

WHEN THE GAMING GETS SERIOUS. REFLECTIONS ON STUDENT AGENCY WITHIN INCLUSIVE VIRTUAL LEARNING ENVIRONMENTS

QUANDO IL GIOCO SI FA SERIO. RIFLESSIONI SULLO STUDENT AGENCY NEGLI AMBIENTI DI APPRENDIMENTO VIRTUALI INCLUSIVI

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Abstract

This contribution intends to offer an overview of the types of Virtual Learning Environments (VLEs) that may be used in educational field and in the school context. This review also aims to stimulate a preliminary reflection on promoting educational interactions between VLE and learners with Autism Spectrum Disorder, paying particular attention to how digital tools may foster student agency. In fact, because of their peculiar way of functioning and interests, it is also important to accurately design and select VLE to promote both their agency and teaching-learning process.

Questo contributo intende offrire una panoramica delle tipologie di ambienti di apprendimento virtuale (VLE) che possono essere utilizzati in ambito educativo e nel contesto scolastico. Questa revisione mira, inoltre, a stimolare una riflessione preliminare su come è possibile promuovere delle interazioni educative tra i VLEs e gli studenti con disturbo dello spettro autistico, prestando particolare attenzione a come gli strumenti digitali possono favorire lo student agency. Infatti, anche per il loro peculiare modo di funzionare e per i loro interessi, è importante progettare e selezionare accuratamente i VLEs per aumentare il livello di partecipazione e promuovere il processo di insegnamento-apprendimento.

Keywords

Virtual Learning Environments; inclusive design; Autism Spectrum Disorder.
Ambienti di Apprendimento Virtuali; progettazione inclusiva; Disturbo dello spettro autistico.

1. Introduction

The extensive dissemination of digital devices in school and educational contexts has gradually fostered a reduction of the boundary between real and virtual, as well as an evolution in the ways in which teachers and students interact and share educational experiences (Potter & McDougall, 2017; Wenger, 2011).

Therefore, technological evolution involves new challenges and investments aimed at stimulating people to acquire skills and knowledge oriented by inclusive values. The role of the school, in facing change, is both to develop critical skills and to teach how to face the uncertain «by standing on the shoulders of giants of the past [author trad.] », but also to reformulate contents and modalities with the intention of encouraging learners to build community within a contemporary society which is more complex than the past (Bianchi, 2020, p.10, Morin, 2020). For this reason, it is crucial to adopt digital tools, such as *edugames* or *serious games* which, in an educational setting and with the mediation and interaction with avatars, may help to encourage positional thinking. This way of thinking is based on education for democracy (Nussbaum, 2010) and is recognized as the ability to put oneself in the shoes of others, inhibiting one's point of view (Berthoz, 2011). Moreover, it may promote inclusive actions when the virtual place becomes an ethical laboratory, where student-players experience real life situations and solves tasks by anticipating future scenarios (Anolli & Mantovani, 2011) asking himself questions as «why is the bad guy good? [...] What makes what we define as good, good? » (Gee, 2013, p. 133).

Starting from these premises, digital devices may be used within an educational setting «to recover the practices that young people live in informal places» (Nardone, 2020, p. 241), consequently, the learning environment extends its boundaries by incorporating formal, informal and non-formal environments by assuming an *ecosystemic nature* (Pancioli, 2018). This configuration offers the opportunity not to limit the teaching-learning process to the physical space of the classroom, but to extend it to all the students' life contexts. In fact, as Sibilio (2020) points out, technologies may be conceived as «true learning attractors, or rather they act in all places, vicariate subjects and educational institutions through a powerful legitimization of an open, facilitating, motivating access democratically usable by everyone [author trad.]» (p. 11). This fruition is also supported by the principles of *seamless learning*, a notion that:

«recalls the concepts of *learning anytime* and *learning anywhere* and not just *learning everytime* and *everywhere*. This does not mean that the student “is *always doing tasks and pursuing learning especially outside of school*” (Wong, 2012, p. 20), but rather that the goal is to support the student to learn whenever his/her desire to learn is stimulated» (Mangione et al. 2015).

This is possible only through an accurate design of *Virtual Learning Environments* (VLE) that encompasses all *online environments* and serves as a supplement to an educational path, whether these are online courses, or reading resources, or informative sites with self-assessments of skills, or *serious games*, *edugames* or other forms of learning through the use of other VLEs.

The design should not envisage a mere transposition of methodologies, practices, times, relational modalities and tools adopted in presence, but it would require their re-examination to take advantage of the opportunities offered by new technologies. The VLEs are promoters of a *life embedded* and *across* learning process *spaces* (Looi et al., 2009; Looi et al., 2010 in Mangione et al., 2015) where different teaching methods may be integrated promoting the adoption of educational approaches that make students active builders of their own cognitive and learning process. In addition, these spaces provide students with several opportunities to learn to self-regulate, to monitor their own learning process (Wong et al., 2019), to become “co-producers” (Arduini, 2022) of the virtual space-time

where they can interact with physical, virtual and social spaces, based on the *affordances* that the environment offers and on the personal factors that guide their actions and their learning process (Laurillard, 2015).

However, these considerations lead to the need of reflecting not only on what are the intrinsic characteristics of these VLEs and the principles that underlie them, in order to facilitate the learning process through a specific design, but also to understand how to promote the active participation of students whose way of functioning may hinder it. In fact, sometimes student agency may be delayed within these environments because of difficulties that students with disabilities and with Autism Spectrum Disorders may face when the VLE is not well suited to their learning preferences and interests. Hence, the present contribution will offer a brief review on the characteristics and principles of VLEs and then on student *agency in inclusive VLEs*.

2. New educational-didactic scenarios: the potential of *Serious games* and *Gamification*

Today, serious games and gamification seem to be equally important to motivate students to actively participate in VLEs and acquire knowledge, develop cognitive, affective, social and behavioral skills (Boyle et al., 2016). However, although both work with game components, they differ in the underlying principles and, above all, in the way these elements are presented and incorporated into the VLEs for the achievement of one or more learning objectives (Schöbel, Saqr, & Janson, 2021).

2.1 *Serious games*

There are several explanations of the conception of “*Serious game*”, in fact it is complex to identify a single one, due to its adoption in different fields of study and interventions (De Lope, & Medina-Medina, 2017; Djaouti, Alvarez, & Jessel, 2011; Viola, 2021). Who introduced this concept is Abt (1987), who states that there is often a tendency to distinguish games used in a “serious” way from those used in a “casual” way. The first tends to have an explicit educational purpose, on the other hand, the second one is used for purely enjoyable and entertaining purposes. Abt (1987) rejects this clear distinction, typical of a Calvinist approach, stating that:

«We reject the somewhat Calvinistic notion that serious and virtuous activities cannot be “fun”. If an activity having good educational results can offer immediate emotional satisfaction to the participants, it is an ideal instructional method, motivating and rewarding learning as well as facilitating it» (pp. 10-11).

According to the author (Abt, 1987) these categories of games may be significant for the acquisition of different skills without being too much serious or exclusively enjoyable. They may promote learning even when they may appear serious but proactive, and not without humor, or difficult and challenging without causing frustration. Therefore, the scholar invites to integrate and balance the two characteristics and, in his text, he presents useful suggestions for creating simulations, educational and funny games that may improve teaching processes both inside and outside the classroom. These proposals mostly involve the use of games based on “*computers mainframe*” or on the use of “*pen and paper*” (Djaouti, Alvarez, & Jessel, 2011). However, his contribution has influenced several professionals in the field of education. In this regard, we recall Sawyer (2007) for whom the concept of “*Serious Games*” is linked to the idea of interconnection of a serious purpose to knowledge, to involvement in political life, as well as to the potential of the technologies promoted by the videogame industry. He helps to found the *Serious*

*Game Initiative*¹ and promotes several conferences, such as the *Serious Game Summit* and *Games For Health* (Sawyer, 2007).

At present, the *Serious Game* is a scientific area that focuses on the development of games that may be advantageous for leisure purposes, nonetheless mostly for other more “serious” and important objectives such as medical (health and psychological therapy, training) and social (education, training, etc.) ones (De Lope, & Medina-Medina, 2017; Schreiner, 2008; Sudarmilah et al., 2018). In fact, as Zyda (2005) states:

«[It is] mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives» (p. 26).

Although a general definition of “*Serious Game*” seems to be partially shared, the boundaries of the domain of the field of these games are still a matter of debate (De Lope, & Medina-Medina, 2017). Furthermore, some studies have highlighted that usually these games involve a combination of virtual and real environments known as Augmented Reality (AR) technology (Sudarmilah, Ustia, & Bakhtiar, 2019). The AR offers the opportunity to physically and cognitively immerse both in the reality and in the VLE, but it may also improve learners’ attentional and motivational processes, long-term memory, understanding of abstract concepts and problem solving skills; at last, it may promote a positive attitude, foster collaborative learning, STEAM skills acquisition and active participation (Chiu, Dejaegher, Chao, 2015; Garzón et al., 2020; Fidan, Tuncel, & Mustafa, 2019; Jesionkowska, Wild, & Deval, 2020; Maas, & Hughes, 2020).

2.2 Gamification

The notion of *gamification* is an umbrella term that, in informal context, is adopted to refer to games that involve the adoption of some typical components of videogames to improve the experience of the student-players and their involvement (Schöbel, Saqr, & Janson, 2021). In educational and training contexts, *gamification* may support the students to recognize that learning may be fun and stimulate them to perform better (Sailer, & Homner, 2019).

In fact, in the didactic field there is a tendency to speak of *Edugame*, a term which encompasses the educational aspect (as can be seen from the prefix *edu-*, which stands for “education”) and the playful aspect. Edugames are videogames that can be employed to teach in an entertaining way and, for this reason, they can be considered as an “alternative” educational activity, which combines the potential of *edutainment* (educational entertainment) with learning objectives, typical of *Serious game* (Hourst, Thiagarajan, 2007). Classified as real digital artifacts, even the *edugames* allow the student to develop and enhance many skills and to acquire new knowledge in a playful manner. This is possible as these artifacts are carefully designed taking into account the principles of *Game-based learning* (Gee, & Rivoltella, 2013; Kucher, 2021): interactivity and cooperation, immersivity, resolution problem solving, feedback, and explorative freedom.

As regards the first principle, an *edugame* may achieve good levels of effectiveness for learning new knowledge and skills, as well as active involvement, proposing an appropriate level of meaningful interactivity to the learners. This type of interaction may take place between the student and the environment, between multiple players (Maraffi et al., 2017), but also between a player and the content of the game (Di Tore et al., 2020; Campitiello et al. 2022). In the latter case, this is usually promoted by the principle that Gee (Gee, & Rivoltella, 2013)

¹The Serious Games Initiative (SGI) was established with the single objective of using games to include a larger audience in political debate. Since its founding, SGI has been a pioneer in the serious gaming industry. As a part of the Science and Platform Innovation Program, SGI employs games as a dynamic technology to communicate and distribute cutting-edge research on these subjects.

defines as *Just in Time* or *On Demand*, whereby players receive information directly from the VLE, when they need it, and it also teaches them to be patient, to persist, to think critically, to be creative by co-building the story through some form of interaction, such as solving a puzzle or completing a level.

Immersivity, on the other hand, is another representative trait. Some studies show that role-playing and identification with a character positively influence students' motivation to be successful and, consequently, to be actively engage (Papadakis, 2018). This principle is also encouraged by the possibility of being able to explore the surrounding through an active and dynamic interaction of the students with the VLE.

The third principle is about adaptive problem solving. The *edugames* may, in fact, be used to offer some challenging problems to the students which invite them to question themselves in order to identify appropriate solutions to face them. Such challenges should be appropriately designed based on the competencies possessed by the learners to foster *mastery learning* (Bloom, 1971).

After all, feedback plays a central role. Although students have control over the game, *edugames* may include different types of formative, summative or diagnostic assessment tools that allow the student to monitor his/her own performance to modify or replicate winning moves (Abrams, & Gerber, 2013).

These considerations invite us to reflect on the pedagogical-didactic importance of the design of such VLEs to foster the teaching-learning process of all students.

3.Promote student-agency in the VLEs for inclusive education

The need to accurately design VLEs, to encourage active participation and learning process of all students, stimulate a reflection on what are, *in primis*, which design elements should be added to follow the educational principles aforementioned that characterize the VLEs and, *in secundis*, which skills teachers should have in order to build inclusive VLEs.

As Borba & Villarreal (2005) affirm:

«[...] humans-with-media, human-media or humans-with-technologies are metaphors that can lead to insights regarding how the production of knowledge itself takes place [...] this metaphor synthesizes a view of cognition and of the history of technology that makes it possible to analyze the participation of new information technology 'actors' in these thinking collectives in a way that we do not judge whether there is 'improvement' or not, but rather identify transformations in practice (p. 23).

These *metaphors* are explanatory about the new relational and cognitive modalities that are reified in such environments (Taub et al., 2020). In fact, interactions are established in VLEs characterized by a dialogical relationship between a user, who has its own peculiarities and preferences - including sensorial ones - and those who have designed that given software (Borba & Villarreal, 2005). Furthermore, cognitive process fostered of an active and free exploration of the VLE, and it is oriented by the way the user perceives these spaces, processes them, and then acts in and with them. When in-game actions aren't perceived as meaningful, or have only a superficial effect, studies show that user *agency*² is reduced. However, in some circumstances, the opposite may also happen. When a VLE is designed in such a way that it leads the student to believe that he/she may perform some action in the virtual environment (e.g. use a virtual object), the student may still perceive that he/she have a high degree of agency. This

² In the context of serious game and gamification design, this agency is defined in terms of the amount of flexibility and control given to a player to do meaningful acts in a virtual world (Wardrip-Fruin, Mateas, Dow & Sali, 2009). It is closely connected to human agency, which is defined by intentionality, self-reactivity, and self-reflection, as well as to conceptions like: control, self-determination and self-regulated learning (Taub et al., 2020).

happens because the freedom of exploration, the degree of immersion and the presence of appropriate *affordances* increase the degree of perception of one's freedom of action and control within the virtual game environment.

In addition, it is important to note that some studies have suggested that greater *agency* in these settings is associated with higher levels of engagement and better learning outcomes in ELVs, whereas others have shown that learners may show metacognitive inabilities and difficulty on selecting, organizing and integrating relevant information leading to a reduction in activity in interacting with the context (Taub et al., 2020). Sometimes, this could be caused by a non-personalized and overstimulating VLE design. It would increase the possibility that learners will be distracted by engaging, irrelevant features would hinder an effective learning process due to *seductive details* (Harp & Mayer, 1998). Therefore, it is important to ensure that such mechanics also align with the main learning objectives of the activity, when incorporating game mechanics associated with higher levels of freedom and control, such as allowing students to explore an *open world environment*. This is also essential to reduce the problems encountered by students who do not interact with crucial elements of the content (Mayer, 2004).

These considerations are pivotal for the design of VLEs, especially when it is intended to include them among the digital artifacts adopted to teach in classrooms with pupils with marked hypersensitivity, problems in processing sensory information, in attentional processes or other special educational needs (Maliverni et al., 2017). In addition

«the person with disability can enter into a crisis in his self-perception of corporeity precisely because, the parallel system of formation of the Web society and video games, determines an evident *mismatching on the basis of the different ages* between the sense of one's corporeity which is fundamental in recognizing one's identity and the identity of others and the phantasmatic projection of one's life project» (Spadafora, Fabiano, 2022, p. 312).

These considerations highlight the need to reduce the risk of *mismatching* and, taking into account that currently the studies on the interaction between the design of the VLEs and the student's agency are lacking, it is considered appropriate to start further investigations of an empirical type to identify the characteristics that the VLEs should possess in order to be able to share useful indications with those who deals with the design of these environments, promote the *agency* of all students and foster both the teaching-learning process and inclusion.

4.Promoting the agency of students with Autism Spectrum Disorder

To date, several Virtual Reality games and other kind of edugame are employed to support student with ASD to develop multiple skills: social, communicative, empathy, emotions recognition and perspective taking (AIELLO et al., 2016; Baldassarri et al., 2021; Di Tore et al., 2020; Malinvernì et al. 2017; Parsons e Cobb, 2011; Parsons e Mitchell, 2002). It is usually possible since student with ASD perceive virtual environments as safe, they feel having more control on stimuli and being able to play using their competencies while playing (Ke, & Im 2013; Parsons & Mitchell, 2002). It also important to consider that this perception is also related to the design of the environment, because who suffers sensory overload, like some student with ASD, would be less responsive to developer strategies for teaching game concepts and engaging the player (Costello, & Donovan, 2022) and it would hinder the learning process. In fact, Costello and Donovan (2022) examine the perspective of videogames from individuals with ASD to gain further about their needs considering their perception of a game environment and if they may experience sensory distress while playing videogames. The preliminary investigation involves thirty-two participants with ASD who answered to some questions about the topic. Participants affirm that some sensory features are a source of distress, in terms of jarring sounds, flashing pictures, game difficulty, screen shakes. Results are in line with Watson (2018) considerations as sensory distress, due to sensory overload, may be related to concerning symptoms including trouble concentration, anger, and worry.

It's important to consider that not all the students with ASD may be overwhelmed by sensory stimulations. Because of its heterogeneity, students with ASD may exhibit a wide variety of symptoms as well as variation in the kind and intensity of severity of over- or under- stimulation. This variety requires the game to be adaptable in terms of the stimuli provided on the screen (both in quantity and quality), visual and auditory components, game flow and storylines, simplicity, flexibility, and motivating aspects to keep the students involved in the learning process (Ghanouni et al., 2020).

Moreover, it clearly links to the concept of agency as it

«highlights that actors always act by means of their environment rather than simply in their environment [so that] *the achievement of agency will always result from the interplay of individual efforts, available resources and contextual and structural factors* as they come together in particular and, in a sense, always unique situations» (Biesta & Tedder, 2007, p. 137, in Sibilio, Aiello, 2018).

To foster this interplay further investigations are needed to extend the pedagogical research usually focused on teachers' agency (Aiello, Sharma, Sibilio, 2016; Miller et al., 2020) and to adopt an ecological perspective by considering also other characters of the teaching-learning process, such as the student with ASD and other caregivers. Collaborating both with students with ASD and their caregivers to co-designing accessible and educational videogames may be beneficial to enhance the quality and effectiveness of the teaching-learning process (Malinverni et al. 2017; Millen, Cobb and Patel 2010; Parsons et al. 2011) and detecting which objective, social, and emotional affordances (Fusco et al., 2020) it may be appropriate to foster student agency of people with ASD within the VLEs.

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