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HOW SERIOUS CAN PROMOTE INCLUSION, HISTORY AND CULTURAL HERITAGE THROUGH THE VIRTUAL REALITY

COME IL SERIOUS GAME PUÒ PROMUOVERE INCLUSIONE, STORIA E PATRIMONIO CULTURALE ATTRAVERSO LA REALTÀ VIRTUALE

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Abstract

Serious games are becoming a new interactive way to virtually rediscover ancient civilizations and reinterpret their distinctive features, through simulation and immersive experience. Serious games are also designed according to interdisciplinary principles aimed at capitalizing, at an educational level, suggestions that have emerged from borderline studies such as history, philological, pedagogical, and anthropological sciences. In this contribution, we will try to bring out some considerations: 1) serious games can be designed following the principle on which experimental archaeology is based, i.e., verifying first-hand the conditions experienced by other human beings from an anthropological point of view 2) the design of serious games must consider assistive technologies to become an educational tool promoting inclusion.

I serious game stanno diventando un nuovo modo interattivo per riscoprire virtualmente antichecivilità e reinterpretare i loro tratti distintivi attraverso la simulazione e l'esperienza immersiva. I serious game sono anche progettati secondo principi interdisciplinari volti a capitalizzare, a livello educativo, le suggestioni emerse dagli studi di confine, quali la storia, le scienze filologiche, pedagogiche e antropologiche. In questo contributo si cercherà di far emergere alcune considerazioni: 1) i giochi seri possono essere progettati seguendo il principio su cui si basa l'archeologia sperimentale, ovvero verificare in prima persona le condizioni vissute da altri esseri umani da un punto di vista antropologico 2) la progettazione di serious game deve tenere conto delle tecnologie assistive per divenire uno strumento educativo promuovente l'inclusione.

Keywords:

Serious Games; Museum Education; Inclusive Education; Assistive Technologies.

Serious Games; Educazione museale; Educazione inclusiva; Tecnologie assisitive.

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1. Introduction

Serious games represent interactive virtual simulations with a well-structured objective in which serious and playful aspects are balanced. They can be defined as games that are not initially designed for educational purposes but can be used to generate educational practices (Clark, 2007). Moreover, these specific kind of videogames have extremely different applications that may include the marketing market (called Advergames), through to medicine, with the rehabilitation of people with cognitive deficits, and finally to the educational and didactic field. Due to their playful scope and the strong interaction required to the student, serious games can be considered a tool for promoting the learner's emotional skills (Papoutsi et al., 2022). Indeed, they can be considered as well as a tool for fostering learning through manipulation, thus requiring a non-passive role of the learner, who can approach knowledge in a new and adaptable way to his/her special needs and cognitive style. The repetition mechanism of a given game, or the repeated procedures lead the child to improve his learning and to gradually acquire rules that will be respected not only in the game, but also in the extra-virtual reality. More in details, serious games have the advantage of being adaptable to the various contexts of application, as well as the active involvement of the user. The environment is not closed, such as a classroom, but open, in which the child can experiment, to move freely, learning in a totally autonomous manner, even though errors (Ferguson et al., 2020). Therefore, a video-ludic approach is a highly inclusive medium, since in education it can be used to work with students with Special Educational Needs, as it is also flexible and adaptable to the students/users that use it, and at the same time it can also be used to pass down culture in an alternative and non-linear manner, and can become an important place of learning, where it replaces other places, perhaps characterized by architectural barriers or limitations that prevent its correct use, especially when it is to be used by a student with difficulties. The aim of this text is precisely to analyze the importance of serious games for inclusion, especially in relation with museum didactic. The first section of the paper will present a general overview of the value of serious games and how they can be useful for inclusive education. The importance of serious games as an assistive technology element will then be analysed. We will then move on to investigate the relationship between serious games and museum education, highlighting how serious games can become a cultural transmission tool for students with Special Educational Needs.

2. Serious games and inclusive education

We provide a theoretical background, in terms of inclusive education, that supports the technological and methodological choices to be used in installations that are placed in museums based on serious games approach. To find the link between the concept of serious games and that of inclusive education, it is first necessary to make some reflections on the historical aspects that allowed this type of software to become widespread. The path that led to the "birth" of serious games "unfolds through fundamental stages" (Barbuto, Mariani 2016, p.274). The first stage took place in the 1990s and concerns the realization of the first E-Learning platforms; the second, still contextualized in the 1990s, consists of the realization of the first Edutainment software, which can be considered, the first video games to "foster learning practices". The word Edutainment itself originates from the fusion of two terms "Education" and "Entertainment" and recalls the integration of two practices, namely that relating to education and that relating to entertainment (Cangià 2009) with equal prominence and dignity, as McLuhan well recalled when he said that those who make a distinction between entertainment and education perhaps do not know that education must be entertaining and entertainment educational (McLuhan 1967). Specifically, the role of an Edutainment is to foster (Aksakal, 2015): 1) learning-learning processes; 2) making sacrifices to achieve clear and stated goals; 3) overcoming the frustration that comes from failures to progress; 4) fostering awareness of one's actions; 5) improving inductive problem-solving skills and critical thinking; 6) developing choice and decision-making, observation, situational analysis skills. Finally, the third stage comes at the end of the 1990s when the concept of Digital Game-Based Learning emerged, i.e., the process through which to foster meaningful learning through video games and

through the fundamental role assumed by the user, with the variability of functions he or she can assume (Coleman et al., 2020). Today, serious games can reproduce any socio-cultural, as well as historical aspect, starting from the simple representation of buildings, objects, up to the reproduction of figures belonging to mythology and the past or animals (Prpic et al., 2019). Applications or software of the tutorial type, characterized by highly structured objectives-contents, organized in short sequences aimed at developing skills or procedural competences (Mori, 2012). Serious games can be created from video games of various types, such as simulation, role-playing and strategy. It should be noted that every category of video game (arcade, adventure, simulation, role-playing, wargame and strategy) can effectively be converted into an educational game. Obviously, this process requires due care and the content of the serious game must be evaluated in ethical and pedagogical terms. (Todino & Sibilio, 2018).

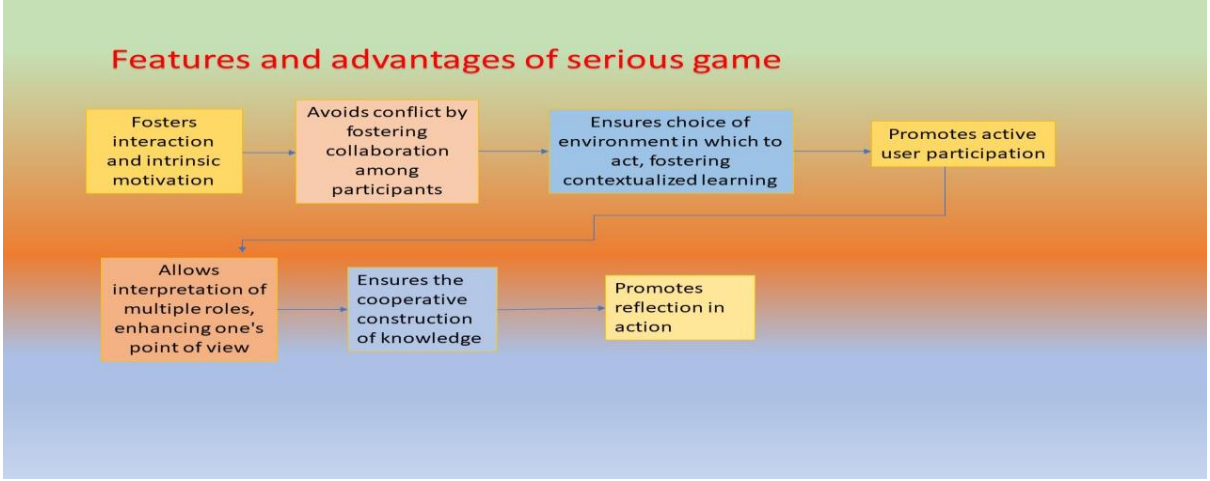

Diagram 1: *Features and advantages of serious games, adapted from Anastasiadis et al., 2021*

It is legitimate to ask whether serious games can promote inclusive education. Regarding this reflection we must always remember that any video game can be played with numerous input peripherals (keyboard, mouse, joypad, joystick, etc.) and outputs (monitor, Head Mounted Display, etc.) and often what determines the inclusiveness of a technology is not the game itself but the peripherals with which it is played. Serious games, therefore, based on the previous statements, can also become tools with a strong inclusive potential. In general, the document regarding the profile of the inclusive teacher reveals the need for the latter to "know how to use 'information, communication and adaptive technologies to enable open modes of learning' as an 'effective approach to heterogeneous classrooms" (EU-Agency, 2012, p.19). Specifically, technologies can bring out individual potential (Maglione, 2017). Moreover, they enable the comparison of different teaching-learning processes (Laurillard, 2015), helping to borrow the set of knowledge, skills and competences generated by the diversity of others' styles (Mori & Panzavolta, 2019). These three considerations are possible if one reflects, just to define one aspect of it, on the possibility of each and everyone recognising that it is possible to learn from disability, and specifically, from the "vicarious modes of use" of technology (Berthoz, 2011; Sibilio, 2014, 2017a, 2017b) which is often a rich store of knowledge, born of experience, that some pupils can make available to other learners and teachers. The vicariousness of use envisages precisely that an object, an element, born with certain characteristics and having certain functions, can acquire other diversified ones, to achieve certain objectives. In this case, the technological medium, which was born with the fundamental objective of arousing playfulness in the child, acquires a new function, that of fostering learning processes. This digital toolbox learned out of necessity, often as a compensatory tool, thus becomes an asset in terms of inclusive didactics to enhance multiple learning and teaching styles in the classroom, following the trajectory that emerged from the studies on "multiple intelligences" by Gardner (2005) (Todino & Sibilio, 2018).

The criteria to be followed in the programming of a serious game must take certain factors into account these games must "involve the user through exploration of locations, problem-solving, competition or collaboration with other users (Barbuto, Mariani 2016, p.275). To play games with other users (multiplayer serious games) therefore requires programming that needs game engines that handle these features (such as Unity 3D, Unreal, etc.). Another element that is to the advantage of serious games, compared to other educational tools, stems from the fact that:

For students, video games are a familiar medium of communication (Gee, 2013) because they allow them to overcome many of the barriers that exist in other languages. Arguably, video games, consisting of commands to respect and specific rules for enjoying the game, are still easy to understand and guarantee improved perspectives in terms of learning and socialization (Menduni, 2014). When video games are replaced by serious games, they can be an effective tool for aggregating heterogeneous classes through games and their content. Serious play, through the simulation of real situations, through active play and experience, consolidates knowledge, resulting in skills and abilities that, when carefully selected, can lead to important teaching and pedagogical outcomes.

Therefore, one could conclude by saying that serious games differ from video games because the latter are not based on explicit didactic or pedagogical principles. More specifically, in serious games there is always a simulative "substratum" that can become didactic and if assisted by assistive technologies can become explicitly inclusive. More generally, simulators are linked to didactic aspects, acting on the ability to predict events (El Mansouri & Biagioli, 2019). In turn, prediction can be considered one of the founding characteristics of learning, in fact, play also ensures the ability to foresee in students, where the term foresight includes knowledge. Prediction is the basis of simulation, that is, of that didactic device that consists of making learners imagine what consequences the manipulation of the variables that regulate the behaviour of a phenomenon might produce over time, as well as of knowledge, since simulation, imagination and knowledge guarantee the acquisition of knowledge (Rivoltella, 2014).

3.Serious games and assistive technologies to promote inclusion

Serious games are closely related to gaming peripherals. Such input output devices, to make serious games inclusive, must be counted among assistive technologies. The term Assistive Technology (AT) has now become a full-fledged term officially used by the European community. There are studies that show that Assistive Technology is now used in multiple fields of reality and with multiple functions and can be used to work with people with Special Educational Needs, such as those with intellectual disabilities (Torrado et al., 2020) or those with visual and hearing impairments (Sorgini et al., 2018). In these documents, it is carefully emphasised how assistive technologies to support disability are applicable for recreational, hobby, sports and leisure activities. In this series of documents, the importance of using serious games in various contexts emerges (Salvador-Ullauri et al., 2020). Indeed, thanks to virtual simulators, it is possible to recreate many different experiences. Current technologies allow people to move around in photorealistic environments by guiding humanoid avatars to identify themselves, which enable people with disabilities to carry out training activities in various life contexts (Zumbach et al., 2020). Furthermore, from the work carried out by the EPRS, a link emerges between the use of educational video games and the improvement of the teaching-learning process in individuals with autism spectrum disorder (Almurashi et al., 2022) For example, they promote social interaction through eye contact, recognition of faces, expressions and emotions (Hassan et al., 2021) and more generally of any perceived and experienced barriers, which become a limitation to the inclusive process.

4.Serious game for inclusive museum education

That the cultural heritage of our country is a strategic asset for the entire nation is now a fact (Santagata, 2007, p.15). It consists of its tangible, intangible and material form and must be enhanced through modernization (ibidem). From these two considerations, serious games can be counted among the possible media channels capable of generating part of

this modernization, in fact the latter can have an educational value if "for example" they follow the principle on which experimental archaeology is based, or experimentally verify the conditions experienced by other men in an anthropological key (more details on experimental archaeology at web http:///www.borsaturismoarcheologico.it/laboratori-di-archeologia-sperimentale). In this specific case, such a serious game could be part of an installation at a museum intended as a "workshop in which to know, analyze, experiment and propose to a community of visitors, products of high cultural value" (Panciroli, 2010)". (Todino, Sibilio, 2018).

More in detail, the serious games in a virtual museum:

1) Are a media channel capable of conveying "wide-ranging" information regarding both the context (historical and landscape) in which the museum is located and its content in terms of artistic and archaeological heritage. In addition, this information was previously left only to the verbal visual channel through brief descriptions combined with paintings or objects displayed in display cases. Now, thanks to serious games, they can become multimedia and interactive, increasing the possibility of involving the visitor and intercepting other learning styles (non-verbal visual, auditory, kinaesthetic, etc.). It is possible to affirm that serious games, used through assistive technologies, are oriented to the concept of "multidimensionality of the teaching-learning process" (Sibilio, 2014, p. 12).

2) Propose, like experimental archaeology, a direct experience of the use of objects in the collections, making history "alive".

3) Through the Assistive Technologies, they allow access to the contents of the museum favouring a didactically inclusive process.

4) Can be played on site, or at the museums themselves, but if sold in the bookshops of museums or made downloadable online can "produce culture" increasing "the maximum degree of access" to the museum that becomes a centre of cultural production (Santagata, 2007, p.111).

5) Through devices that set the body in motion, amplify the emotions to welcome the "message of Damasio" fundamental also in the context of cultural heritage (Santagata, 2007, p.41).

6) Can encourage curiosity to visit other museums in the same district, provincial and regional thanks to the preview of works in the other complexes. Therefore, serious games can create "systemic effects that attract visitors and tourists" (Santagata, 2007, p.66).

In more detail, serious games can become a new mode "to recover the civilization of an ancient population and reinterpret its fundamental connotations" (Marandino, 2018, p.9) through simulation and "direct" experience. The contents will have to use the procedures, criteria and ways that are based on the interdisciplinary relationship that groups the intersection "of historical, philological and anthropological research" that if properly integrated between them already produce "results of undoubted relevance" through previous media, such as audio-visual documentaries (ibidem).

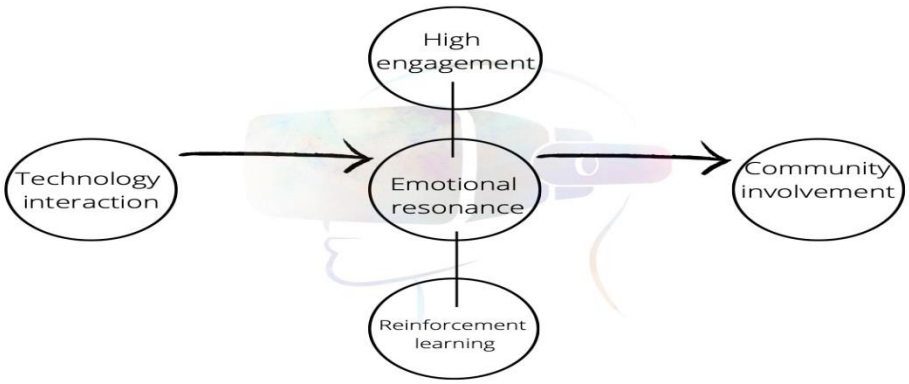

Diagram 2: *The advantages of using digital tools in museum contexts. Adapted from Chen et al.,2021*

Focusing the attention on the inclusive potential of serious games and their relationship to museum education, it must be recognized that they represent a tool of active participation on the part of the student, in which he or she is directly involved by being able to almost touch the objects that characterize the culture, breaking the pattern for which, the work of art must only be seen (Maniello, 2018). In addition, the presence of a virtual museum also allows the student to select works of art according to his or her personal inclinations and preferences, based on his or her personal needs both in terms of cognition and learning, and this represents one of the cornerstones of inclusive education, that is, being able to personalize teaching by making it child-friendly. The presence of a virtual museum, in which it can be accessed at all times, also breaks down any limitation posed by architectural barriers, by the impossibility of being able to access the interior of some facilities due to the lack of adequate equipment to guarantee access to people with disabilities. Moreover, new technologies at the service of education, especially in the museum field, represent a tool in which it is the visitor himself who leads the immersive experience, starting from his own inclinations, his own passions (Donnini, 2014). Respect for personality, for one's personal peculiarities, the possibility of being able to act with autonomy, represent fundamental objectives of special education. The presence of a serious game that can operate following these lines of work can provide the way to make culture and all that characterizes it an active element, manipulative, of emotional stimulation and appropriate to an education that is of everyone and for everyone (Sibilio & Aiello, 2015).

5. Conclusions

A serious game can be a valid inclusive didactic tool both if it is installed in museums and if it is distributed through the web when it can be used through assistive technologies, moreover, it produces a favourable effect in terms of dissemination of artistic and cultural heritage in the younger generations as required by law 107/2015 (Panciroli & Macauda, 2016). While making a serious game, it is advisable to design and test it through AT, especially the cheapest and most widespread ones, to make it more inclusive (STOA, 2018d, p.16). Fortunately, over the years, scepticism towards serious games has diminished and educational research is highlighting that these new video games with “serious” content have great potential (Bonaiuti & Calvani, Menichetti & Vivanet, 2017; Rivoltella, 2015a, 2016b, 2016c). In particular, the rise of cognitive and ergonomic human-machine peripherals, which can be used through vicarious use as AT, increase the level of verisimilitude of environments simulated through computer graphics. Serious games, moreover, leverage on cognitive technologies, this locution expresses the bond that "is established between human beings and technological devices" amplified by the unity generated by the relationship between device and body (Calvani, 2017b, p.19) that reaches, at present, its peak with Head Mounted Displays (HMDs), such as Oculus, capable of "extending" cognitive processes. Tying it to virtual museum education could, therefore, be a valuable tool not only for cultural transmission and awareness, but a tool for immersion, practical manipulation of culture and all its characteristic elements. This kind of use, in working with pupils with Special Educational Needs could be an additional tool for educational support, recognition of individual peculiarities and needs, and the project value of the project. Working with pupils with Special Educational Needs requires adapting the work flexibly to different learning needs. Therefore, such work aims to strengthen the sense of cultural belonging, while respecting the cognitive and learning needs of each individual.

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