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TRAINING DIGITAL TOOLS FOR STUDENTS OCCUPATIONAL SAFETY AND HEALTH: THE BECOMING SAFE PROJECT

STRUMENTI DIGITALI PER LA FORMAZIONE SU SALUTE E SICUREZZA DEGLI STUDENTI: IL PROGETTO SICURI SI DIVENTA

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Abstract

Information and communication technologies can improve the quality of the educational process. Serious games support the learning as they promote learner engagement and motivation by fostering social integration, sharing and cooperation through play and fun. This paper describes a research experience for the co-design of a digital serious game, aimed at students in the last three classes of Italian secondary education institutions, to increase awareness of the risks and value of health and safety in the workplace. This tool represents a valid support to the specific compulsory training in occupational health and safety for students involved in the paths for transversal skills and orientation.

Le tecnologie dell'informazione e della comunicazione possono essere utilizzate per migliorare la qualità del processo educativo. In tale contesto, i serious game possono migliorare l'apprendimento in quanto promuovono l'impegno e la motivazione dell'allievo favorendo l'integrazione sociale, la condivisione e la cooperazione attraverso il gioco e il divertimento. Con il presente lavoro viene descritta un'esperienza di ricerca per la co-progettazione di un serious game, rivolto agli studenti delle ultime tre classi degli istituti di istruzione secondaria di secondo grado, per accrescere la consapevolezza dei rischi e del valore della salute e sicurezza negli ambienti di lavoro. Tale strumento rappresenta un valido supporto alla formazione obbligatoria specifica in salute e sicurezza sul lavoro degli studenti coinvolti nei percorsi per le competenze trasversali e l'orientamento.

Keywords
Serious games, videogame, students, OSH learning
Serious games, videogioco, studenti, formazione in salute e sicurezza sul lavoro

Introduction

In recent years, e-skills have become increasingly important as they give people the opportunity to fully participate in a society that is increasingly based on digital platforms offering services, including institutional ones, enabling an active interaction between people and institutions. At the same time, digital skills improve the access to health care and public services, and make it possible to manage privacy and data security risks. In addition, the digital economy increasingly requires workers who are able to solve problems in high-tech environments and who also have the creative and interpersonal skills to make such environments successful.

In this context, the learning processes is also being transformed through the use of digital technologies, both in schools where young people are experimenting with new ways of teaching, and in adult education, where opportunities to take online courses enable effective life-long learning (Stabile, 2017).

Particularly, among information and communication technologies (ICT), digital serious games, which have an explicit and well-defined educational purpose, and did not primarily designed for entertainment but without excluding it (Abt, 1987), can make a relevant contribution in the knowledge society in different sectors such as education, health and business, etc. (Argenton, 2014). In fact, some digital experiences can be used to raise young people's awareness of health and safety at work; by activating attention and emotional involvement, because they help students to acquire information that will help them to think and act safely.

This paper presents a research experience that led to the innovative design of a digital serious game aimed at increasing the awareness of the risks and value of safety in the workplace of students involved in the Italian paths for transversal skills and orientation (PCTO). During these pathways, students are equated with workers in that they work in contexts other than school, which may expose them to the risk of occupational accidents and diseases, and therefore they must be adequately protected in terms of occupational health and safety (OSH).

The EU OSH policy framework 2014-2020, (European Commission, 2014) considers the prevention culture an important area of action: the purpose is to ensure that students receive risk and OSH education as part of their general education before they start working (Copsey, 2010). A recent study of the French National Research and Safety Institute for the Prevention of Occupational Accidents and Diseases found that for young workers who received OSH teaching at school, the occupational accident rate was 50% lower than for young workers who did not (INRS, 2018).

1. PCTOs and OSH Training

PCTOs aim to bring students closer to the world of work to help them identify their professional vocation, integrating classroom training with experiential learning in public or private contexts (Stabile, 2019). These projects have their normative foundation in Legislative Decree No. 77 of 15 April 2005 (General rules on alternation school work - ASL) and in Law No. 107 of 13 July, 2015 ("La Buona Scuola"), which made ASL compulsory over the final three years of classes in high schools. Subsequently, by Budget Law No. 145 of 30 December 2018, which provided for a reduced number of hours with respect to ASL pathways, these programmes were renamed "pathways for transversal skills and orientation".

The PCTOs approach is centred on self-guidance, allowing skills to be adapted to the demands of a labour market increasingly conditioned by rapid technological change. In this way, the danger of obsolescence of key competences as defined in the EU Council Recommendation/2018 is addressed too (European Council, 2018). During the PCTOs, students work in new contexts other than school, which may expose them to work-related risks, and therefore adequate OSH measures must be ensured for them. In these cases, according to the 2019 PCTO Guidelines, students acquire the status of workers under Article 2(1)(a) of Legislative Decree 81/2008 and are subject to the requirements for OSH protection, such as training and, if necessary, health surveillance and the provision of personal protective equipment (PPE).

The Charter of the rights and duties of students engaged in PCTOs, issued by Decree 195 of

2017 and referred to by the same guidelines, at art. 5 specifies, moreover, what kind of training must be guaranteed to students, providing general and specific training in OSH, as provided by the State-Regions Agreements 2011 and 2016. Today it is therefore necessary to use methodologies that stimulate young people's interest also by taking advantage of the opportunities offered by ICT and the new digital tools and languages, as underlined by the aforementioned Recommendation.

Education and training, in fact, are called upon to play a key role in the acquisition of skills and competences useful for seizing the opportunities that arise in anticipation of changes in society and in the world of work. These skills include pure digital skills but also the emotional and social skills associated with safely navigating the online world. Possessing this mix of skills, conveniently labelled as "digital literacy", is a pre-condition for people to harmoniously combine their digital and real lives, and to avoid the mental health problems associated with abuses of digital technologies (OECD, 2019). Three types of skills needs have emerged in the context of the digital transformation: ICT problem-solving skills, numeracy and problem-solving skills; specialized skills (i.e. cloud computing, big data analysis, blockchain and AI are reliant on highly specialized skills); additional skills that are complementary to digital technologies, such as creative, social and emotional skills. To sum up, today, digital skills are a prerequisite to fully participate in the labour market.

Besides offering new pathways for learning, schools play an important role in bridging the digital divide and ensure that all children reap the benefits of technological advances. Evidence suggests that educating individuals to become more flexible, resilient and creative and to pursue personal wellbeing helps them to adapt better to the changing work and life environment. Interactive teaching practices, for example the problem-based learning (PBL), require students to work in groups and use non-cognitive skills in their discussions, to listen to one another when solving problems, or to make choices about their own learning. PBL can contribute to developing a student's cognitive skills and, together with interdisciplinary learning, can facilitate the acquisition of non-cognitive skills by emphasizing the importance of flexibility and innovation. In this context, serious games in videogame format are digital tools that do not have exclusively or mainly an entertainment purpose, but contain educational elements, can represent in this context a valid support for training. Serious games, in fact, integrate declarative and procedural knowledge and keep the simulative, ludic and educational dimensions balanced, making learning and involvement effective (Anolli, 2011).

2. Learning through playing: serious games and videogames

In Italy, in 2018 16.3 millions of people (aged 6- 64) played videogames: the 37% of the Italian population within this age range (54% men and 46% women) (Aesvi, 2019). But the 2020 was the year of records for videogames: not only that, but in Italy above all, since in our Country the growth of the sector is among the three highest in Europe. The numbers, which have just been made official by the national category association Italian Interactive Digital Entertainment Association (IIDEA)[1] are unequivocal: in a scenario heavily influenced by the Covid-19 pandemic last year the turnover developed by videogames in Italy reached 2 billion and 179 million euros, with a growth of 21.9% compared to the previous year.

The number of gamers remained unchanged, with 16.7 million people enjoying themselves with a joypad in hand, i.e. 38% of the Italian population aged between 6 and 64. Provided by Game Sales Data, GameTrack and AppAnnie as part of the permanent observatory on the sector promoted by the Interactive Software Federation of Europe (ISFE), the data of the annual report on the consumption of videogames in Italy had never detected similar peaks.

The vast majority of psychological research on the effects of "gaming" has been focused on its negative impact: the potential harm related to aggression, addiction, and depression (Granic, 2013). Instead of several studies consider the benefits that videogames could have in several domains too: cognitive (e.g., attention), motivational (e.g., resilience in the face of failure), emotional (e.g., mood

1 https://iideassociation.com/notizie/in-primo-piano/iidea-presenta-il-nuovo-rapporto-annuale-sul-mercato-dei-videogiochi-in-italia.kl

management), and social (e.g., prosocial behavior). Moreover, an increasing number of serious games applied in education are emerging because the educational elements can be integrated into the gameplay, which will be subconsciously acquired by the players during the gaming process. (Zhonggen, 2019). Easiness of use, elements of surprise in the story-script, open-ended situations have been found as influential factors for the effectiveness especially among young players.

In videogames the learner is involved in the constructed reality through the integration of different sensory stimuli, which extends the learning process. (Stein, 1993; Calvert, 2004).

Video games, if developed in the right way, also have great potential for improving empathic and cognitive skills. (Buiatti, 2014; Falcinelli, 2011).

Thanks to their cognitive and affective mechanisms, games allow for collateral learning and learning by doing, on which the development of attitudes and skills is based (Benassi, 2013). This happens thanks to the interaction with the players and the negotiation of the system of rules, constraints and affordances, typical of the game.

Gaming activities require cooperation and collaboration to achieve specific goals too. For this reason, the design of digital training courses that include the characteristics of videogames seems to increase long-term motivation and participation in communities (Vassileva, 2012).

It is precisely starting from these social characteristics of gaming that it will be possible to design inclusive and personalised educational paths, able to promote integration through an exploration of learning that is guided, but also autonomous and structured in a cooperative sense, favouring the reduction of the discrepancy between the levels of competence of individual students (Barata, 2013), and bridging the generational gap between teachers and students (Oblinger, 2004).

In recent years games with an explicit and well-defined educational purpose, not primarily designed for entertainment, but not excluding it (Abt, 1987), are emerging as innovative tools to promote opportunities for psychological growth and well-being and could be introduced as positive technologies. Positive technology is an emerging field based on theoretical and applied research, whose aim is to investigate how ICT can be used to enhance the quality of personal experience at three different levels: hedonic well-being, eudaimonic well-being and social well-being. As positive technologies, serious games can influence both individual experiences and interpersonal relationships by nurturing positive emotions, promoting engagement and enhancing social integration and connectedness (Argenton, 2014).

Serious games and games in general are closely linked to positive emotions and a wide variety of pleasurable situational responses that make gaming the direct emotional opposite of depression (McGonigal, 2011). First, in fact, serious games can evoke sensory pleasure through graphics, usability, game aesthetics, visual and narrative stimuli. Secondly, they can elicit pleasure in knowledge by stimulating curiosity and a desire for novelty in a protected environment where individuals can experience the complexity of themselves and develop mastery and control. In this way, independence, self-confidence and self-esteem are strengthened (Oatley, 2006), supporting a process of recognition of personal ability to perform tasks well, solve problems and manage difficulties. Thirdly, games promote the pleasure of winning and, by supporting virtual interactions with real people, they nurture social pleasure, encouraging collaborative and competitive dynamics through communication and sharing of opportunities, even outside the game context (Reeves, 2009).

3. Materials and methods

The research, based on active participation aimed at co-designing a videogame, involved 7 italian secondary schools, distributed in 3 regions, related to 3 working sectors: agriculture, construction and manufacturing. The study involved 12 teachers and about 300 students, mainly from classes IV and V of these Italian institutes. Using qualitative and quantitative methods, a semi-structured interview was administered to the teachers, 4 world cafés/focus groups were set up, which led to the creation of working groups on an instant messaging platform (WhatsApp).

In addition, an anonymous questionnaire was administered to 277 students to investigate the representation of risk in the workplace and the training needs, also in methodological terms, in relation to OSH.

On the basis of the analyses, the main results and the comparison with OSH experts, researchers and teachers, a first version of the videogame on safety at work "Becoming Safe" (Sicuri si diventa) was realised. Regarding the satisfaction/usefulness of the videogame a survey was carried out involving some users too.

4. Results

The research, based on active participation and aimed at the co-design of a videogame, involved 7 secondary schools from 3 different working sectors with a medium-high risk from an accident point of view: construction (42.6%), manufacturing (28.9%), and agriculture (28.5%), , which were distributed in 3 regions: Lazio, Emilia Romagna and Marche.

12 teachers and about 300 students from the last three years (22.7% III class; 44.1% IV class; 33.2% V class) of the institutes involved took part in the study.

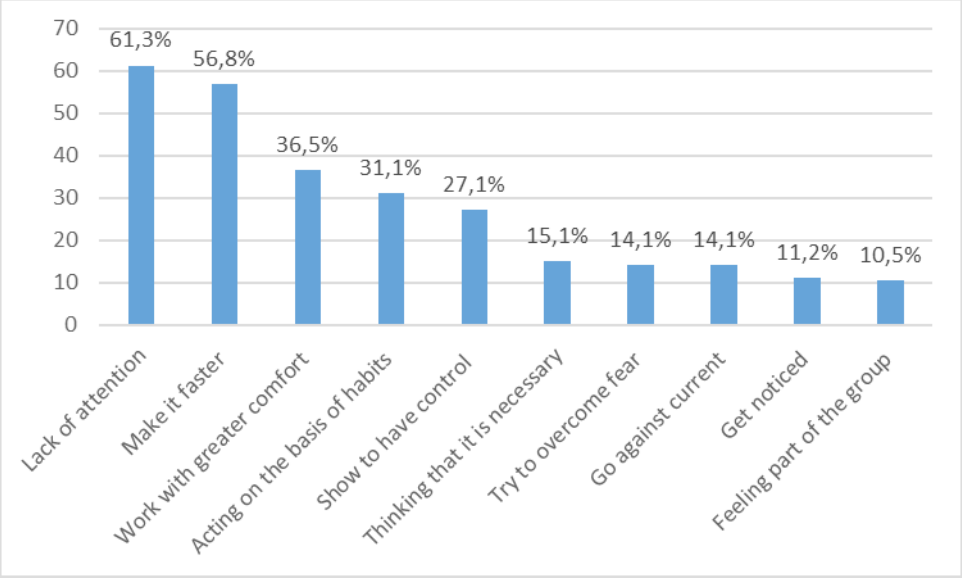
A semi-structured interview was administered to the teachers, 4 world cafés/focus groups were organised with the creation of 3 working groups on an instant messaging platform.

An anonymous, ad hoc questionnaire was administered to 277 students (63% boys and 37% girls), to investigate the representation of risk in the workplace and the training needs, also in methodological terms, in relation to OSH.

The data obtained from the different surveys were analysed using qualitative and quantitative methods.

From the analysis of the data it emerges that 92.5% of young people reported to have already participated in work based learning (WBL) projects or PCTOs, but only 27.1% (19.6% boys and 31.4% girls) had attended OSH training courses in this context. Concerning the usefulness of the PCTOs training, 62.8% of the young people say that it is certainly useful and 69.7% say that compliance with the regulations guarantees safe working. About 50% of the participants considered the training with direct experience in the field to be the most effective training, followed by direct testimony of workers (12.30%) and briefing in the classroom (12.30%), while only 5.5% indicated slides and explanations as the more effective method for OSH training

Young people associate risk mainly with danger (67.5%), harm (39%), getting hurt (30.3%), the unexpected (28.9%) and inattention (27.4%). According to respondents, people at work risk mainly because of inattention (61.3%), haste (56.8%), convenience (36.5%) and their own habits (31.1%) (Graph.1).



Graph.1 (Association risk - danger)

90% of the participants liked the videogame as a whole, 55% considered it very useful for learning while having fun, 43% for learning about the rules of safety at work, 42% for becoming more aware of the risks at work and, finally, 26% for remembering the rules of safety at work, in particular those concerning the uses of the personal protective equipment (PPE), which played an important role in the game narrative.

Almost all of the participants appreciated the game very much (47%) and quite (43%), while only 10% liked it fewer.

Conclusions

The study confirms that elements related to OSH can be integrated into videogames to be acquired by players during the game it-self increasing OSH awareness, knowledge and skills in young people who will be future workers and employers (Pietrafesa, 2020).

ICT and new digital tools and languages allow the creation of educational spaces through which students can approach, within the PCTOs, the business context, translating innovation into an opportunity for study and training in the light also of what emerges in the report of the International Labour Organization (ILO, 2018). This report also highlights the importance of integrating OSH into general and vocational education and how this is an effective way to increase OSH awareness, knowledge and skills in the young people who will be the future workers and employers.

It is therefore stressed that since young people represent the future of any society and are important drivers of cultural change, basic OSH information should be an integral part of school curricula, technical training and educational programmes. In this way, young people can become active players in protecting their own health and safety, as they are aware of their rights and duties.

The exchange of ideas between institutions, experts and students (researchers from Inail, the University, experts and technicians from the prevention services of the health authorities, teachers, students and software houses developers) was very significant too, thus it encouraged reflection on the educational advantage of innovative training methods, which are closer to the languages and cognitive and emotional processes of young people and which encouraged their interest and involvement. In this sense, the videogame developed proposes a challenge in which scores are obtained according to the ability to protect and to secure workers, avoiding accidents. The aim is to show how applying the rules does not lead to a loss of time or profit, but rather promotes efficiency and growth in economic and health terms. By using the virtual space and experimenting with the routes needed to reach the various objectives, the player learns the rules by putting them into practice.

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