & Baranowski, 2011), and therefore a longitudinal study is needed to analyze the effect of exergames on physical activity choices of students, to reveal the long-term effects of using exergames in the curriculum of a physical education course. The exergames will change as new portable technologies are introduced, also their use over time should be deepened and applied in all their potential and possibilities. At present, these future devices take the form of smartphones, portable GPS and other augmented and virtual reality devices, which could maximize and generalize the results and the engagement by the individual and by large number of people. (Mears, Sibley, & McKethan, 2012).

4. The serious game in favor of the development of the LifeComp

Playful activities are naturally connected to the seriousness of learning, so Serious Games (SG) represent tools capable of promoting effective learning and training processes, but at the same time these can be interesting, fun and engaging. The term SG was born before the explosion of the digital world, it was in fact Clark Abt in 1970 (Bercigli, 2019) who created it, by arguing that games, in addition to the playful aspect, could have purposes related to learning. However, in its current value, the SGs are considered interactive digital activities, which allow us to live virtual simulated experiences, to facilitate the learning of various skills related to daily life. An SG is defined when the subject falls into a challenging goal simulation environment, with rankings and scores. It must be fun, engaging and ultimately it must lead us back to real life skills or behaviors. Learning, as Bandura explains in the theory of social learning, is "an active acquisition that occurs through the transformation and structuring of experience" (Marmocchi, Dall'Aglio, & Zannini, 2004, pp. 29). In fact, the SG through interactive simulation allows users to put their ideas and attitudes into play within the context of an engaging and realistic simulation. In a virtual world, made up of various navigable environments (which can reproduce offices, natural environments, or other work environments), players must: both correctly interpret the problematic situation (problem setting) and suggest an effective solution (problem solving). Actual simulators help to train and improve complex behaviors and systemic skills. A real tool that allows you to have meaningful, engaging experiences about a serious goal to achieve. The key features that distinguish SGs from other digital products are the following:

- adaptability: the player is faced with many possible choices. The decisions he makes during the simulation will change the connotations of the story and the behavior of the virtual interlocutors (bots);
- wholeness: during the game every choice made contributes to building a player's profile. How the virtual interlocutors converse will also change in relation to the style/character expressed by the player's choices;
- immediate feedback: feedbacks give back quantitative and qualitative principles to the player, who can finally analyze them in order to try a new game and improve his own performance;
- trial and error: it is the basic model of simulators. Through repeated playing they allow the participant to discover his level of knowledge and competence *in action*, and at the same time, allowing the teacher/trainer to understand what and where the difficulties encountered by the learners/participants are.

The situations originated through the SG allow to:

- streamline the *reality* to better understand the complexity of the phenomenon/matter;
- investigate environments and scenarios that would otherwise be impossible or risky;
- try different strategies, leaving the comfort areas;
- make invisible relationships between things concrete;
- amplify or compress time.

In 2020, the European Framework for Personal, Social and Learning to Learn Key Competence, LifeComp (Sala et al., 2020) was prepared to offer a conceptual framework of 3 skills: personal, social and learning to learn. Each one of them is additionally divided into three competences. These skills can help people become more resilient and manage the challenges and changes in their personal and professional lives in an ever-changing

world. They are:

Personal

- self-regulation: awareness and management of emotions, thoughts and behaviors;
- flexibility: ability to manage transitions and uncertainty and to face challenges;
- well-being: pursuit of satisfaction in life, care of physical, mental and social health and the adoption of a sustainable lifestyle.

Social

- empathy: understanding the other person's emotions, experiences and values, and knowing how to give appropriate answers;
- communication: use of relevant communication strategies, specific codes and tools depending on the context and content;
- collaboration: commitment to group activities and teamwork in which others recognize and respect each other.

Learning to Learn

- growth of the mindset: believing in one's own and others' potential to learn and progress continuously;
- critical thinking: ability to evaluate information and arguments to support reasoned conclusions and develop innovative solutions;
- learning management: planning, organization, monitoring and review of one's own learning skills for interpersonal relationships: knowing how to create positive relationships with others, maintaining and managing them correctly, and if necessary, being able to interrupt them constructively.

Therefore, the school could undoubtedly be the main place to develop LifeComps, in addition to the various extracurricular experiences. In this regard, the SG combined with concrete experiences can put together personal experiences influenced by one's own culture, which diversifies and differentiate each other's abilities. Therefore, the school would have the potential to make various individuals reflect on themselves, in order to question themselves and gain awareness of their essential skills. LifeComps also have practical potential, but they require socio-cultural contextualization as point of reference. In summary, the school context is ideal for the introduction of LifeComps, for the positive and central role they could play within social contexts, for the possibility of reaching a large part of young people, for the use of an already consolidated structure, without having to establish new and expensive services, for the possibility of using a trained and experienced teaching staff, for the appreciation that schools enjoys from parents and society in general, for the opportunity to have quick feedback on the effectiveness of these life skills, acquired through learning assessment systems.

5. Conclusion

The motor activity that is supported and enhanced by the technology of games is really an interesting topic, but at the same time extremely complex and rich in multi and interdisciplinary interconnections. To start every research and every experimentation in this field because the subject is extremely delicate, a transdisciplinary approach is needed, which puts the person and his/her educational and training needs first. Technology in our society is too predominant and too important to be neglected or in any case not to be bent

to serve people's needs, especially when young learners of any kind of ability will eventually benefit from it, thanks to specific software and the use of other aids. A new design of the spaces is also needed, within which to create alternative and complementary teaching paths to traditional teaching methods. Technologies become functional when they are able to implement and diversify educational and didactic paths, when they are capable of realizing an authentic personalization of the teaching process, within complex contexts. Different types of present technological systems open up scenarios that were unthinkable only up to a few years ago in the field of communication, in terms of inclusive teaching, and these systems enrich the environments of didactic research with new teaching methodologies and new methods of analysis. Using technology to enhance the conscious use of the body's potential for action and to make knowledge an active, subjective process rooted in corporeality, can only lead to broadening the cognitive experience or bring up educational technologies to create an augmented body, a perceptive interface capable of increasing the possibilities of action as in the case of Natural User Interfaces (Aiello, Di Tore, Di Tore, & Sibilio, 2013). Therefore, it is necessary to support the plural and complex character of teaching, considered in all its connections with multiple levels of training, including the intellectual, bodily, affective and relational dimensions of the individual (Sibilio, 2012): a transdisciplinary model of research in didactics is increasingly emerging, whose approach is multidisciplinary, integrated and also available to deal with other scientific patterns. Finally, this contribution attempts to offer an integration between the digital world and the school, suggesting that Serious Games are an alternative form of learning, both in terms of the method and in terms of the learning content itself. Given their variety, Serious Games could be suitable for the most diverse categories of students, from elementary school to university, supporting the learning process by assisting them to learn both traditional school subjects and more transversal competences, aiming to improve the education of each student. The obstacles in introducing Serious Games in a school environment are obvious but not insurmountable, especially when keeping in mind the new generations of students, who would not need to adapt to this brand-new tool, as they grew up in an era where new media have always been around. The playful component of the Serious Game, as already highlighted in the elaborate, allows you to live an engaging and immersive experience, also thanks to the use of a tool recalling that same playful experience of the childhood's video games. In this way, the game becomes an opportunity to fix issues related to the studying process. In light of the above, it is really worth paying attention to the close connection between Serious Game and learning and to the potential of this tool within the school context. Those that today may appear as difficulties in their applicability, are however outclassed by the actual innovative potential, especially if we consider that our society is nowadays permeated at every level by the presence of technological devices and that in the post-Covid era the use of technology has become more and more predominant. The challenge is therefore to welcome all the possible innovations in schools as well, trying to make the most of them in favor of the primary purpose, which is to train, teach and share knowledge.

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