

### Educational benefits of serious games in the context of a H2020 research project about bullying and safe use of the Internet

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**Abstract:** The benefits of incorporating digital games into the educational environment are not exclusively motivational. A school environment enriched with the features of games can allow students to develop their own pace through individual feedback, in addition to strengthening skills such as problem-solving, collaboration and communication. In order to contribute to the research in the field of Serious Games in education we are working on the eConfidence project. This project includes the analysis of the benefits of two serious games in the change of behavior and attitudes in teenagers, towards the safe use of the Internet and the dangers of bullying. eConfidence is a 24 months project that started in November 2016 and has received funding from the European Union's Horizon 2020 research and innovation programme (ref. No732420). In this paper, we will contextualize the project with a theoretical review about serious games, benefits of games,

experiments using serious games in education, and issues about bullying and the safe use of the Internet. Then, we will explain the features of the project and its possible contributions in the field of education.

Key words: video games, serious games, education, behavioral change

### Introduction

Games have traditionally been seen as a way of entertainment (Martín, 2015)m, and even as a distraction from other important activities in life; however, they have now also become an increasing trend in formal and non-formal contexts, such as industry and education. It is not difficult to admit that games can be motivational and attractive, especially for young people, children, and teenagers. Moreover, they could be used as an effective instrument to shape behavior (Teng & Baker, 2014).

The benefits of incorporating games into the educational environment are not exclusively motivational. A school environment enriched with the features of games can allow students to develop their own pace through individual feedback, in addition to strengthening skills such as problem-solving, collaboration and communication.

In order to contribute to the research in the field of Serious Games in education, a new project has been carried out: eConfidence (Confidence in Behaviour Changes thought the use of Serious Games). This project has received funding from the European Union's Horizon 2020 research and innovation program under the grant agreement No 732420. The partners of the project are Instituto Tecnológico de Castilla y León (ITCL), as project coordinators, University of Salamanca , Nurogames , EVERIS, European Schoolnet, and Faculty of Humanities and Social Sciences, University of Rijeka. The project aims to develop a new methodology to create serious games, specifically a new approach for serious games design focused on behaviour changes and implement it through two games that could have a direct impact on the behavior of the users on two main topics: safe use of the Internet and bullying at school.

In this paper, we will first contextualize the project in terms of scientific background, providing a theoretical literature overview in this area - talking about serious games, their benefits in education, some experiments on taking digital games into the class, and the issues of bullying and safe use of the Internet. We will explain the eConfidence project, the phase in which we are currently working, and its main aims.

### Contextualization

Serious games are technological games designed with a purpose that goes beyond mere entertainment, that is, thought up and created for educational and informative purposes (Dicheva et al, 2015). This kind of games sets the player/student in a very particular context with the aim, for example, of developing a specific knowledge or skill. But not only are serious games created for educational purposes, there are also serious games whose aims are to inform about news or to increase awareness about different social issues.

A serious game can be described as a game with purpose: it seeks to influence the resolution of real problems in manufactured environments that simulate real life. Although they can be fun (and, in certain way, they should be fun to engage players), this is not the main intention for which they are created. Generally, a social change, development of skills, emotional health, etc. are sought (Wouters, van Nimwegen, van Oostendorp & van der Spek, 2013).

Serious games have become a popular tool both for the transfer of knowledge and the achievement of cognitive, perceptual or behavioral changes in users. Besides, they have been studied in literature to verify their effectiveness (Bowen et al, 2014; Chen, Lin & She, 2015; Theodoropoulos, Antoniu & Lepouras, 2017). A good pedagogical design could empower these advantages. We can see a lot of benefits that serious games can provide to students. For example, in terms of specific experiments using serious games in education, there are some in which phonological awareness and word recognition is worked on with dyslexic children (Jiménez & Rojas, 2008); or the development of students' multiple intelligences (Del-Moral-Pérez, Gúzman-Duque & Fernández, 2014); or for oral health education (Aljafari, Gallagher & Hosey, 2017). There are even examples of experiments about the treatment of bullying with a serious game, like, for instance, in Guerra (2017).

In order to contribute to the research on serious games and their influence in changing attitudes and behaviours and developing knowledge, eConfidence project designed two games that try to change two realities that are of great concern to our societies nowadays: safe use of the Internet and bullying at school.

Bullying behaviour is internationally recognized as the intentional use of physical and psychological force or power, threatened or actual, against oneself, another person, or against a group or community that either result in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation (World Health Organization, 2002).

According to Olweus (1993), we can identify bullying according to three principles: intentional aggression, repetition, and a power imbalance. It is an aggressive and intentional behaviour carried out repeatedly and over time in an interpersonal relationship characterized by asymmetry of power. Together with bullying, we may pay attention to another issue that is causing concern among the society and, especially, educational communities nowadays. We are talking about the Internet and the risks it can pose if we do not know how to use it safely. The safe use of the Internet constitutes a complex concept that involves a large number of behaviours that change over time, given the permanent state of evolution of the web (Cavus & Ercag, 2016).

Recent years have seen a spectacular increase in Internet use, particularly among the youngest individuals. In fact, according to the Spanish National Institute of Statistics (2016), the 98.6% of men and 98.2% of women between 16 and 24 years old have used the Internet in the last three months covered by the report. This widespread use has offered numerous advantages, but also certain drawbacks. Due to their natural adoption of Information and Communication Technologies (ICTs) and less cautious, more trusting behaviour, children and adolescents are more vulnerable to certain risks. In fact, Fernández-Montalvo, Peñalva & Irazabal (2015) analysed how Spanish students between 10 and 13 years old use the Internet, finding out that students exhibit risk behaviours (for

example, meeting with people they do not know or insulting other people). Different educators and institutions are trying to solve this problem using different resources like workshops, educational books, videos, etc. For that reason, we think serious games can be a useful resource to help to solve this issue.

### **Description of the project**

eConfidence is a project funded by the European Union Horizon 2020 research and innovation programme (Call: H2020-ICT-2016-2017; Topic: ICT-24-2016). It was launched in November 2016 to study and test, in the span of 24 months, how confidence in behaviour changes through serious games.

This project focuses on the creation of a new methodology to create serious games, specifically a new approach for serious games design focused on behaviour changes. It aims to prove this methodology with the development of two serious games regarding behavioural aspects for the safe use of the Internet and the elimination of bullying. The games will be tested in Spain and English-speaking countries in schools addressing 12 to 14 year-olds, in a storytelling way. Thus, the players will be lead into an activity where they will experience both a wider perception of the problem and how this can be modified and improved in their behaviours. The games will be tested in a pilot programme during the 2017/2018 academic year.

eConfidence will present new chances for tracking and examining learners behavioural data and interpreting them in an educational meaningful way. In terms of our field, education, the outcomes of the project aim to improve the assessment of progress, performance and learning outcomes. Also, the project aims to stimulate the use of serious games and digital games in schools as an educational resource.

On the other hand, the main contribution of the eConfidence project in the scientific context will be the validation of an experimental methodology for the design of serious game mechanics, as well as the overall design for a game aiming to introduce changes through Applied Behaviour Analysis (ABA) procedures within a defined scope, i.e. Safe use of the Internet and Bullying.

In order to verify whether the use of eConfidence games causes cognitive, emotional and behavioural changes, a quasi-experimental, pre-test-post-test design with experimental and control groups will be followed. Experimental groups will participate in an educational activity (playing one of the eConfidence games: Safe use of the Internet or Bullying). In order to assert the efficacy of the experiment, a separated control group of students will not engage in the use of serious games, but will still be evaluated with the same external instruments as the tested groups. Additionally, two experimental groups will serve as control groups for each other.

In terms of measurement instruments, they refer to conceptual and operational description of variables that will be assessed both prior (pre-test), during gaming (experimental treatment) and after the gaming experience (post-test). Specifically, in the pre-test and post-test, we will focus on knowledge, behaviour, and variables derived from the Theory of Planned Behaviour (TPB: attitudes, perceived behavioural control, subjective norms and behavioural intentions) related to safe use of

the Internet and bullying, as well as on personal variables (social skills, assertiveness, empathy, and friendship). All TPB and personal variables will be assessed by using self-reported instruments that will be applied online.

### Conclusion

This paper has revealed the relevance that serious games are acquiring in the educational field in general and as a complement to education, highlighting the benefits that a good use of them contribute not only to the development of the physical and cognitive students' skills, but also in social relations (Huizinga, 2000; Padilla, González, Gutiérrez, Cabrera & Paderewski, 2009).

These aspects, together with the fact that video games are always associated with entertainment, make them increasingly important as a way of recovering motivation and interest of students towards curricular issues. With this type of educational games, it is intended that students learn in interactive, accessible and social environments.

It is in this context where learning processes are favoured and cognitive conflicts occur in users because of the discussion and opinions exchange, which invite to reflection and cognitive change (González, 2010; González & Blanco, 2011).

A new serious game design methodology has been proposed, and two serious games have been created (taking into account the issues related to bullying and the safe use of the Internet) with which we intend to achieve a modification and behavior change in children regarding those areas.

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