Editorial. Digital games and learning
Editoriale. Giochi digitali e apprendimento

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The strict relationship between play and learning has been extensively investigated by well-known educational psychologists like Piaget and Bruner. Nonetheless, if play is commonplace in early-years and primary education in our schools, the same cannot be said of secondary and higher education, let alone adult learning. While it is true that most of the research into learning through play focuses on childhood education, there is no reason why learning, for older students, should not be enjoyable and, where possible, fun.

Since the beginning of the '80s, with the ever increasing spread and technological innovation of videogames, researchers have been investigating questions concerning the key features that make computer games so captivating and engaging. Some have gone on to explore ways these features might be harnessed for making learning engaging and motivating like gameplay. Thomas Malone (1980), a pioneer in this field, mostly focused on the motivating power of games, while James Paul Gee and Mark Prensky advocated the power of digital games for learning by arguing that good videogames are not only engaging, they «*incorporate a whole set of fundamentally sound learning principles, principles that can be used in other settings, for example in teaching science in schools*» (Gee, 2003, p.20). Some, like Prensky (2006), believe videogames even have the power to prepare young people for fast-changing life in the 21st century.

The claims from such visionary authors have been critiqued as being utopian, overly enthusiastic about the transformative potentials of videogames, and out of touch with the complexities that emerge when games are brought into educational settings (Buckingham, 2013). Nonetheless, these visions paved the way for two decades of intense research and experimentation into how to harness the power of digital games for educational purposes.

In line with this research, the use of digital games for learning is now increasingly being taken up in formal education, especially schools, but also in higher education and professional training. Indeed so much so that a number of new games-related fields have emerged. One such is "serious games", that is games designed and used for purposes other than entertainment (Ratan & Ritterfeld, 2009). Another is "gamification", i.e. the application of game-design elements, such as game mechanics, outside of a gaming context (Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011). Another still is "game making", a constructionist approach focused on the idea of providing students with the opportunity to design and implement their own (digital) games rather than 'simply' playing them; this is a knowledge-building approach based on the collaborative production of an artefact: the game.

Digital games can be powerful, highly interactive and engaging tools for learning, offering immersion in virtual worlds with affordances sometimes similar and sometimes utterly different from the real world. In these virtual worlds, students can practice their skills or learn new ones; some of these may be related to disciplinary content, while others are transversal, like collaboration, competition, problem solving, critical thinking, etc. Games' affordances for learning can be employed effectively in formal learning contexts, provided that the teacher orchestrates their use within a coherent and pedagogically informed educational design. However, learning through gameplay can also take place when people play entertainment videogames, without an explicit learning intent on the part of the designer or the player (Persico, Passarelli, Pozzi, Earp, Dagnino, & Manganello, 2019).

The landscape covered by this special issue includes all of the above scenarios, without however shying away from the possible drawbacks connected to gameplay in both formal and informal contexts, and it is therefore very broad. In fact, the relationship between digital games and learning encompasses not only a large variety of contexts, but also an equally large range of game types, learning outcomes, approaches and disciplines, many of which are represented in the papers selected for this issue. The digital game types considered vary from computer-based games to mobile apps, and from serious games to purely entertainment games. The described approaches are not limited to the use of games for learning or entertainment: although game making and gamification are not, strictly-speaking, "educational uses of games", they are covered here because they represent important strands of digital game-based learning research. Indeed, gamification may succeed in fostering engagement in learning tasks and improving learning effectiveness where other approaches fail. Game making, instead, can promote active participation and student centeredness through learner creation of cultural artefacts potentially leading to the activation of transversal skills and also acquisition of subject area competences (Earp, Dagnino, & Caponetto, 2016).

The learning outcomes considered in the papers selected for this special issue are also very diverse, highlighting how games have clear potential for fostering the achievement of different types of learning objectives. Digital games, in fact, can be employed to foster the development of both disciplinary competence and 21st Century Skills such as communication, collaboration, problem solving, critical thinking, creativity, self-regulation or media literacy. Additionally, some narrative-driven games can be used to encourage reflection or discussion on complex topics, from philosophical questions to ethical and psychological issues, such as reflection on death, attitudes towards sexual, cultural and religious diversity, and thus help to foster cultural and personal development.

This special issue aims to increase the body of knowledge and evidence concerning the learning potential of videogames and gamification, as well as the problems associated with educational uses of games (Persico, Passarelli, Dagnino, Manganello, Earp, & Pozzi, 2019). The selection of papers presented here has been informed by this overarching aim. At the same time, we hope that educators planning to employ games in their classes will find that they provide inspiring examples of educational uses of games. Since designing appropriate and pedagogically sound game-based learning interventions is a difficult endeavour, we do hope that the following articles will contribute to dissipate the fog that often envelops design principles for Game-Based Learning.

The first research paper, by Freina and Bottino, provides an example of entertainment games used for learning in primary school. In this study, an experimental group of students underwent a period of training of their visuospatial skills via digital gameplay in an immersive virtual reality game, while a control group followed the traditional math curriculum. The study is based on the hypothesis that training visuospatial skills has a positive impact on students' maths results. Indeed, the maths skills of the experimental group improved significantly more than those of the control group, providing evidence for the initial hypothesis. The main take away of the study is that the maths skills of primary school children can benefit from the

training of students' visuospatial skills and that such training can be done through immersive virtual reality games.

In the second paper, Nicolaidou, Tozzi, Kindynis, Panayiotou and Antoniades present an evaluation study of a gamified application designed to support children's stress management. The app, named Kids Stress Relief, adopts interactive storytelling and is endowed with game mechanics (like rewards, levels, and feedback) in order to engage the user in learning how to identify bodily signs of stress and perform stress relief exercises. According to the authors, gamification is a novel concept for stress management apps and its potential has not yet been exploited in conjunction with behaviour change techniques and stress management methods. The app was tested on a sample of children (5 to 12 years old) and data were collected through the app logs and a usability scale. The reported results are quite promising, both in terms of usability and acceptance of the app, and the authors discuss the instructional and design implications for psychology-based apps.

The perception of teachers about game-based interventions is a core issue that significantly affects adoption. In the third paper, Loperfido, Dipace and Scarinci investigate teachers' confidence, knowledge and attitudes about the use of digital games in teaching activities. Data were collected through questionnaires and focus group discussions. According to the authors, the investigation reveals that the target cohort (kindergarten, primary and middle school teachers) have a lack of competence in strategies and methods for game-based learning. In addition, games were considered not for their innovative potential, but rather in relation to traditional and consolidated teaching practices and aims, which are taken as benchmarks.

Weitze, in the fourth paper, provides an interesting example of game making. In this study, twenty-two second grade students at a primary school in Denmark used Scratch to develop their own games in small teams. The constructionist approach adopted allowed the students to achieve discipline-specific learning objectives (reading, interpretation, interactive communication and linguistic production) in line with the school curriculum, alongside with the transversal skills of collaboration and self-regulated learning. The method adopted is in line with problem-based learning theory and constructionist ideas, leveraging students' creativity and motivation.

The last research paper, by Cecchinato, Papa, and Foschi, is a quasi-experimental study testing a teaching method based on gamification. In this gamified approach, one of the key elements of games – the presentation of a challenge to be overcome – is used to elicit reflection on a grounded problem. In the approach presented by the authors, a clearly-defined pedagogical model is used for throwing down, driving, and closing the challenge, guiding the educators through the whole educational process. The results of the paper are highly encouraging, as the gamified approach adopted increased students' self-determination and motivation for learning, and met their basic psychological needs of autonomy, competency, and relatedness. The intervention described in the paper successfully applied a technique focused on critical examination of real-world problems.

The first of the "platforms/tools" columns included in this issue, by Benassi, focuses on a non-digital application of game elements, namely escape rooms. These are time-limited, team-based live action games that have encountered a surge in popularity in recent years. Inspired by point-and-click adventure games, they require players to solve puzzles collaboratively in order to exit a seemingly inescapable physical room. Benassi's column provides an overview of escape rooms, outlining their applications for educational purposes (including training of 21st century skills) and their evolution over time. However, in practice, escape rooms are rarely compatible with the logistics and budgets of schools. Hence, the author also discusses the growing educational use of virtual and mixed reality escape rooms, bringing to a close their full circle evolution– from the digital to the non-digital, and back to the (partly) digital again.

The second "platforms/tools" column, by Nicolucci, presents A Mortician's Tale, a narrative-driven,

death-positive videogame that explores the themes of death, loss, and funeral rites. While the game was not expressly designed for educational purposes, the game developers' chief aim was to sensitively expose players to these themes and encourage them to explore them in a meaningful way. The paper argues that, for this reason, A Mortician's Tale could be employed with adolescents to foster reflection and discussion about death and loss without eliciting excessive stress on their part. Videogames have been widely used for fostering disciplinary knowledge or motivation for learning, but this paper clearly illustrates the potential games offer for dealing with difficult and/or sensitive topics that nonetheless can and should be part of school education.

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