UTILIZZO DEI SERIOUS GAMES NEL CAMPO DELL'EDUCAZIONE E DELLA DIDATTICA: APPLICAZIONI CONTEMPORANEE NEI SETTORI DELLA VITA SOCIALE

EDUCATIONAL AND DIDACTIC USE OF SERIOUS GAMES: APPLICATIONS IN CONTEMPORARY SOCIAL LIFE SETTINGS

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Abstract

The introductory part of this article will focus on defining the methodological characteristics of the use of serious games (SGs) in education and training. Recently, these educational technologies, as well as digital games, have been used to allow students and professionals to acquire soft skills using a playful, competitive and interactive approach. In the second part of the paper, we will analyze how serious games are used in social life settings to promote inclusiveness and communication skills in subjects predisposed to experiencing exclusion and isolation. In the final part, future perspectives will be discussed and described.

La parte introduttiva di questo contributo si concentra sulla definizione delle caratteristiche metodologiche nell'utilizzo dei *serious games* (*SGs*) nel campo dell'educazione e della formazione. Di recente, queste tecnologie educative, alla pari dei giochi digitali, sono state impiegate per consentire a studenti e professionisti l'acquisizione di competenze trasversali, usufruendo un approccio coinvolgente, competitivo e interattivo. Nella seconda parte dell'articolo si considerano le modalità secondo cui i *serious games* possano essere utilizzati nei settori della vita sociale al fine di promuovere inclusione e capacità comunicative in soggetti che sono

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maggiormente predisposti a sperimentare esclusione e isolamento. Infine, nelle conclusioni, vengono presentate e discusse alcune prospettive di studio per il futuro.

Keywords

Serious games, education, inclusiveness, inclusion, educational games
Serious games, educazione, inclusività, inclusione, giochi educativi

Introduction

Games are among the most effective exercises towards the acquisition of knowledge and practical skills: indeed, it can be asserted that, game is something serious (Munari, 2017), especially among children. Between the second and the fourth month of age, children start doing random actions which give them satisfaction; then, they keep repeating the same patterns (Piaget, 1974) and eventually turn them into actual games. Symbolic gaming (Piaget, 1992) has a fundamental role in children's mental development: « (...) the child has only to desire something strongly or fear something and the game becomes a test, and its success or failure are regarded as the sign and cause of the realization of what is desired or feared» (Piaget, 1929, p. 225). Moreover, there are toys or games that can help develop body features, such as strength, balance or motor coordination. While playing or manipulating a toy, children receive continuous sensory stimulation (Nigris et al., 2016), touching, listening or even tasting the objects involved in the interactional processes; also, they can use creativity in order to make their game *more personal* and in accordance with their own preferences and inclinations. This is the reason why it is important to produce games – videogames included – that are much more customizable. Another relevant aspect of games is related to communication and socialization: ludic practices can instill crucial skills (i.e. team building, team working, problem solving, among others), mediatic patterns and interactional strategies. During the game, a lot of emotions are felt: anger, sadness, fear, happiness; people learn how to cooperate with fellow gamers towards a specific goal, how to deal with failure and loss, how to express their feelings in a more appropriate way. Playing together, children learn norms of social coexistence because they have the opportunity to collaborate, cooperate, respect the rules, wait for the moment, negotiate and find a compromise (Toto, 2019). Donald Winnicott (2018) has widely discussed the role of ludic activities in enhancing the identity growth of the child. Within their transitional area of development, children playfully engage with objects that represent their first, real possession. These objects will help him:

1. distinguish between *self* and *not-self*;
2. switch from a total reliance on their own mother to a relative independence.

These transitional items can be represented as blankets, toys or dolls to which children get deeply passionate: thanks to them, children realize they are not just an extension of their mother, but rather individual beings, who are capable of acting on external elements of reality. Considering all of these theoretical premises, it is self-evident that educational studies should inquire the possibilities offered by gaming in the field of formation and social life.

1. **Background: contemporary forms of gaming and their applications in educational contexts**

In current times the most appreciated and used games are the electronic ones. Especially during the pandemic, children have showed to prefer videogames and indoor activities rather than toys or outdoor amusement (Kourti et al., 2021). Gaming industry is increasingly becoming interested in teaching processes, leading to an evident surge of educational and serious games. The latter do not have the aim to merely entertain the user, but they are designed to teach and train (Abt, 1987; Gee, 2009). Game Based Learning (GBL) consists in the use of digital games for educational purposes. Within this scenario, videogames become an instrument through which it will be possible to stimulate and effectively support learning processes (Gee, 2003; Kahn, 2021). Serious games (SGs) represent a successful combination between interactive learning by doing (Dewey, 1967) and gamification. The involvement of ludic mechanisms in teaching and training paths helps educators to make their lessons more challenging and enjoyable. SGs allow students to experience:
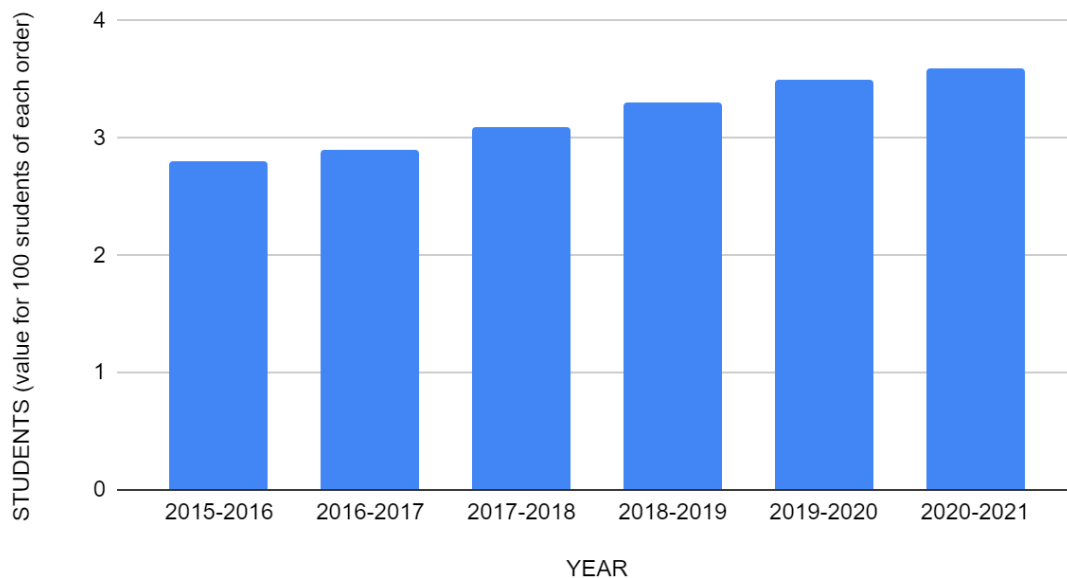
2. an effective and attractive learning activity;
3. the possibility of feeling more autonomous by manipulating the components of the games;
4. the acquisition of cognitive and digital skills, thanks to the interaction within a virtual and safe environment;
5. a pleasant and satisfying exercise.

Unlike gamification, which is a procedure consisting of score attribution or levels achievement (Vlachopoulos & Makri, 2017), SGs are proper games, that are used and enjoyed. In 1973, after seven years of ongoing research and more than 150 publications, Sonia Livingstone and others demonstrated that SGs can be a valid methodology to make people learn skills and contents. Connolly and colleagues (2012) collected empirical data based on practical experiments, showing that GBL could have a large impact on players' levels of perception, cognitive capabilities, behavior, emotional management and motivation.

1.2 **Research question**

In the field of learning sciences and educational research, GBL and SGs should be seen as a breeding ground for new projects and applications; using games in teaching practices means finding new methods to innovate pedagogy and promote students' well-being. The design thinking model is very effective in terms of social innovation (Brown, 2009), because this approach is totally people-centered. Hence, a needs analysis and identification of the affected population was carried out before this review was conducted. We started by collecting some data: last year only 32% of schools in Italy were accessible to students with motor disabilities; in the last three years 2 out of 3 Italian classrooms have not yet been equipped yet with computer stations for kids with disabilities; only around 1% of Italian schools are equipped with aids for people with visual impairments (ISTAT, 2021). It could be argued that the Italian school system still has a long way to go in integrating people with disabilities or health problems.

Graph. 1 A growing need: students with disabilities in Italy. (Source: ISTAT, 2021)

Games for change are tied to a specific research field that implies positive change in society: this means that they could enhance real change through several persuasive strategies. Therefore, the research question underlying this study is: within educational settings where people may feel excluded or limited, which impact could serious games have in increasing levels of inclusiveness?

2.   **Methodology**

The present study was conducted through a Scoping Review, in order to summarize the research activities with respect to the planned investigation topic. The survey was conducted using the Scopus search engine (Elsevier Ed.). The main objective of this work is to perform an initial exploratory investigation that will be expanded in the next steps through a Systematic Review aimed at deepening the research question, namely the impact that Serious Games can have on the levels of inclusiveness in educational environments. Ultimately, the goal will be to quantify the impact and determine which benchmarks are capable of producing the greatest impact.

Therefore, the following keywords were identified to help select the benchmark studies: Serious Games (or Serious Game); education (or educational games); inclusion (or inclusiveness or inclusivity). All of the selected studies are written in English and the time criterion refers to studies from 2018 to March 2022. Furthermore, studies belonging to the following sectors were eliminated: engineering, medicine, mathematics and energy - because they are considered, at the moment, not congruent with the topic being investigated.

During the scoping process, the methodology proposed by Arksey and O'Malley (2005) was used; the latter is characterized by 5 phases:

1.   identification of the research question;
2.   identification of relevant studies;
3.   selection of studies;
4.   data tracking;
5.   collection of results.

2.1   Identification of the research question

In this first phase, the research question was identified and constructed on the basis of the main reference topics of our research baseline. In this Scoping Review, the main interest has been to investigate the impact that Serious Games can have on the levels of inclusivity within educational contexts, where educational contexts refer not only to school contexts but to all those processes in which the potential for development can emerge.

2.2   Identification of relevant studies

A search phase was then launched, using the Scopus search engine, to find relevant articles using the identified keywords (Serious Games or Serious Game; education or educational games; inclusion or inclusiveness or inclusivity). The first search yielded 53 documents.

2.3   Selection of studies

Studies belonging to categories deemed not congruent with the investigation topic (engineering, medicine, mathematics and energy) were subsequently excluded. The analysis then led to a number of 44 articles. In this phase, the abstracts of all the selected articles were read in order to understand the real affinity of the studies with the topic of the Scoping Review with reference to the selection criteria (educational contexts, use of Serious Games in promoting change in supporting inclusiveness). Therefore, 25 articles were selected at this stage.

2.4   Data tracking

In this phase, the 25 articles were read and those deemed to have the greatest impact in relation to the research question were selected. A total of 7 articles were identified and analyzed.

2.5   Collection of results

The analysis of the 7 selected articles were arranged in a table (Table 1) and, in addition to the basic references relating to authors and year, the following criteria were examined: topic, type and number of samples, context, main results, limitations.

AUTHORS	YEAR	TOPIC	TYPE OF PARTECIPANTS	CONTEXT	MAIN RESULTS	LIMITATIONS	FUTURE PERSPECTIVES
Tang, Zheng, Zhang, Yu, Ren, Li, Chen	2022	Educational game; game-based intervention; serious games; stigma	Students (n=96)	Middle School	After the intervention with the Serious Game, the rate of awareness of	The findings of AIDS-related stigma and high-risk behavior attitudes are not statistically	Investigate any changes in the perception of stigma with respect to AIDS

					AIDS knowledge has increased and the use of the game has been very positive	significant	
Baldassarri, Passerino, Ramis, Riquelme, Perales	2020	Autism Spectrum Disorder (ASD); Computer graphics; Education and therapy; Emotions; Interactive tools; Serious games (SG); Tangible interaction; Technology platforms; Videogames	Students (n=9)	Educational Setting	The use of Serious Game reports describes increased attention (receptive or selective) and promotes the cooperative work	Need to complete a second study with emotional scales	Extend the investigation with the integration of multimodal sensors in order to increase sensory stimuli such as tactile, olfactory, and oral input
De Vasconcelos, Junior, De Oliveira Malaquias, Oliveira, Cardoso	2020	Inclusive Education; intellectual disabilities; literacy; serious games; Virtual Reality	Teachers (n=3) ; students with ID (n=8)	School	The game works in developing the skills of reading, memorization, attention, concentration, perception and spatial organization for children with ID	Qualitative analysis. Low sample size	Implement access to educational games by ID as this access is still limited
Jaramillo-Alcázar, Cortez-Silva, Galarza-Castillo, Luján-Mora	2020	Accessibility; Disabilities; Educational; Impairments; Learning; Multi-platform; Online; Serious games	Students with disabilities (n=10)	Educational Setting	The Serious Game motivates students to use alternative learning and fulfills its goal of informing and encouraging computer learning	Low sample size	Study the long-term effects of gaming. Conduct an analysis of the accessibility of the platform and the extension of the accessibility features. Extend the game to include more features
Lievense, Vacaru, Kruithof, Bronzewijker, Doeve, Sterkenburg	2020	Rational-emotional behavioral therapy; Serious game intervention; Socio-educational outcomes	Students (n=64)	Primary School	Serious Games can improve psychosocial outcomes in children with visual impairments (Vis)	Problems with test-retest reliability. Difficulties measuring emotional well-being. Geographic restriction of the sample	Investigate the effectiveness of Serious Games in reducing stigma with respect to the effects seen through in-person

						interventions
Stančin, Hoić-Božić, Skočić Mihić	2020	Digital games; Game-based learning; Inclusion; Intellectual disabilities; Serious games	None	Educational Environment	The benefits of learning from Serious Games are diverse and obvious. A cross-cutting challenge is represented by: design, game mechanics and content	The advantages do not have a solid methodology	Investigate the development of a digital game expert system designed specifically for people with intellectual disabilities. Expand the literature on the topic of Seriius Games for individuals with disabilities.
Cangas, Navarro, Aguilar-Parra, Trigueros, Gallego, Zárate, Gregg.	2019	Education; Inclusion; Mental health; Serious games; Stigma	Students (n=530)	School; University	The Serious Game helps reduce stigma. The reduction is greater in school students because they had higher initial stigma values	No follow-up was conducted on the results conducted. The sample consisted only of students studying education related topics.	Investigation on the reduction of stigma toward disorders other than schizophrenia.

Table 1 Selected Studies

3.   **Results**

In the study conducted by Cangas et al. (2019), the effects that the use of serious play (Stigma Stop) can have on raising students' awareness of mental health problems were researched. In particular, the level of stigma among students was investigated. The serious game analyzed is characterized by four characters with psychological disorders of various types: schizophrenia, bipolar disorder, agoraphobia, depression). During the game, the user interacts with each character and performs a group task. In addition, the user expresses their opinion on the emotional states of the characters in order to promote empathy. It was found that, after the intervention, the stigma decreased - especially among high school students compared to university students - thus demonstrating that the use of serious game had an effect. Evaluation aspects were also positive: students assigned a high score for usefulness and a slightly lower score for value of entertainment; moreover, 91% of users stated that they would recommend the use of Stigma Stop, thus underlining the usefulness of the intervention.

A study by De Vasconcelos et al. (2020) the effectiveness of a serious game, based on Virtual Reality technologies, on the literacy process is analyzed. In particular, the SG was designed with the contribution of special education professionals and was tested by teachers from schools rated as inclusive and by students with intellectual difficulties. The virtual environment of the serious game consists of a city with its elements: houses, shops, streets. Game designers have developed 15-point guidelines to guide game planning and implementation in order to promote effective learning and an inclusive context. During the game, users search for items in a shopping list and move between locations to acquire these items. The learning process comes into play as soon as the names of the objects are

made explicit, - even those not included in the list. The student can learn to pronounce the name of the objects, write it and learn how to break it down into syllables. The teacher can acquire the data emerging from the learning analytics and will use it to evaluate progress in the literacy process.

In a 2020 article by Baldassarri et al., the possible role of videogames in the education of children with ASD was analyzed. The aim of this study was to determine whether SGs could be an effective tool to facilitate communication and interaction among students with autism. The results were collected through two different case studies: the first experiment involved a previously tested 3D maze videogame in which the emotions could be captured thanks to a video recording system; the second one was created with the help of a tangible interactive tabletop and measuring instruments operated by experts in the field. Thanks to the first SG tested, Baldassarri et al. were able to stimulate basic emotions in children with autism and report them with relative accuracy. The use of the interactive tabletop increased the attention span in subjects with ASD or special communication needs, at the same time improving their performance. A combination of these two technologies could provide students with innovative and collaborative tools to train their social skills and feel more included.

Jaramillo-Alcázar et al. (2020) developed a comprehensive method to include people with different types of disabilities in SGs processes. Considering the needs arising from different types of impairments, the research group created a specific model to measure the accessibility rate in SGs and develop more gamer-friendly products. Later, the model was tested by experimenting with a videogame called PC Travel, which was designed to instill digital skills in its gamers. 60% of the users said that after trying SG, they actually felt more confident with computers.

Lievense et al. (2020) dealt with the problematic situation of children with visual impairments, who have proven to have a poorer self-concept and lower relational well-being. Their intervention consisted in testing a videogame called See on children with VIs, recurring to a randomized controlled trial. The results showed positive effects on the social inclusion of the participants, as well as social well-being and self-perception within the academic environment.

The study by Stančin et al. (2020) is part of a larger project ("Digital games in the context of learning, teaching and promoting inclusive education") funded by the University of Rijeka (Croatia). The authors focused mainly on intellectual disabilities, outlining guidelines for future research developments. The aim of the Croatian research group is to understand the extent to which GBL can increase the levels of inclusion within educational contexts, facilitating the acquisition of life skills and drawing a theoretical framework for the development of innovative ludic technologies. The mentioned study is purely preliminary, suggesting that the topic is attracting the interest of the European scientific community.

Tang et al. (2022) highlight the effects that the use of a serious game - with a prevention theme in the health field - can have on three main topics: awareness, reduction of stigma, improvement of attitudes towards high-risk behaviors. The AIDS prevention game is characterized by an attack that HIV throws at the human body. Players must implement in-game behaviors to eliminate HIV (such as rejecting dangerous sexual behavior). The study showed that after using a serious game for a two-week period, the participants in the experimental group showed an improvement on the above-mentioned topics. Game use was also found to have good implications for knowledge of AIDS-related laws and

regulations. The data show that after the intervention the positive rate of attitudes towards high risk AIDS behavior decreased, thus indicating an effective effect of the intervention. In terms of evaluation, the results suggest that students provide positive feedback with respect to the serious game in question; emphasizing that the SG has a good GUI and usability.

4.   **Discussion**

This article discusses the real usefulness of SGs and gamification in promoting inclusivity in social life environments, analyzing data collected from several studies. Found evidence led us to suppose that SGs could be designed to meet the specific needs of students and individuals with disabilities and cognitive impairments. In particular, an interesting aspect concerns the reduction of stigma: the promotion of awareness and interaction with the specific educational need leads to a greater knowledge of it and an increased collective understanding. This aspect proves to be effective from the perspective of inclusion and welcoming diversity. Thanks to the validated results, it has been demonstrated that SGs can also effectively contribute to the reduction of social exclusion: the challenge is to develop SGs that are not limited only to users with special needs, but can also be used by their peers within different social contexts, especially in educational settings. Explicit evidence is reported in the study by Cangas et al. (2019): the use of Serious Game about psychological disorders has actually increased the levels of awareness and reduced stigma towards psychological difficulties among students. In the moment when scientific evidence reports an increase in symptoms related to psychological disorders, it is very important to get people used to listening to themselves and others, in order to implement behaviors aimed at prevention and psychological support. It emerges also in the study of Lievense et al. (2020): with respect to students with visual impairments, the need to increase the levels of social well-being and self-perception within the academic environment is evident. At the same time, inclusion also involves overcoming barriers and taboos towards physiological illnesses such as the manifestation of symptoms resulting from HIV (Tang, 2022). In fact, the word *inclusion* should refer to eliminating barriers through individual expression in every context.
The limitations of the present article refer to the moderate number of articles considered. In addition, the relevant areas are very varied, but still they are all considered congruent to the research question. It would be useful to deepen the identified topic through an analysis related to a particular need for inclusion in the educational settings. With respect to the papers under analysis in this Scoping Review, as shown in Table 1, the main limitations are related to the methodological aspect (Lievense et al., 2020). In particular, the results obtained are not all statistically significant considering some of the variables studied (Tang et al., 2022); in some cases, follow-up was not realized (Cangas et al., 2019) or the sample consisted in a low number of subjects (de Vasconcelos et al., 2020; Jaramillo et al., 2020).

Conclusions

This Scoping Review investigates the crucial aspects of educational SGs used to promote inclusiveness, social interactions and peer-to-peer sympathy. The survey shows that the use of SGs has proven to be a valid and effective way to facilitate communication and

social inclusion of people with mental and physical impairments. SGs can encourage more inclusive behaviors among students in educational contexts. In particular, we have found that SGs have proven to be an effective way to reduce social stigma, spreading more knowledge about clinical conditions (Cangas et al., 2019; Tang et al., 2022); therefore, some studies have highlighted the necessity to improve new design models for SGs which include accessibility parameters (Jaramillo-Alcázar et al., 2020). The paper emphasizes that access to educational games for students with intellectual disabilities (ID) is still limited (de Vasconcelos et al., 2020). Some studies included in this article (Baldassarri et al., 2020; Lievense et al., 2020, etc.) have evaluated the role of SGs in ensuring students with cognitive disabilities or autism spectrum disorder more opportunities of social interaction and psychological well-being. Ultimately, it will be interesting to investigate further aspects related to specific needs through a systematic review. Collecting best practices and related evidence can be very useful to all professionals and actors in the educational setting (i.e. teachers, educators, parents, students, and so on) in order to design targeted interventions to promote the empowerment of everybody, no one excluded.

References

Abt C. (1987), *Serious Games,* Lanham (Maryland): University Press of America.

Arksey H, O'Malley L. (2005), Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology*, 8(1), 19–32.

Baldassarri, S., Passerino, L., Ramis, S., Riquelme, I., Perales, F. J. (2021). Toward emotional interactive videogames for children with autism spectrum disorder. *Universal Access in the Information Society*, *20*(2), 239-254.

Brown, T. (2009), *Change by design: how design thinking transforms organizations and inspires innovation*, New York: Harper Collins.

Cangas, A. J., Navarro, N., Aguilar-Parra, J. M., Trigueros, R., Gallego, J., Zárate, R., Gregg, M. (2019). Analysis of the usefulness of a serious game to raise awareness about mental health problems in a sample of high school and university students: relationship with familiarity and time spent playing video games. *Journal of clinical medicine*, *8*(10), 1504.

Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., Boyle, J. M. (2012), A systematic literature review of empirical evidence on computer games and serious games. *Computers & education*, 59(2), 661-686.

de Vasconcelos, D. F. P., Júnior, E. A. L., de Oliveira Malaquias, F. F., Oliveira, L. A., Cardoso, A. (2020). A Virtual Reality based serious game to aid in the literacy of students with intellectual disability: Design principles and evaluation. *Technology and Disability*, *32*(3), 149-157.

Dewey J. (1967), *Esperienza e educazione.* Firenze: La Nuova Italia.

Gee J. P. (2003), What video games have to teach us about learning and literacy. *Computers in entertainment (CIE)*, 1(1), 20-24.

Gee J. P. (2009), Deep learning properties of good digital games: How far can they go?, in Ritterfeld U., Cody M., Vorderer P. (2009), *Serious games: mechanisms and effects*. New York; London: Routledge, 89-104.

ISTAT (2021), *L'inclusione scolastica degli alunni con disabilità - A.S. 2020-2021,* Istituto Nazionale di Statistica: Roma.

Jaramillo-Alcázar, A., Cortez-Silva, P., Galarza-Castillo, M., & Luján-Mora, S. (2020). A method to develop accessible online serious games for people with disabilities: A case study. *Sustainability*, *12*(22), 9584.

Kahn M. A. (2021), COVID-19's impact on higher education: a rapid review of early reactive literature. *Education Sciences,* 11(8), 421-435.

Kourti A., Stavridou A., Panagouli E., Psaltopoulou T., Tsolia M., Sergentanis T. N., Tsitsika A. (2021), Play Behaviors in Children during the COVID-19 Pandemic: A Review of the Literature. *Children*, 8(8), 706-724.

Livingstone S., Coleman J., Kidder S., Fennessey G. (1973), *The Hopkins game program: final report on seven years of research.* Baltimore (Maryland): Hopkins Press.

Munari B. (2017), *Fantasia. Invenzione, creatività e immaginazione nelle comunicazioni visive*. Bari: Laterza.

Nigris E., Teruggi L. A., Zuccoli, F. (2016), *Didattica generale*. Milano; Torino: Pearson.

Piaget J. (1929), *The child's conception of the world*. New York: Routledge.

Piaget J. (1974), *Lo sviluppo mentale del bambino*. Torino: Einaudi.

Piaget J. (1992), *La psychologie de l'enfant,* Paris: Presses Universitaires de France.

Stančin, K., Hoić-Božić, N.,Skočić Mihić, S. (2020). Using Digital Game-Based Learning for Students with Intellectual Disabilities–A Systematic Literature Review. *Informatics in education*, *19*(2), 323-341.

Tang, J., Zheng, Y., Zhang, D., Yu, X., Ren, J., Li, M., ... Chen, Y. (2022). Evaluation of an AIDS Educational Mobile Game (AIDS Fighter· Health Defense) for Young Students to Improve AIDS-Related Knowledge, Stigma, and Attitude Linked to High-Risk Behaviors in China: Randomized Controlled Trial. *JMIR Serious Games*, *10*(1), e32400.

Toto G. A. (2019), *Expertise docente: teorie, modelli didattici e strumenti innovativi*. Milano: FrancoAngeli.

Vlachopoulos D., Makri A. (2017), The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, 14(1), 1-33.

Winnicott D. W. (1953), Transitional objects and transitional phenomena - A study of the first not-me possession. *International Journal of Psychoanalysis,* 34(2), 89-97.