# PLAY2LEARN

## PROCEEDINGS

gami LEARNING

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This 1st edition of the **Play2Learn** Conference in Lisbon brings together international researchers, practitioners and policymakers to explore and discuss research, policy and best practices for game play and game production in learning.

**Play2Learn** is the culminating event for GamiLearning, an international research project funded by the Foundation for Science and Technology (FCT) in Portugal and supported by the UT-Portugal project at The University of Texas at Austin (USA). Over the last three years, this international team of researchers conducted research about the uses of digital game creation in the classroom to support critical and participatory dimensions of media literacy for children ages 9-14 in Portugal and in the US.

With keynote speeches from Divina Frau-Meigs and Anne Mette Thorhauge, critical media literacy and game design as a learning process will be introduced in times of attacks on media freedom, disinformation on the internet and the rise of populism. Those are indeed difficult times, that can become opportunities if citizens are able to fully embrace digital media and information technologies to express themselves with safety and privacy.

Authors from five continents will present and discuss their research about 'pedagogies and therapies' of play. Their presentations follow the order of the parallel sessions for the **Play2Learn** Conference: Games for Well-Being, Games for Social Learning, Gamification Across the Curriculum and Gamedesign.

We are happy to discuss and share with you our main findings and to receive your feedback.

**Hope you enjoy Play2Learn!**

Kathleen Tyner and Conceição Costa
Scientific Committee Chairs
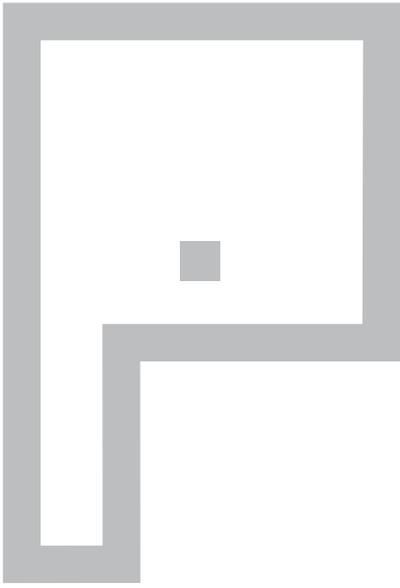
## Parallel Sessions 1
Games for Well-being

# Videogames, Violence and Aggressive Behavior: an Educational Proposal

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**ABSTRACT**

This contribution, articulated in three parts, proposes an articulated interpretation of the relationship between violence and videogames. The debate, nevertheless current, is in fact rich in positions diametrically opposite and often accompanied by superficial and not much argued visions which make parents, teachers and media suspicious. The dialogue and communication with youngsters and with the industry is connoted by a communicative distance which is growing more and more.

The first part of the contribution will offer an overview taken by different disciplines (from the ethology of Lorenz to the philosophy and sociology of Morin) to describe the destructive and transformative components of the aggressiveness. Moreover, it will be talked the aggressive component in relation with the cultural dimension of the game in general with its "play" component. In the second part it will be explored the complexi-ty of the combination "Violence / Videogame" by trying to propose a critical and ana-lytical vision, that can open new spaces for questions and interpretations. In the third part, starting from some essential issues and questions concerning education (Why vio-lence in computer games is so much invasive? Does exist alternative forms of digital games narrations which don't use violence as key element for the solution of conflicts or problems in the gameplay?), it will be investigated the distance between teacher's representations and prejudices/expectation about digital game, the student's experienc-es and the educative and creative potential of "media culture". Finally, in order to fur-ther explore the topic, it will be presented a media-literacy experience carried on in the framework of the European project Appyourschool about the use of non-violent video-games for developing crea-tivity and critical thinking within pre-adolescents.

## Introduction

This contribution, articulated in three parts, proposes an interpretation of the rela-tionship between violence and videogames. The debate, nevertheless current, is in fact rich in positions diametrically opposite and often accompanied by superfi-cial and not much argued visions which make parents, teachers and media suspi-cious. The dialogue and communication with youngsters and with the industry is connoted by a communicative distance which is growing more and more.

The first part of the contribution will offer an overview taken by different disciplines (from the ethology of Lorenz to the philosophy and sociology of Morin), to describe the destructive and transformative components of the aggressiveness. Moreover, it will be talked about the aggressive component in relation with the cultural dimension of the game in general with its "play" component. In the second part the complexity of the combination "Violence / Videogame" will be explored, by trying to propose a critical and analytical vision that can open new spaces for questions and interpretations. In the third part, starting from some essential issues and questions concerning education (Why violence in computer games is so invasive? Do alternative forms of digital games narrations, which don't use violence as key element for the solution of conflicts or problems in the game play, exist?), the distance between teacher's representations and prejudices/expectation about digital game, as well as the student's experiences and the educative and creative potential of "media culture", will be investigated. Finally, in order to further explore the topic, a media-literacy experience carried on in the framework of the European project *Appyourschool* about the use of non-violent videogames for developing creativity and critical thinking within pre-adolescents, will be presented.

## Aggression and Violence

The majority of adults' fear, that their children will become violent because of videogames. Others fear that a predisposition to aggressive behavior will be the determining cause in choosing a violent videogame on the part of teenagers.

However, in order to understand the complexity of this phenomenon, before even analyzing it in specific technological terms, the reflection needs probably to be investigated within the frame of games and the context that is established with the ones interacting with that very context (Watzlawick, Bevelas, & Jackson, 1967).

If this link really exists, we should first of all ask ourselves if aggression and the complexity that characterizes the aggressive behavior are connected to the predisposition of the subject choosing violence in the "virtuality" and if, at the same time, using videogames represents the incentive to break the taboo of violence, and the diffusion of violent behaviors within real contexts.

Common thought associates the diffusion of deviant behaviors with the use of videogames and it contributes to the spread of the misconception that the boy or

girl playing videogames is the most inclined to act violently. Consequently, games are tools always far and distant from those who work in educational environments, particularly in schools. In doing so, aren't we however constructing simplistic opinions and reinforcing common sense that justifies the relationship between videogames and violence while giving an interdependent and inevitable definition?

In this contribution, we will try to understand some reasons explaining this binary combination and tackle some "systematic" cultural issues (Bateson, 1972).

Aggression, just like other factors of life, appears as a pre-cultural dimension and has contributed to the socio-biological organization of subjects. Ethologists (Eibl Eibesfeldt, 1977; Lorenz, 1969; Tinbergen, 1963) identify its "spontaneous" component as the ability to produce positive social and biological effects on a community.

According to Lorenz, the aggressive impulse does not have to be interpreted as "a diabolic fact or as the destructive principle", nor as the force "that wants always the evil and creates the good", but as a valid instrument at the service of life, on which the "flower of personal friendship and love" (Lorenz, 1963, p. 65) is based. The territorial organization between species, the development of primary emotions such as fear and aggression have prepared an evolution in the research for collective shelters or in survival, albeit never being a gratuitous act but rather functional to specific collective needs with the aim of conserving instead of destroying the species. Therefore, thanks to the ethologists' contribution, we can engage in a reflexive work allowing to, debunk the preconceived ideas that historically define the aggressive act within the instinctive behavior sphere and, at the same time, enhance a symbolic and cultural dimension determining the polysemic meaning of aggression.

Moreover, along with the specific regulatory functions (Hacker, Fromm, Morin have then widened the field of research on the cultural and biological interdependence), aggression covers the structural characteristics defined also as integral part of the game dynamic: starting from the threshold between imagination and action-realization, to the relationship between reality and its representation that improves the recreational activities.

Its "spontaneous" component, acceding to an elaboration on the cognitive and relational level, does not necessary lead the subject, to "do something bad to

someone else", but it can also be structured as an experimental space where every subject can experience aggression.

In other words, its dynamism and its creativity define the variable of a communicative context that can influence the meaning of the very context itself and, at the same time, be transformed by it (Morin, 1973). This reflection led to an important realization that, thinking again at the introduction of the text, redefines the aggressive component in a context that does not necessarily determine the aspects of immutability and/or irreversibility.

The well-known scientist Gregory Bateson, interested in the nature of games as a form of meta-communication, has tried to define the ambivalence of some behaviors in the paradoxical experience proposed by the recreational context.

> "The message does not consist of the objects that it denotes (the word cat cannot scratch us). This is also what happens in games: "game" actions are linked to other "non-game" actions, as you will encounter examples of signals that stand for other events. It is therefore clear that the evolution of games might have been an important step in the evolution of communication." (Bateson, 1972, p. 222)

The power of this intuition implies that, if I act aggressively in a controlled symbolic context, I can negotiate its meaning, experience its ambivalences and try to live the contradictions that "naturally" distinguish us and I can help realizing its cultural meaning (Morin, 1973). This is an important step if we want to avoid the trap of being either in favor or against videogames and if we see videogames as generators of interpretations and significations of reality and experience.

However, it is undeniable that – and we do not want to underestimate the issue – aggression implies a number of human problems whose origin and consequences are grounded in fractures and dramatic social results that the subjects have engendered at the level of evidence and socio-cultural experience (war, gender violence, xenophobia, intolerance, radicalism, fundamentalism…). The actual scenario is our witness and it is certainly not reassuring.

The philosopher of education G. M. Bertin, in these terms, gives an interesting interpretation and defines the extension of behavioral dimension as "hypertrophic

tendency" (Bertin, 1981), which, at a certain time in human history, has engendered a violence expansion in society.

Violence is once more defined as a cultural component that can increase or decrease, change and transform itself on different levels – normative, social, cultural, political – in relation with contexts.

However, if on the one hand this definition suggests the risks contained in the most extreme expression of aggression, on the other hand, it refers to the possibility of its contrary and therefore to the alternatives to war, intolerance and the reduction of its realizations.

At the same time, we cannot exclude a priori that the area of virtual games will never contribute to the expansion of aggressive behavior and to violence in general. However, because of the "regulatory" and cultural components engendered, we cannot exclude the possibility that the virtual, under the conditions that define it as a "good videogame", offers safe environments while creating a narrative frame where players "try" to live reality and its ambivalences.

## Interaction and Components of Violence in Videogames

Video games and violence are two often associated terms: during the last years many researches tried to investigate the relationship between the consumption of digital games and violent behavior. The various approaches from different researchers polarize fundamentally in two main streams: on one side there are all the studies which, by applying maybe in a too much of simplified way the Bandura's Social Learning Theory (Bandura, 1978), try to show that the fact of being exposed to violent scenes can generate into the public a drive of more or less unconscious emulation (Kirsh, 1998); on the other side one can find studies which approach the subject from a diametrically opposite point of view, that is, try to show that violent videogames are mainly used by violent people (Anderson & Bushman, 2001; Bartholow, Bushman, & Sestir, 2006).

The report *Summary of Violent computer games and aggression – an overview of the research 2000-2011*, published by the Swedish Media Council (2012), offers a transversal analysis of many researches and experiments concerning the topic in exam. The report states that it's not possible to demonstrate a cause-effect

relationship between videogames and violent behavior mainly because of the vagueness of the different methodological approaches guilty of not considering enough aspects such as social contexts, or the complexity of the phenomenon.

Videogame is, in fact, a medium whose target seeks entertainment, leisure and wants to be challenged. Game developers need to sell, and often the easiest way is the most effective one: violence is therefore strongly connected to its same gasoline that keeps the engine walking. It's sufficient to think of the most common classification systems out in the market: first person shooters (like *Doom* or *Wolfenstein* saga), third person action-adventure-shooters (like the *Uncharted* saga, *Tomb Raider* saga, *NiER Automata*), hack' n slash (like *Diablo*), beat'em up (*Street Fighter*, *Tekken*, *Mortal Kombat*), are all types of game in whom it is necessary, in order to advance, to eliminate physically the enemies, who are there to prevent the player from reaching his/her goal, by means of gun power or swords or kicks and fists, This mechanisms is so rooted that it is also found in apparently less violent games: role-playing games, platforms, certain drive simulation games, even in some puzzle-games.

Conflict, in most of these contexts, assumes even the role of narrative engine and it's perfectly integrated in the storytelling of the adventures: one can say that it is thanks to the violence that it is possible to build up and to solve, in a more or less elaborated way, the challenges in the game. Conflicts are considered, also by the world of fairytales and literature, as proper narrative trope and topos: the clash between good and evil, between cleverness and strength, between what it's legit and what's not (Triberti & Argenton, 2015).

However, it is important to acknowledge that in this scenario the main problematic is the representation of the violence, given by the context and the meaning of the violent actions showed. We aren't speaking about the difference between jumping over a mushroom and crush the skull of a demon with a shotgun, but the way in which the violent actions are shown in their context, about the message behind them and in the way in which such actions are handled.

In the field of social psychology, many are the studies which show that the way violence is represented, more or less justified (Paik & Comstock, 1994), punished or rewarded by the social context (Ballard & Lineberger, 1999), is an important factor which influences the probability of emulation of violent acts among the observers.

According to Ferguson, there would be a difference in terms of the impact on the player between a violent act where the character-victim suffers from a deplorable or immoral act, and two characters challenging each other into a ring or an arena (Ferguson, 2010).

In addition to the contextual elements and representation issues that, as already summarized before, they make difficult to identify a unique and unambiguous shape of violence in videogames, another crucial element to include in the discussion in order to better understand the effects of violence in videogames is whom the public is composed of and the way with which this violence is perceived.

If it is true that the content classification systems, such as the European PEGI or American ESBR, are indications designed to help users identifying the titles more suitable for specific age-ranged targets, it is as much true that often these indications are completely ignored as the youngest are attracted by games conceived for more mature players (Aroldi et al., 2012). But why violence attracts so much the players? The components that contribute to provide an answer to this question come from different domains of research like, example given, the theories which associate this attraction with the fact that players are fascinated by an esthetics of the destruction (Allen & Greenberg, 1978), or that they look for pleasure by new experiences which they cannot live in the reality (Cloninger, 1987). An additional point of view is the fact that confrontation with violent situations, can lead the spectators-players, to an empathic mechanism with the victim and of contempt towards the executioner (Zillmann, 1998).

Among the various manners to perceive violence one must not forget the cathartic component of the outburst acts that makes possible to the player to set up protected spaces, in this case the a "safe" digital environment, where it's possible to amuse and live small moments of carnival and of un-harmful rash, relief and experiment new and different roles (Sloterdijks, 1983), or where one can experiment other identities and confront himself with different scales of values.

It is because of this dynamic that the player does not always feel positive emotions if exposed to violent situations, but he may experience any kind of emotions in the spectrum: frustration, guilt, pleasure, relief, fear… and he may identify himself differently with the characters involved in the scene.

There are also examples of use of very special video games which may influence, in our opinion, the way the users perceive violence. It's the case of speedrun-gaming and gameplay-react such as blind-run or competitive game plays: different "YouTube genres" among the most successful, popular, and rewarding.

It is about videos, or in some cases entire YouTube Channels, where recordings of the gameplay of certain videogames completed in the least amount of time or with spectacular and very difficult actions are uploaded. In this case the game becomes a challenge against time, a challenge against other players and against oneself, where the only thing which counts is to show to the web the level of technical finesse: all aspects concerning violence or pleasure inducted by the vision of the violent acts seems to disappear or to be forgotten.

Different is the case of the gameplay-react: here one can find gameplay sessions accompanied by vocal or video comments in an angle of the screen. It's very common to find youtubers, sometimes real celebrities of the Web, which play with very difficult or extremely scary and violent games with the purpose to show their own reactions. In this case the exposure with this kind of scenes, that can be also violent acts assumes quite a new function: an aggregative one, that Henry Jenkins would call *participative culture*.

Watching and sharing these videos may ignite on-line discussions, composed by comments and exchanges both in offline and online contexts: using James Paul Gee's words (Gee, 2003) we can say that here we call in cause the external grammars of the semiotic field of the video game as medium. In other words, a network of relational and learning exchanges that burst out around the act of play, and it's important to remind that they are almost never isolated, but rather always accompanied by socialization, digital or non-digital.

Seen all that we summarized up to here, it's easy to notice the difficulty in finding an unambiguous correspondence between violence and videogames: the effects on the public are multiple because the public is multiple, because the different forms of violence's representation are multiple and because multiple are the ways of reading and perceive these representations.

Nevertheless, one should not be deceived by all these considerations: it's necessary to remember that the media universe which surrounds everyone, put in

synergy with our experiences, our socio-cultural and economic context, influence our way of thinking ecologically and produce social change: a change that it is produced of, and at the same time influences, our representations of the world itself.

Not considering the relationship between aggressive and violent behavior and virtual experiences driven by digital games in the pedagogical debate would mean neglecting an important ethical requirement and, with it, other contradictory and complexities which need to be questioned and taken in consideration.

## Which Questions Videogames Bring to Education?

From all the stimuli set so far, some questions arise about which maybe is necessary to start reflecting on: "Why is violence in computer games so much invasive?", "Is it really necessary to introduce some violence in a videogame to make it a good title?", "Do alternative forms of digital game narrations which don't use violence as key element for the solution of conflicts or problems in the gameplay exist?".

Of course, there are virtuous examples which show other ways of conceiving videogames: game developers that don't put violence at the core of the gameplay. Games such as *Unravel*, *Portal*, *What Remains of Edith Finch* or the old classic *Monkey Island* Saga, are only few examples of titles which broke the equation "good game = violent game".

The formal education system, adults with educational roles and video-game developers have the duty to face this problem in an open way that goes towards a direction of media literacy and critical behavior. Families should make more efforts in filtering the titles for their children and mediate more their gaming practices, also by playing together with them. Schools should open their doors to this powerful medium, powerful for the cognitive-emotional exercise which some titles set up, and to try hard to hold open a dialogue with the youngest that may enable them to read in a more aware and critical way this medium in its mechanics, in its languages and in the historical context which represents and into whom it is placed.

Videogames, among all the available media, seem to be the last taboo of the school : recently social networks have gained their place in the educational discourse due to the evidence of fundamental citizenship issues that increasingly are

passing through post, sharing and tweet (in order to give an example, it's sufficient to think about the hate speech online)

This medium remains the great unknown by teachers which often do not appreciate them, understand them and which often think about them as something questionable by the families: "what will parents say when they'll know that at school we work with videogames?". The gates are barely open and only to those games which are strictly related to some educational topics, but they are completely shut for those titles which are composed by complex narratives, more difficult to decode, that often generate complex questions: those titles that, instead, fill the free time of boys and girls. Yet teenagers are there!, in front of those screens. As an educator, retreating, means leaving them alone (and then often accusing them) in front of a whole world of meanings, narratives and new imaginaries. It means forgetting those "media-cultures" (Jacquinot-Delaunay, 2006) that help them to create their identity, which provide some keys to interpret the world. And, sometimes, displace the adults too: teenagers able to program a video game, to coordinate in group - in their free time - to achieve a common goal, to form themselves by mapping what they know and what they do not know (then look up and master it) are not seen by the educators around them.

The paradox is just around the corner: "… yes, but do the history teacher knows that you are developing a video game settled in the Middle Ages?" – "No, to him we only ask for things when we have doubts about the sources". In these few lines, witnessed directly from the writers of this contribution, it's clear that the school "unplugs" the youngsters: adults stop seeing them because they are not keen to explore their media practices; they can't open up to the unknown in order to understand with which kind of words and images this unknown will take shape; they feed prejudices, enough to extinguish amazement.

## The Appyourschool Project

In videogames, more than with other media, the disjunction between practices and student's experiences is quite evident, as the shyness of the educational practices. The European project *Appyourschool* tries to bridge this distance, by testing educational ideas and hints for activities that can then be disseminated and discussed.

The project started in 2016, funded by the programme Erasmus Plus KA 2 – Strategic Partnership for Schools and it involves 8 partners across Europe: Centro Zaffiria from Italy, ERA from Czech Republic, Kuopio from Finland, Karpos from Greece, Edukaciniai Projektai from Lithuania, Fundacja Nowoczesna Polska from Poland, AENIE from Portugal, and Esenler District Education Authority from Turkey.

The main objective is to test and implement innovative methodologies and practices in the field of formal education: observing which extracurricular media practices, freely chosen by adolescents, can be brought into the school, to emphasize skills and abilities that the adult doesn't observe, capture, nor finds out, except – in most of the cases – by chance, and to reach out for those who risk school dropout.

*Appyourschool* project aims to create complex educational situations that challenge teachers and students alike, in line with their individual needs and expectations, and that value the media literacy competences on both sides: transporting students' extra school media practices inside the curricula, enabling so a transition from a school extern solitary consumer relation with digital knowledge into collaborative productive processes that are capable of transforming learning actions inside the school, as well as the relation between school and society, through the design and implementation of projects for the community, supporting social development and innovation at local level. The project also aims to implement new transversal methodologies that open a dialogue among students, schools and societies, promoting a development of school as place to imagine, think and test the future.

The principles of these digital ateliers, the backbone of the project, can be summarized in 9 points:

1. *Research Based:*
   Digital Ateliers are a place where the process of discovery is welcome, where to avoid explanations and where to design concrete experiences. The classroom has to become, in this sense, a common research-community guided by questions such as: How can we do it? In how many ways can something be done?

2. *Scientific Approach (Manzi), Design Approach (Munari):*
Teacher, writer, scientific divulger, tv and radio author, trainer and designer: Alberto Manzi (1923-97) was a person who facilitated the emancipation of individuals and communities: discovering the world with children was probably the adventure that fascinated him the most. His Scientific Approach foresees that the adult is able to arouse in children a cognitive tension aimed at making them passionate and motivated to learn and be curious. Learning that is realized through a concatenation of experiences - and not explanations - in which children work driven by questions; doing and undoing, deconstruct and build again, where the concrete work with hands is essential.
Bruno Munari (1907-98), artist and designer, known almost everywhere, experiments workshops for children in years of great cultural changes. His Design Approach starts from its codified planning method for design (about the design and conceptualization of objects). From this method Munari has translated, thanks to his skills as an artist, this approach into an educational level by setting up a methodology that allows the development of creative design thinking in children starting from tools, techniques and materials.

3. *Dialogue Between Digital and Manual:*
The teacher will be able to design an educational experience that starts from an ICT content (for example an app) to develop then a manual task, with real everyday tools and materials, in order to start a personal and collective research with students.

4. *Interdisciplinarity:*
Contemporary art and installations, ICT, cultural services and common work materials will be mixed in students' and teachers' hands. Not only one discipline is involved, but all tools coming from different disciplines and subjects.

5. *From Consumer to Inventor:*
The media content is a new space of "signification" and becomes the material of labor of the student who interacts in a divergent way. The aim is

to understand the ICT in a deep way and to be able to think and experiment new ideas.

6. *Collaborative Learning:*
   Students work collectively within the framework of a participatory process where they work together and for a common goal. The approach is guided by Spencer Kagan's Cooperative Learning principles: Positive Interdependence, Individual Accountability, Equal Participation, and Simultaneous Interaction (Kagan, 2013).

7. *Exploration of Reality:*
   Real life is the main topic to understand. People need to understand reality and the relationship between things, events and worlds. It's not a question of memorizing information and knowledge but it's about the possibility to experience that reality can be understood and managed.

8. *Engagement:*
   Creative and responsible use of media can transform reality. Students will appreciate the possibility to produce something new and interact in a collaborative way.

9. *Meaningfulness:*
   The activities need to be strictly intertwined with real everyday life's issues: in the digital atelier is important to create a link with the daily life of students, with their extra school abilities and practices.

To design a digital atelier means to focus on the act of *Educate to think* (Bertin, 1968)**:** it's a global approach, not only focused on ICTs and technical skills. For this reason, one needs to transform students into researchers: they have to feel the need of finding answers. Teachers have to create cognitive interests to move them and to passionate them, by not giving them all the explanation but rather conceiving educational situations that put students at the center. Media and Information Literacy is fundamental: ICTs should be treated culturally, in a creative and divergent way, remarking the importance of the link between analogical and digital, of collective and participatory uses, and the engagement in society.

**On the Field: Some Examples**

In this section are gathered some actions that run in the framework of the *Appyourschool* project: more specifically two digital ateliers which involve the use of videogames (*Brick Building Game* and *Minecraft Education*) and an initiative of teacher training with the use of a game called *Unravel*.

| Title of the digital atelier | LEGO – Transforming my city |
| --- | --- |
| Target age | 11-13 |
| Country | Lithuania |
| Objectives | To encourage children to learn more about constructions, buildings; |
| | Using different static and dynamic tools to stimulate the joy of discovery, imagination and creativity of workshop participants; |
| | To give children a sense that they are creators/ designers of their own city; |
| | To develop a wide set of skills: creativity, orientation, artistic; knowledge: mathematics, arts, history, IT; |
| | To make indirect suggestions to the local authorities, tourism center to make one's local city more attractive by offering new tourist routes complemented with objects of augmented reality. |
| Software used | Pixlr (telephone app): https://pixlr.com/mobile |
| | Brick Building Game: http://www.brickbuildinggame.com |
| | Lego Digital Designer: http://ldd.lego.com |
| | Lego 3D catalogue (app): https://www.lego.com/en-us/games/apps/lego-3-d-catalogue-c58888ace5964f41a331070846794991##sp=100 |
| | AURASMA: https://www.aurasma.com/ |
| Topics | Focusing on the elements of the building; |
| | Learning about 2D and 3D of objects; |
| | Experimentation with different building techniques – from paper to augmented reality; |
| | Orientating in the map; |
| | Exploring your own city; |
| Brief presentation | This digital atelier focuses on creating buildings, landscape by using different techniques and decorating the city (with the help of the map) with these tools in order to contribute to making it prettier, more modern and attractive to local residents and tourists. |

| Title of the digital atelier | Minecraft museum |
|---|---|
| Target age | 12-14 |
| Country | Italy |
| Objectives | Discover Minecraft by connecting analogical and digital design; |
| | Working with an interdisciplinary approach about nineteenth and twentieth century's art; |
| | Encourage students to document their own experience, to understand how they learn, how they discover, how they can be autonomous in learning; |
| | Encourage students and will explain to adults what minecart is and how it works. |
| Software used | Minecraft Education edition |
| Topic covered | Students' motivation to learn and to participate; |
| | Approaching a topic in a multidisciplinary way; |
| | Foster creativity and learning through gaming. |
| Brief presentation | The goal of this workshop is to explore the potentialities of Cooperative Learning ap-plied to videogames. Throughout a long and continuous interdisciplinary iter, the stu-dents investigate specific aspect connected to the nineteenth and twentieth century's art. They designed and implemented collectively a "virtual" museums with the help of the sandbox potential of Minecraft, a Microsoft online videogame that puts the players in the shoes of virtual builders able to create basically anything. Students also created some short video tutorials to explain their parents, their teachers and their peers the process behind the whole experience and some insights and tips about the world of Minecraft. |

## Teacher Training

Teachers also experienced videogames in training initiatives, under a creative and divergent point of view.

Starting from a very specific videogame called *Unravel,* which places the gamer into the story of a small ball of wool that goes in search of his memories, an educational experience has been designed with the intention of interweaving memories and videogames.

The woolen thread, the main character of this game, also became the analogue work tool with whom to start building one's own album of memories.

A thread was launched from above and fell accidentally on a sheet of paper to encourage teenagers and teachers to complete their profile, and to begin the journey from their visual identity.

The action of curling up and eluding, foreseen by the videogame, becomes an opportunity to build a network between people who have woolen threads in their hands and which intertwine with each other according to the quantity of shared memories. The final idea is the project of a collective game in the public space in which citizens can take note of their collective memory facing challenges, such as in video games, with the constraint of remaining linked to their own wool thread, and to someone else's. Individual and collective seamlessly relate to the physics of a ball of wool that can break, elongate, get stuck. The videogame thus becomes the narrative plot underlying an educational path that allows teenagers to connect the pleasure of videogaming with fundamental citizenship themes such as that of collective historical memory.

## Conclusions

It's not less important, in the scope of this contribution, the role of the videogame industry; role that's often not too much considered in the debate but that it should be underlined in order to widen the interest towards problematics that are of another nature rather than cultural. Some virtuous examples have already been mentioned: but more and more are needed. Titles that don't anesthetize the imagination and the taste of the young players, but that in opposite stimulate them to think, to raise questions that show alternative manners rather than violence to solve situations or to implement fascinating stories. Those who work in the field of conflict resolution, knowledge that should be shared also from the professionals in the education field, don't work on eradicating the conflict from social exchanges, but they offer tools to the subjects, so they can transform conflicts into dialogue and opportunities of inclusion. Conflict doesn't always meant to be solved with an "act of death": violence is, according to Hannah Arendt's thought (1970), the easiest and most dumb way to solve a situation.

Thus, for the same reasons, responsible games are needed today more than ever. And with them, are needed also responsible adults, which in front of the "spectacularization of the violence" know how to accompany the young players toward

a critical reflection of its contents and towards a strengthening of the symbolic component which characterizes videogames and, with them, the violence which is represented.

In the last months of 2017, a huge debate interested the launch of a title called *Detroit: Become Human*: Quantic Dream presented a trailer where one of the androids that the player can control was victim of an episode of domestic violence to protect a young girl from his drunk father. Children's campaigners and a UK Member of the Parliament have criticized publicly the trailer for its controversial domestic abuse scene, by stating that any video game that trivializes or normalizes child abuse, neglect or domestic violence for entertainment is unacceptable.

David Cage, lead designer of Quantic Dreams, replied like so: "Would I be doing my job as a creator if I was making the game you want me to make? I don't think so - I'm creating something that I find moving and meaningful. And I think people should see the scene, play the game and see it in context to really understand it. The rule I give myself is to never glorify violence, to never do anything gratuitous. It has to have a purpose, have a meaning, and create something that is hopefully meaningful for people."

These words are very important to understand the core of the problem: as long as violence is represented gratuitously it will be a form of violence used to spectacularize and entertain the audience, but If the same violence is used to send a strong, meaningful and important message than we are in front of a total different situation.

We think that games such as *Detroit: Become Human*, where the violence is used to "condemn" violence itself, need to be promoted and spread as much as games like the ones used in the digital atelier here presented in the framework of the European Project *Appyouschool*, where the gameplay is not centered around violence but rather on creativity, contents, and engagement.

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# Digital Educational Games: Inclusive Design Principles for Children with ADHD

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**ABSTRACT**

This work presents the characteristics inherently present in games which can positively influence children's learning and are considered of special relevance in the learning process of those diagnosed with Attention Deficit Hyperactivity Disorder (ADHD).

The development of digital educational game requires the game designer's awareness of the influence of learning outcomes of all game elements. Starting with the first creative ideas until the last testing sessions.

Despite being the most common neurobehavioral disorder related to human infancy and a cause of severe hindrance to the personal and academic life of children, studies discussing how digital games can be developed or better adjusted to effectively support these children's learning process seems to be lacking. The main objective of this article is to provide guidelines with which game designers can create better educational games by improving their accessibility and inclusiveness, while having this target audience in mind. To do so, 11 guidelines are presented based on essential components of Interaction Design, User Interface and User Experience, as well as foundations of Cognitive Psychology and clinical characteristics common to children with ADHD. These guidelines are Simple interactivity; Recurring rewards through positive feedbacks; Removal of distracting elements; Emphasis on relevant elements; Level flexibility; Reduced level duration; Multiplayer option; Unlimited game session duration; Validation of important game actions; High visual standards; Motivation and fun as main components.

The isolated use of each guideline is already a contribution to the process of creating educational digital games for children with ADHD. However, this work intends to promote a complete and directed guidance to the game designer, who will be able to develop games that effectively improve the learning conditions of children with ADHD by combining the different proposed guidelines.

## Introduction

Several pedagogical, neurological and prescriptive studies support the general idea that teaching methods should be adequate to the pedagogical profiles of students. This didactic procedure, oriented according to pedagogical profiles, requires that the educator knows the limitations, skills and potential of his students, in order to define strategies and resources more adequate to the learning aid. For the creation and development of successful educational games it is crucial that the game designer understands that its audience will have several types of profiles with different potentials and cognitive constraints. It is up to the game developers to create inclusive and accessible games that can cover all types of audiences, so that it can be an effective aid during each player's learning process. Player-centered approaches are increasingly assumed by large communities of developers and issues related to inclusive design are also gaining terrain in the learning and entertainment industry. Several studies, regarding digital games in education, focus on this particular disorder as it is already the most common neurobehavioral disorder found in young children and has a particularly negative effect on their performance in school.

## ADHD

Understanding kids with ADHD it is often difficult as most of them will present very unstable behaviours. Their limitations, skills and potential should be considered as one to understand the origins or neural bases, the division in subtypes and what is its prevalence. Also relevant in the context of education, it is important to understand what the general neuropsychological profile of a child with ADHD is focusing on which cognitive processes are more often affected and what losses can be expected. Before presenting the guidelines for the development of accessible and inclusive educational games for ADHD, we will briefly address the most common teaching strategies used with these children.

### Definition and subtypes

Coming from genetic, biological or neuropsychological causes, ADHD is a neurodevelopmental disorder that offers harmful levels of inattention, disorganization and/or hyperactivity-impulsivity and which occurs in childhood and persists into adulthood. There are three subtypes of ADHD: *Predominant Inattentive*

; Predominant Hyperactive-Impulsive; and Combined. The *Inattentive* subtype is manifested in infantile behavior through rambling in tasks; lack of persistence; difficulty in maintaining the focus of attention and disorganization. Inattention does not correspond to a lack of understanding, however, it can be an obstacle for it to happen. The *Hyperactive-Impulsive* subtype is manifested in behavior through excess motor activity and impulsivity, which leads the individual with the disorder to perform precipitate and unplanned actions. Finally, the Combined subtype is manifested through the combination of symptoms present in the *Inattentive* and *Hyperactive-Impulsive* subtypes.

### Prevalence

According to Hora et. al. (2015), it is the most common disorder in childhood, with a worldwide prevalence rate among individuals aged 3 to 17 years from 2.7% to 31.1%. This disorder is more frequent in females, with a ratio of 2: 1. In adults, this ratio is lower, falling to 1.6: 1. Females are also more likely to be inattentive than males. During the child's development process other mental disorders associated with ADHD may manifest, such as Conduct Disorder with 40% of the cases; Depression with 21%; Anxiety Disorder 18%; 12% Bipolar Disorder and 10% Learning Disorder.

### Neural Bases

The origin of the disorder is not fully defined. Szobot, et. al. (2001), emphasize two groups of researchers in this area. The first group argues that the characteristics of the disorder are the result of changes in some brain regions, enumerating the prefrontal, parietal, nuclei of the base and cerebellum, and their integrated circuits. A second group of researchers has related ADHD with failures in the transmission and reception of neurotransmitters, mainly dopamine and noradrenaline. Dopamine is responsible for fine motor behavior, cognition / perception, hormonal control and motivational behaviors of desire. Noradrenaline is related to mood control, motivation, cognition / perception, fine motor behavior and blood pressure maintenance. These failures result in malfunctioning of the posterior cortex attention system to external stimuli.

*Executive Functions and Attention*

In addition to the possible changes in the neural basis, individuals with ADHD show signs of bad behavior in a set of cognitive processes responsible for the performance of voluntary, independent, self-organized and goal-oriented actions, often called executive functions. These function problems affect inhibition, flexibility, emotional control, volition, operational memory, planning, self-monitoring and organization of space and materials. Another problem in the cognitive process of an individual with ADHD is related to attention, a neuropsychological function responsible for the selection and maintenance of focus on the input of information needed at a given moment. Changes in these cognitive domains can have a great impact on children's daily lives, with important consequences for their school performance.

*Neuropsychological Profile*

The disorders mentioned above are presented in different ways in each subtype of the disorder. Individuals with the predominantly inattentive subtype have changes related to selective attention (which is responsible for directing attention to a stimulus when there are many other distracting stimuli around them), attention maintenance, and information processing speed. On the other hand, those with the predominantly hyperactive-impulsive subtype present difficulties in inhibitory control and in the maintenance of attention over time and therefore these individuals are more vulnerable to distraction. Despite that, the academic performance of the *Inattentive* individual is usually considered inferior when compared to the *Hyperactive-Impulsive* individual. On the other hand, the implications in social relationships are less evident for *Inattentive* than for Hyperactive-Impulsive.

## Learning difficulties

In addition to low school performance, children with ADHD tend to have a higher than normal rate of disapproval. In addition to having more suspensions, when compared to their classmates, they are considered lazy and irresponsible mostly because they take too long to complete tasks, or, in some cases, can't complete them. This stigma is a misunderstanding and can bring great suffering to these children. They also have a greater tendency to get injured, which results in absence from school. All of this can contribute to several negative effects, such

as suffering social rejection or even being victims of bullying, due to the unusual or exaggerated characteristics shown for their age. Furthermore, this affects not only the academic life of the individual with the disorder, but also their social and familiar relationships and later on, their professional life. During adolescence, they are more likely to develop conduct disorder and, in adulthood, an antisocial personality disorder, which increases the risk of substance use. Therefore, when they do not have adequate follow-up, individuals with ADHD may not reach a more advanced level of education and, professionally, may present low levels of performance, low success rate, as well as attendance failures that, in isolation or combined, can lead to unemployment. It is important to emphasize that, with adequate follow-up, individuals with this suffering from this condition can improve academic and social performance and have a good quality of life.

### Teaching Strategies for Children with ADHD

To improve the academic performance of children with ADHD, it is possible to use several teaching strategies. According to Costa et al. (2013), based on a study with children with ADHD, six strategies were identified that can aid in the learning process. They are: the creation of a bond between teacher/student and student/student; cooperative work; mediation for conflict resolution; routine; pedagogical resources; and delimited environment. The ADHD Brazilian Association ("ABDA - Associação Brasileira do Déficit de Atenção") showcases on its website (tdah.org.br) strategies aimed at assisting: attention and sustained memory; time and information processing; organization and study techniques; inhibition and self-control.

Both strategies proposed by Costa et. al. (2013) and ABDA advise the use of more than one pedagogical resource, so that the child can have the freedom to choose the resource that best suits his or her profile. This can contribute to increasing the interest and motivation for learning, besides strengthening sustained attention. Regarding aid of time and information processing, ABDA also suggests the use of technologies that may aid in learning. Digital games, often associated with devices and more accessible technologies, are increasingly present in the lives of children and young people. These games can be powerful means for the promotion of educational activities, making them appropriate for Digital Game-Based Learning strategies (DGBL).

## Digital Game-Based Learning

Digital games assist in building a deeper understanding of scenarios, concepts, processes, and systems, through repetition and experimentation. Recognizing the usefulness of digital games not only for common practices, but also for children with ADHD is of great value as it is the first step to improve accessibility in digital games and DGBL strategies for all children. DGBL introduces or reinforces good practices for using technology and game dynamics in teaching. Most of the DBGL design principles are planned to support the development of new knowledge and promoting skills and attitudes, while taking advantage of digital games characteristics.

### *Digital Games and their Benefits in Education*

In a dynamic and fun way, the digital game can transform the student. Traditionally the student mainly assumes the role of a spectator. However, digital games provide a much more active role in a dynamic and fun way for the student. When playing, students become full participants, with a relevant role in the construction of the knowledge that they acquire along with their peers and teachers. Several advantages are associated with the use of digital games in education. One of the most relevant advantages is the possibility of reducing the stress associated with failure, by being able to modify actions or levels of difficulty in failure cases. As such, players can take more risks and are encouraged to explore and experiment more. This can make digital games become a great learning environment, where learning can be reflexive and critical, benefiting the learning process through trial and error. Several authors in the field of education also support the use of digital games as they can be adaptive educational tools, especially if they enable customization of levels according to the level of knowledge and experience of each student. Some authors add up that digital games can provide increased creativity, planning capacity and strategic thinking.

Digital game development in educational contexts should, however, require some considerations so that it does not become a problem neither for the student nor for the teacher in the classroom environment. The playful component of the act of playing should not be compromised and thus make the game a problem.  With this in mind, teacher interference during the game should be limited and the rules of play should be well explained. Most importantly, the student should not be

forced to play. Different games and devices should be carefully chosen according to learning objectives. Teachers and the educational institutions should take these aspects into account when using digital games to avoid the risk of making these resources an obstacle to learning.

### *Types of Digital Games*

Most games types and subtypes available on the market have pedagogical characteristics and may be included in the classroom according to the educational context and teacher's objective. Action games can aid in the development of children's psychomotor development by developing reflexes, motor coordination and assisting in the process of rapid thinking. Adventure games, which focus on solving puzzles, collecting and managing items, stimulate students' exploratory abilities by proposing problem solving solutions through experimentation. Simulation games, on the other hand, enable students to experience real situations that would be impossible to perform in the classroom. Strategy games mainly stimulate thinking and the ability to predict and plan actions, providing new knowledge and also allowing the categorization of resources learned during the game. Thus, digital games as a teaching tool can be useful in concrete contexts to achieve specific pedagogical goals, and, in general, will contribute to the child's cognitive development.

## Graphical User Interface and User Experience

The didactic features present in the game are not the only ones that can contribute to the player's learning. The Graphical User Interface (GUI) can have a specific role and positively influence the overall user experience (UX) contributing to the way the student learns and develops.

### *GUI*

Summarizing the GUI is what stands between the human and the machine. In a digital game, the GUI is what allows communication between the player and the game. Its main function is to provide feedback and control to the player. The GUI can be a game control or a display device and all elements that the game uses to communicate. It can also be called virtual interface.

The feedback given by the game presents information to the player, such as obstacles, score, lives, duration and progression of the player, becoming the element responsible for the output of information. Based on this information, the player can define his strategies, as well as his short and long-term decisions within the game. The control communicates to the game the actions of the player, being he, the player, the element responsible for inserting the information. It's through feedback and control that the interface unites the player and the game. The GUI can provide a good balance of functionality, usability, accessibility, immersion and aesthetics. When the interface is poorly designed some issues will certainly arise. One of the most common problems is the need for excessive training time for their use, which potentially discourages their usage. When the interface is not clear or coherent it may cause confusion in the players and induce them to error generating dissatisfaction and decreased productivity. In these cases, the game does not reward the student for the expected return on investment in terms of effort and time.

### *UX*

User Experience is the term defined by Donald Norman and Jacob Nilsen to gather all factors and elements that influence the union between the user and the product. The authors count as most important factors all those that will influence the perception and behavior of users. Usability is thus, part of what is evaluated in the scope of UX focusing on information architecture and interaction design. UX aims to study all aspects of the user experience with the system. For the creation and development of digital games, UX becomes a key element by optimizing the player experience. It provides the player with an interactive and meaningful experience by incorporating not only explicit interactivity but also choices and system response as the way to identify the depth and quality of the interaction. Thus, through it, it's possible to create not only a good experience for the game and its mechanics but also satisfaction and fun for the player.

## Accessibility in Digital Games

An accessible digital game guarantees as much as possible the inclusion and autonomy of any player. Accessible games have a larger audience or a larger percentage of the gaming market then non-inclusive ones. Accessibility promotes the

establishment of a relationship between a person and an environment or object in a friendly and secure way, in the case of the digital game, it also includes the promotion of satisfaction and enjoyment.

By employing good practices when developing the GUI and UX, it is possible to implement accessibility methods within a game that avoid most or all possible problems. A central factor in the UX study in a game relates to managing the levels of player frustration. If the player is unable to understand or perform any objective in the game he may feel frustrated, which may result in him giving up. Frustration can happen to anyone, not just someone with a disability and/or cognitive impairment. For this reason, accessibility should always be a game designer's concern and not only developed for specific games.

Accessibility is such an important component for digital games, that a group of developers belonging to the *International Game Developers Association* (IGDA), together with the UK non-profit organization *Special Effect* have created a list of 10 features that promote accessibility within digital games. This list was created to reach the widest possible audience, from designers to programmers, applied to any type of game, to be used in any context and for players with any kind of disability. These general characteristics are here listed: allow the definition of alternative controls; enable the choice of alternative sounds; enable volume control independently of music, sound effects and dialogs; show high visibility in graphics; present a design version aimed at color blind; offer various levels of difficulty and/or speed adjustment within levels; have a free mode, training mode and tutorial; display menus in an accessible manner; and present a list of features and accessibility requirements within the game. These features described by this group of experts will work as main reference and are adapted here to a pedagogical context taking into account our specific audience. The reframing of this list will provide a set of guidelines that hopefully are more suitable to the intended audience and will allow creating games that will be more effective and efficient.

## Guidelines for the Design and Development of Educational Digital Games

The guidelines for the design and development of educational games for children with ADHD follow the previously presented neuropsychological profile of children with this disability. The following guidelines will not make the game less enjoyable

by other kids or will be less accessible for kids with other disabilities. The same game developed for kids with ADHD can be played by the whole class.

The proposed set of guidelines follow the analysis and adaptation of the already mentioned usability heuristics of Nielsen (1995), the list of accessibility features promoted by IGDA and the organization Special Effect and the teaching strategies proposed by the ABDA.

Below are listed the 11 design guidelines for the creation of educational games for children with ADHD that are described along with the main benefits they convey.

### Simple Interactivity

Children with ADHD lose interest and are easily distracted. Limit the type of interactivity through simple mechanics. The child should not be presented with more content than the one that will be transmitted through the game. A simple design option is to remove any controls' setting from the start of the game so that the child can start the game right away. That option should exist but cannot be an obstacle to play. In addition to simple mechanics, it's important for the player to get used to the game and to develop in-game skills through free modes, training and an engaging tutorial. These modes not only facilitate the understanding of the game but can also respect the learning time of each child.

### Recurring rewards through positive feedbacks

Because children with ADHD need support and encouragement, it's important for them to be rewarded for each in-game achievement. These rewards appear in the game through positive feedback, either through words of encouragement; graphics that represent achievements, such as stars or a trophy; or by rewards within the game, for example, score, life, ammunition or game items. These elements will be fundamental for the child to understand his evolution in the game, which may increase the satisfaction of playing.

It's also important that the child understands the reason behind the reward, in order to develop a perception of his potential and consequently be able to have the security and motivation to overcome each challenge proposed. Feedback should also be given in case of error, but in a clear, constructive and respectful manner, without letting the error appear to be a performance failure.

### Elimination of distracting elements

The elimination of distracting elements facilitates access to information and game action, thus decreasing the probability of distraction. It is therefore suggested to insert in the UI, as well as in the game itself, only elements that are fundamental for the game to flow. A minimalist design approach should be followed providing a clean environment for the elements that are relevant to the learning process. Children with the *Inattentive* subtype are easily distracted. For this reason, it is very important to eliminate or reduce the amount of unnecessary information, which allows the child to stay focused on the game for longer periods of time. Elements of distraction can range from options that are poorly accessed or irrelevant in the definition, to elements of the heads-up display, secondary characters or a songs and even sound effects.

### Emphasis on Relevant Elements

Features such as intensity, contrast, size, color, repetition, movement or sound can be great features to emphasize important information and direct the player's gaze to the necessary information at a given time, thus facilitating the player's understanding.

### Flexibility of Levels

One way to reach a larger audience is to offer various levels of difficulty. This flexibility allows for various levels of experience, where, gradually, speed and difficulty are adjusted.

The motivation to keep playing can be found at each level surpassed, where the student can perceive his progress within the game. Therefore, in case of error, not ending the game may be a good practice, since it may prevent the generation of feelings of failure, which may lead to withdrawal from the game and, consequently, from learning. For this reason, in cases such as the previous one, providing clues that contribute to the accomplishment of the task or decrease of the difficulty of the game itself, may motivate the child to continue playing the game. However, easy games can also be detrimental to maintaining the player's attention, so it's important that each level presents challenging goals that can be overcome without frustration.

Games with longer levels and complex goals are not indicated for children with ADHD, as they may lose interest and give up playing in the middle of the game. This issue can occur mainly with children of the *Predominant Hyperactive* subtype, who need to perform some motor activity at short intervals of time, besides having difficulty to sustain attention over a long periods of time.

One way for the hyperactive child to be able to perform motor activities between levels is to create short levels with clear and simple goals. Thus, the probability of the child playing the whole level will increase, which consequently will increase the chances of the child seeing and retaining all the didactic content transmitted by the game. However, each level must present some newness to arouse the child's curiosity and keep him in the game. A new scenario, a different character, or a new item for the inventory collection are artifacts that can be used to generate novelty within the game.

### Multiplayer option

The development of children with ADHD is better when they are in a group, since they find motivation in other people. Allowing a child to play with other children through a multiplayer version means motivating and retaining the child in the game.

### Unlimited play time

Frustration can occur when there is a time limit in the game. Regardless of the ADHD subtype the child possesses, he will learn in his own time. Those of the *Predominant Inattentive* subtype suffer from changes in the speed of information processing, while those of the *Predominant Hyperactive-Impulsive* subtype have difficulty sustaining attention over time, however, they are still able to complete tasks, but require more time. For this reason, giving the child the freedom to fulfill the goals of the game according to their learning time is important. The levels can even be timed, but, they can't finish after a certain time. The completion of the game or level can only happen after the goal has been achieved or the game is abandoned by the child. For the child not to give up the game, it must be possible to save the game, in order to continue at different time.

*Confirmation of the game's actions*

Whether through impulsivity or inattention it's common for non-wanted actions to be taken within the game by children with ADHD. To decrease children's probability of error in a game, it's important to use action confirmation messages mainly for actions that are considered definitive and that may affect the outcome of the game.

*Coherence of Graphics Standards*

The creation of graphic patterns within the game facilitates the identification and understanding of the information transmitted by the game. To accelerate the child's understanding and influence the way he perceives, recognizes, interprets and reacts to an image, it's necessary to organize and structure the visual information of the game, which will contribute to intuitive learning of the functionality of each graphical element. Thus, allowing him to just play and learn the didactic content of the game. This organization and graphical structuring can be done in two ways: through the discrimination of primitive figures and/or the visual grouping of information into significant units. Examples of primitive figures are the use of color, movement, size, and orientation. They have features that highlight a visual element in an image during a search and so are noticed very quickly, even unconsciously. Visual grouping organizes sensory information by groups or units of perception. Thus, it co-relates elements of an image and the relation of an element to the image as a whole.

*Definition of an Exciting Graphical Story*

Competitive activities are inhibited when voluntary attention occurs. This is related to the motivations, interests, and expectations of an individual, being responsible for selecting and controlling the focus of attention. If the game doesn't arouse interest in the child, it will not be able to get their attention and they will distract themselves with other activities, which may jeopardize their learning process.

The use of graphical compositions that appeal to the emotional involvement of the player is a good method to retain attention in the game. These compositions can engage, stimulate interest and motivate the player to stay in the game. It is also possible to use strategies for creating game graphics with emotional appeals. Three possible strategies are:

- Presenting a thematic narrative: the player can identify with the dramatic and emotional aspect of the game narrative by going through similar experiences in his own life or by an experience he would like to go through.
- Using visual metaphors: these trigger non-verbal emotions, stimulate imagination and captivate the interest of the player.
- Incorporating novelty and/or humor: innovate either with humor or with diverse graphical aspects. These provoke curiosity and hold the player's attention for a longer time.

Children with ADHD have very striking characteristics such as creativity, spontaneity, joy, good humor, and have a more artistic side. Exploring these features for game creation is also a factor that will help make the game more engaging and fun.

## Conclusions

The role of the educational game designer is to create and develop games that aid the teaching-learning process for as many children as possible. For the development of this type of game, it's necessary to know the elements and the strategies that can favor positively the transmission of the pedagogical content, while also focusing on the general characteristics of its target audience.

In this work, eleven guidelines were defined in order to provide the most appropriate design options for a young audience that in a determined learning context can have more than 20% of children with ADHD. For the game designer, these guidelines contribute to a clearer and more concise understanding of the elements that provide better learning conditions. It's worth mentioning that those who will benefit most from the use of these guidelines will be all children in school stage. Although there is a direct benefit for children with a learning problem, all children will be favored indirectly. The creation of equal opportunities will ideally provide a means of not leaving any children behind and including everyone in enriching the educational and recreational experience as a whole.

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# Systemic Lisbon Battery for Cognitive Stimulation in the Elderly

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Cognitive impairments are one of the most prevalent type of health problems facing older people in developed societies. To contribute to this topic, the current study reports on an ongoing project that aims to develop and test a serious games-based approach for cognitive stimulation in old-aged persons – the Systemic Lisbon Battery. The cognitive exercises used in this study were focused on the performance of activities of daily living to promote cognitive improvements in this population. The sample for this study comprised 25 old-aged participants (21 women) with a mean age of 70 years-old that were recruited in the Senior Area of the Junta de Freguesia de Benfica, in Lisbon. These subjects were exposed to the cognitive exercises in a weekly basis during a 12-week period. They were assessed at baseline and follow-up with a battery of neuropsychological tests. The platform was created in UnityTM and consists of a small town, in which patients are able to perform several activities of daily living, because we argue that cognitive intervention should be conducted during the execution of everyday tasks to improve generalizability of the effects of cognitive interventions. During these exercises the patients were able to move freely around and to grab objects while interaction with the environment. The following activities were available: morning hygiene, choosing clothes, packing shoes in a shoe closet, preparing food, watching news on a TV set, shopping, going to the pharmacy, attending to an art gallery, or playing in a casino. These tasks are aimed to assess and train specific cognitive abilities, such as memory, attention, executive functions and reasoning, each of those involved in everyday activities. The results suggested improvements from baseline to follow-up in memory, attention and flexibility, which did not depend of age or education. The overall results are promising and highlight the benefits of using technology and serious games to improve cognitive functioning.

**Keywords:** Serious games; Ageing; Health.

# Serious Training for Serious Gaming: Challenges in Training Youth Facilitators on Sexual Rights

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General Theme: Serious games have been used to address social inequalities by creating less formal, or more private, modes of engagement with topics that might be considered sensitive or difficult. Sexual Rights are, especially in the context of disadvantaged youngsters in Portugal, both an important topic and one that has received very little attention, as formal Sexual Education programmes have suffered from systemic deficiencies. As members of the EU Kids Online Portugal team, we had the opportunity to be part of the entire process of design and implementation of the training aimed at creating and using a serious game on the topic of Sexual Rights, which focuses on disadvantaged youths as its main target. This game was created due to a grant received by the Portuguese Association for Family Planning (APF). The project was active throughout 2015. Problem: The development of a serious game in the area of Sexual Rights targeting socially disadvantaged youngsters but, at the same time, open for anyone to access online, requires both a very wide and inclusive approach, and also training targeted at adults who will work with the disadvantaged youths. This creates an added step in the process, as the game is originally conceptualized to work in tandem with those facilitators helping youngsters. Those facilitators, in themselves, are not the target demographic for the game and might require that facilitators be trained in media literacy and in Sexual Rights literacy, even though they had showed a deep and nuanced understanding about the sociocultural context within their areas of intervention, and raised several important points about the application of serious gaming to these communities.

Objectives: To understand how the need to train adult trainers to accompany youngsters in the usage of a serious game about Sexual Rights might create specific challenges to the conceptualization and implementation of the game. To understand how facilitators conceive of serious gaming as a pedagogic strategy and Sexual Rights as a topic.

Methodology: We used participant observation, reports from training sessions, and an analysis of the game's content to gather information about how trainers interacted with serious gaming.

Main conclusions: Facilitators were lacking in knowledge about several issues around Sexual Rights, and about how youngsters tend to interact with media, or with media literacy discussions. They held several stereotypes and beliefs about youngsters and technology, and about youngsters and sexuality. These results show the difficulties of accepting serious gaming as a valid pedagogic strategy and as a tool for promoting citizenship; they also show how serious gaming faces applicability problems that do not stem from technological aspects but from how the topics they cover are thought of.

**Keywords:** Serious gaming; Youth; Sexual Rights.

**Parallel Sessions 1**
Games for Social Learning

# "Fan Favorites": Using Games to Promote Meaningful Conversations about Media

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Over the past few decades, media literacy education has developed into an international field of study and practice. And while scholars and educators have made great efforts to encourage critical engagement with media culture, much of this progress has taken place within formal education settings. "Fan Favorites" is a scholarly and creative project that attempts to make media literacy education accessible to the larger population, using a game to promote players to have meaningful conversations about media. Fan Favorites begins as a card game organized around open-ended questions intended to encourage players to reflect on the meanings they make of their favorite media. Developed in collaboration with university students as part of an undergraduate course on media literacy—the game's questions help players consider concepts from media and cultural studies—like affect, aesthetics and issues of representation—in ways that are engaging and accessible. For example, players may be asked to share the significance of popular songs in their memories of past relationships, to devise a backstory for a unnamed character from a film or to describe how a book they read influenced their perception of a specific social issue. The research study involves focus groups, led by undergraduate students, in which the participants (1) complete an initial survey in which they discuss their media habits, (2) play the game in a group setting, and (3) participate in a post-game conversation about how the game encouraged them to reflect on their experiences with media. Throughout the research study, qualitative data from the surveys and conversations will be compiled as a means of both accounting for the public's perspectives and practices related to media and assessing the effectiveness of the game at promoting critical thinking and creativity. The last stage of the project involves the development of a digital version of the game for use on mobile devices. Available to the public, "Fan Favorites" will serve to simultaneously record and report anecdotal data on players' media habits via the game's initial survey and promote critical conversations about media among those playing. Also, the project itself serves as a means of helping the student participants practice uniting theory with practice, media education with media production. The session will include an explanation of the theoretical foundations of the game, a description of the game's development, a discussion of the data collected as part of the study, and a demonstration of the game itself.

**Keywords:** Media Literacy; Critical Thinking: Games; Videogames; Educational Games; Media Education.

# The Potential of Serious Digital Games for Human Rights Education

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### ABSTRACT

The recent years have seen an increase in serious games dealing with topics that go well with human rights education. The first digital game wanting to make people aware of the situation of refugees is Escape from Woomera (2003). The results of a web-research show that a majority of serious games focus on topics around refugees and poverty – most of them wanting to evoke empathy for the groups depicted. The Serious Games Design Assessment (SGDA) Framework is introduced as a tool to find out if a certain game might be used to achieve the objective the designer had in mind when designing the game. Using the game Bury Me, My Love the approach is explained in detail. The conclusion of the game-analysis shows that Bury Me, My Love can be regarded as a successful example of a serious game wanting to show what it means to go on the dangerous journey from Syria to Europe.

**Keywords:** Human Rights; Games for Change; Serious Games; Game-Design; Teaching.

## Introduction

The right to education is one of the central human rights and it also includes the right to learn about human rights. As stated by the OHCHR | Human Rights Education and Training' (n.d.), this is especially important as "values, beliefs and attitudes that encourage all individuals to uphold their own rights and that of others" are conveyed by human rights education and thus can help to create a just society as well as prevent human rights violations. The World Programme for Human Rights Education which started in 2005 is currently in its third phase which should strengthen the first two phases and ensure that people are provided with knowledge and skills as well as develop their attitudes and behaviors (United Nations, 2014). The number of serious games dealing with human rights topic has been on the rise for the last years. However, there has not been much research in how far these games might change people's attitudes and if that's possible which game-design elements help the games to succeed.

Games for change which can be described as games with a purpose beyond play (Klopfer, Osterweil, & Salen, 2009) aim to change behaviour or attitude of gamers. Therefore, they go well with the aims of human rights education which are often divided into learning about, by and for human rights. Learning about human rights includes knowing about facts like basic documents and organizations as well as understanding the difference between rights and duties or critical thinking with regards to human rights. Learning by human rights refers to attitudes, values and making judgements like reflecting, recognizing manipulation, develop empathy or criticizing human rights violations. Finally, there is learning for human rights which refers to decision-making and responsibility, empowerment and acting within the meaning of human rights.

## A Brief History of Digital Human Right Games

Digital games for human rights education have been developed for about fifteen years. "Escape from Woomera" (2003) is one of the early attempts to focus on human rights in a digital game. The game puts players in the role of an Iranian asylum seeker whose request for asylum has been denied and who therefore decides to plan his escape from Woomera. As the game does not offer a lot of choice for the players, they should feel like the playable character – being restricted and frustrated because of not having many choices and possibilities where to go and what to do. Poremba (2013: 359) points out: "Woomera succeeds less by immersing players in a physical space or revealing truths about the logic of Woomera and detainee strategy, and more in crafting insight into the enacted subjectivity of Woomera refugees, read through the player's embodied gameplay experience." Although using game-mechanics of a typical adventure game "Escape from Woomera" was criticised as being too didactic as it imposes the designer's opinion of what to think about life as a refugee in Australia. There has been a huge increase in the number of games dealing with human right issues within the last ten years. Today there are hundreds of digital serious games which focus on topics like poverty, discriminations, refugees, gender issues, or child labor. These games – most of them having been supported or funded by non-governmental organizations (NGOs) – can be divided according to their aims: (1) to inform players about certain problems or human right violations and (2) to raise awareness or criticize certain situations and motivate activity on the part of players. Most of the

time games provide a mixture of these aims. Like commercial games, these digital games use a variety of game-design strategies to deal with human rights. Some of the games are not oriented towards any particularly fun experiences. This might cause players to quit the game without ever turning to it again. Green (2014: 39) writes that "these types of games have earned the pejorative nickname 'chocolate covered broccoli' in that they are little more than basic and boring drills dressed up in a thin video game shell". Fun, therefore, has to be regarded as a key-element of even serious games. However, one has to bear in mind that fun can be seen in different ways (Lazzaro, 2015). Serious fun, for example, refers to purposeful play in which players would like to make a difference in their real world. Making a serious game fun to play can be difficult for designers as "increasing system realism allows you to communicate a deeper message but typically makes for a less accessible, less fun play experience and thus less people will want to play the game" (Swain, 2007, p. 808). Apart from fun, other important factors in games include being very emotional or games using the concept of satire. Video-games can also be regarded as useful tools for fundraising and creating awareness (Stokes, Seggerman, & Rejeski, 2011).

You can now find numerous games in the field of human rights and human rights education. Most of them aim at showing human rights violations by putting the player in the shoes of a character whose rights are violated or by having the player take on the role of a helper. Topics of these serious games range from situation of refugees in different countries, politics over poverty and child labour and exploitation to equal opportunities. Although the games deal with similar topics and all of them try to teach players more or less about human rights there are huge differences regarding design.

*Ayiti – The Cost of Life* (Global Kids & Game Lab, 2006) was designed with the help of high school students to teach primary school children in industrialized countries the relationship between poverty and education. The simulation presents the player with the Guinnard family (parents and two children) who live in rural Haiti. The game principles are quite easy – the player has to decide who is going to work, who is allowed to attend school, and who should stay at home (and work at the family farm). Players can check on family members' conditions including wellbeing, happiness, and education. Winning the game means that the family has to survive for 4 years (16 seasons). The game challenges typical Western beliefs

as sending all children to school ends the family in poverty, sickness, and death (Ferri & Fusaroli, 2009, p. 36). This way the game mechanics show the complex interaction between the need for education in order to get a better pay and a less dangerous job, but at the same time show that education in these countries is quite expensive. This means working hard (and risking one's health) sometimes is necessary. This vicious circle cannot be broken by simply telling people in less developed countries to send their children to school. What is quite remarkable about the game is that it comes with a lesson plan giving implementation suggestion for school use as well as background information about Haiti and the human right to education. The game is still used by many teachers around the world to teach about poverty in less developed countries.

Another game dealing with less developed countries is *Darfur is Dying* (Take Action Games, 2006) – a browser-based game about the crisis in Darfur. The game won the Darfur Digital Activist Contest sponsored by mtvU. It consists of two modes. In the first part, players choose a family member and are sent to forage for water. If the character is captured by a patrol of the Janjaweed militia, the player receives information of what would probably have happened to their character and is asked to select another family member. In the second mode, a refugee camp needs to be managed – the character has to use the water collected before for growing crops and has to build huts. When water runs out, the player returns to the first mode. In less than half a year after having been published, the game had been played by more than 800,000 people (Parkin, 2006).

After the first successful creations of games which aimed at making people aware of problems, game designers (and the organizations financing them) also came up with the idea of using games as means of fund-raising. *Free Rice* (United Nations World Food Programme [UNWFP], 2007) is basically a website providing multiple-choice quizzes for different subject areas (e.g., English, mathematics, foreign languages, geography). For every question the user answers correctly, 10 grains of rice are donated via the World Food Programme. In 2007 more than 12 billion rice grains were donated ('Totals | Freerice.com', 2015). As the website is constantly being updated, it still attracts many users. In the first 10 days of July 2015, nearly 60 million grains were collected by visitors answering questions. Players can sign up and keep track of their collected amounts of rice, as well as create and join groups. Meanwhile, there are more games working according to the motto feel good while

playing and donate to charities (Basu, 2010). There are games that even go one step further. *Half the Sky Movement: The Game* (Frima Studio, 2013) was co-produced by Zynga and the Games for Change movement as part of a transmedia project. The game is about the empowerment of women around the world and addresses various problems women have to face in today's society. The player starts out in India playing Radhika, who must decide if she should confront her husband about the necessity of getting medicine for their sick daughter. Decisions taken by the player that empower women are rewarded by the game. This game – as usual for games in social networks – encourages players to invite friends to play as well because sometimes support from other players is needed to complete a quest. To be able to play mini-games or travel within the game you need energy – which you can wait to be filled up after some time or you can buy energy using real money. Most of the money earned by in-app purchases is donated to charities. Additionally, there are some more incentives for players to come back and play the game. For example, when reaching a certain amount of points, books or medicine are donated, giving players the good feeling of being able to help by playing the game regularly. There was a huge media discussion when the game was launched, as the plot follows a book and a film dealing with the same topic (Holpuch, 2013; Wolonick, 2013). The game can be regarded as successful when it comes to the number of players and donations. By June 2015 the game had 1.3 million players, reported 250,000 book donations, and generated a total of more than US $500,000 in overall donations ('Half The Sky Movement Game', 2015).

Apart from using social networks, recent games also make use of the latest hardware developments. *Outcasted* (Köln International School of Design, 2014) is a stand-alone first-person-simulation making use of Google's Oculus Rift to enable a completely new game experience. Players take the role of a homeless person living on the streets of a western city. The player's task is to draw passing pedestrians' attention to the playable character in order to receive money. The only action players can carry out is moving their heads to try and elicit eye-contact. Some of the passersby will start talking. Some will even give the character money. Still, more of them will ignore, insult, or even get aggressive towards the character. The developers of *Outcasted* intend to make people feel what it is like to depend on another people's goodwill.

As values can be integrated into digital games in various ways (cf. Flanagan & Nissenbaum, 2014), these games differ in great extent from each other regarding game design and how the topics and contents are realized (cf. Gabriel, 2016). The following sections will introduce the research carried out regarding games dealing with human right topics and show how the SGDA Framework can be used to find out if the game might be helpful for teaching about human rights.

## Methodology

To find out about the potential of serious games, it is necessary to have a closer look at the underlying game design. For this research the Serious Game Design Assessment Framework (SGDA Framework) by Mitgutsch & Alvarado (2012) was used. This approach analyzes "a game's formal conceptual design, its elements, and their relation to each other based on the game's purpose" (ibid p. 121) and therefore helps to assess its possible impact. The SGDA Framework consists of six core components and puts purpose in the center of them all as this should be reflected in all other elements. The other five components are content, fiction and narrative, mechanics, aesthetics and graphics and finally, framing. The SGDA Framework was chosen as it puts emphasis on purpose when evaluating serious games which matches the objectives of human rights education. As Mitgutsch & Alvarado (2012: 123) state, purpose is not only reflected in the objectives and topic of the game but also in the designer's intentions as the latter wants to achieve an impact beyond game-play. The game-design influences if there might be a possible transfer of empathy or change of behavior from the game into reality.

Before some of the games were analyzed according to the SGDA Framework, an extensive web-research was carried out to identify those serious games that deal with topics of human rights (violations). The web-research used Google as search-engine, entering different keywords like "serious game", "human rights", "digital game", "immigration", "refugee", "poverty" and so on in different combinations and in the languages German and English to find as many games as possible. Only those games were included in the list whose purpose could explicitly identified as wanting to convey a message focused on human rights (e.g. discrimination against certain groups, freedom of thought, right to education). Serious games that deal with human rights as a second theme were not included in the list.

Sonja Gabriel

## Results of Web Research

The web research resulted in a list of serious games on various human rights topics. As can be seen from table 1, an emphasis on certain topics can be found. The most prominent topic is poverty which, however can basically be subdivided into poverty in developing countries showing players what it means if there is not enough food, housing etc. available because of (civil) war or natural disasters. Another subgroup deals with factors that might lead to poverty in the so-called rich countries showing players for example that certain people do not earn enough money for paying the costs of daily life. Finally, the third sub-group features homeless people in European or US-American countries picturing the challenges and obstacles these people have to overcome in their daily struggle to survive.

Many games also deal with topics around refugees, asylum seekers and migration – especially those which were published within the last five years due to the topic being present in media and also affecting many people's lives. These games partly deal with legal migration to another country and the game characters facing various challenges to get settled in their new surroundings. A second group pictures people having been forced to leave their home countries and their risky journey into safety.

Generally, most of the games listed aim at creating empathy for the depicted groups by putting players in the shoes of asylum seekers, refugees, poor or homeless people. However, some of them use a more humorous way to make people aware of the topic (as for example Smuggle Truck or Penner Game).

Table 1. Overview of serious games dealing with human rights

| Title of the game | Topic |
| --- | --- |
| 3rd World Farmer | Poverty (developing country) |
| A Breathtaking Journey | Refugees |
| A Closed World | LGBT |
| Against All Odds | Refugees |
| Antiwargame | Terrorism |
| Ayiti – The Cost of Life | Poverty (developing country) |
| Bad Paper – The Debtor Game | Poverty (Western world) |
| Bury Me, My Love | Refugees |
| Cartlife | Poverty (Western world) |

The Potential of Serious Digital Games for Human Rights Education

| Title of the game | Topic |
|---|---|
| Coming Out Simulator | LGBT |
| Cool School: Were Peace Rules! | Conflicts |
| Darfur is Dying | Refugees |
| Das kostet die Welt | Landgrabbing |
| Durch die Wild Web Woods | Basics of human rights |
| Eliminate Child Labour | Child labour |
| Endgame Syria | Conflicts |
| Escape from Woomera | Refugees |
| Execution | Death penalty |
| Finding Home | Refugees |
| Food Force | Hunger |
| FreeRice | Poverty |
| Frontiers | Refugees |
| Garbage Dreams | Poverty (developing countries) |
| GetH20 | Water shortage |
| Global Conflicts Palestine | Conflicts |
| Go Goat Go | Poverty (developing countries) |
| Half the Sky | Gender discrimination |
| Hobson's Choice | Poverty, homeless people |
| Home Behind | Refugees, civil war, |
| Homeland Guantanamos | Refugees |
| Hush | Conflicts |
| ICED – I Can End Deportation | Refugees |
| Inside the Haiti Earthquake | Natural disasters |
| Layoff | Discrimination |
| Lim | Violence |
| Live58 | Developing countries |
| Mainichi | Transgender |
| Maria Sister's: Clean Room | Immigration |
| Marketplace Poverty Simulator | Poverty (Western world) |
| Mars Generation One: Argubot Academy | Ethical decision taking |

| Title of the game | Topic |
|---|---|
| Mission | Poverty, homeless people |
| Mission 4: City of Immigrants | Immigration |
| No Game! | Poverty |
| On the Ground Reporter: Darfur | Conflicts |
| One Hen | Developing countries |
| Outcasted | Poverty, homeless people |
| Papers, Please | Totalitarian regime |
| Parable of the Polygons | (Ethical) decision taking |
| Parable oft he Polygons | Ethical decision taking |
| Peacemaker | Conflicts |
| Penner Game | Poverty, homeless people |
| Penner Game 2 ‰ | Poverty, homeless people |
| People Power – The Game of Civil Resistance | Civil rights |
| Phone Story | Exploitation |
| PING – Poverty is not a Game | Poverty (Western world) |
| Quandary | Ethical decision taking |
| Refugee | Refugees |
| September 12th: A Toy World | Terrorism |
| Sim Sweatshop | Exploitation, Child Labour |
| Smuggle Truck | Refugees |
| Spent | Poverty (Western world) |
| Survival | Refugees |
| Sweatshop | Exploitation, child labour |
| Syrian Journey | Conflicts |
| The Invisible Hand | Fair trade |
| The Migrant Trail | Refugees |
| The Unfair Factory | Exploitation |
| This War of Mine | War |
| Ulitsa Dimitrova | Poverty, homeless people |
| Unstoppables | Discrimination |
| Wildfire | Poverty, gender discrimination, education |

*Bury Me, My Love* (Playdius 2017) is a smartphone app for iOS and Android that tells the story of a young woman called Nour who flees Syria and attempts to reach Europe in safety. The app is an interactive story told via a communication tool similar to WhatsApp. The player takes on the role of Majd who stays behind and can only occasionally text with his wife, send/receive photographs or emojis while she is on her dangerous journey. So, the player can provide Nour only with advice and support being able to influence her decisions and moves to a certain extent. Florent Maurin (2017:1), the designer of *Bury Me, My Love*, calls the game "a reality-inspired game, a fiction directly derived from real events […]". It is based on an article Maurin read in 2016 and on the actual experiences by a refugee from Syria who went on basically the same journey Nour has to undertake within the game. The title refers to an Arabic farewell meaning "Take care".

*Purpose*

The topic of the game is to show players the reasons why people leave Syria and which hardships they have to endure when these people try to flee to a safe country. The designers of the game state their purpose as following:

> "Our two main characters, Nour and Majd, are fictional. They do not exist, or rather, they exist collectively. They are a multitude of men, women and children: Dana, her mother, her brother-in-law… as well as thousands of others who flee their country – or watch their relatives flee – all in hopes of finding a better life in Europe. This story is about those who achieve that goal. It is about those who don't. It is about those who die trying. It is about the world around us. Something which we hope will lead you to keep pondering on after it is over." ('Bury me, my Love – A Story of Love, Hope and Migration', n.d.)

The game provides 19 different endings, thus ensuring that the decisions taken by the players really matter.

*Content and Information*

As the game relies on accounts by someone having fled from Syria, the information presented within the game is realistic and true. *Bury Me, My Love* is mostly

based on text, which means there are many data and facts used. However, the information is presented along the way, integrated in the story and relies on facts as well as personal experience by people interviewed for the game. However, to make the conversation between Nour and Majd more natural and realistic, prejudices and judgmental expressions are used as well. Apart from the text, the game provides a map from which the player can see the places Nour has already traveled to as well as some information about the historical or geographical importance of the place and relevant information regarding Syrian refugees. For example when clicking on Beirut within the map, you get the following information: "As of March 2016, there were over 305000 Syrian refugees officially registered in Beirut. They accounted for 16% of the city's population." The app tracks the progress and the journey using the map as a diary and thus changes from game to game depending on the decisions taken by the player.

### Game Mechanics

As per Sicart (2008: 6) game mechanics is defined "as methods invoked by agents, designed for interaction with the game state" which subsumes the establishment of the rules but also the in-game goal of the game, the operation of the reward system, obstacles/challenges within the game, the difficulty balancing and the win conditions (Mitgutsch & Alvarado, 2012). The goal in *Bury Me, My Love* is to take decisions which enable the non-playable character Nour to arrive Europe safely. The players can only choose between a limited choice of answers or dialogue-parts, sometimes even choose between two different emoticons to send and thus cannot foresee how the decision will influence the story (or if Nour will even follow the piece of advice given by the player). The only feedback the player gets is the advancement Nour makes or the difficulties she has to face as a result of the decisions taken. There are no points or badges awarded, no levels. Advancement can only be seen from the map. However, there are some variables which will influence Nour's decisions and actions: her morale, her relationship level with Majd, her budget and the presence or absence of specific objects in her inventory.

### Fiction and Narrative

The fictional context and the fictional world created is crucial for *Bury Me, My Love*. The whole story unfolds right from the beginning just by conversations between Nour and her husband. As the game advances, the player learns more and more

about the circumstances and reasons why only Nour sets out on the dangerous journey and what the couple experienced in their past. The player takes on the role of the husband, staying behind with his mother in a war-torn country, being unable to help his wife on the journey apart from giving support and advice. The game also enables players to choose the game's speed. If the "pseudo-real time" mode is switched on, the player needs to wait for the story to progress when Nour either does not have any network connection or needs to do something else. The game screen says "Nour is busy". When she needs to talk to the player, a notification is sent. As the player takes on the role of Majd, it helps perspective-taking which "is the active consideration of an outgroup member's mental state, points of view, and motivation" (Darvasi, 2016: 7).

### Aesthetics and Graphics

These elements refer to the audiovisual language of the game and thus "define the overall formal aspects that frame the content (information), the fiction (the world and characters of the game), the framing (target group), the setting, and the mechanics (instructions, rewards)" (Mitgutsch & Alvarado, 2012: 126) The game uses a cartoonish style for depicting the characters (photographs and selfies sent in the game or the profile picture of Nour). The main game screen looks like a typical smartphone messenger app, showing Nour's messages in white font on a brown background and Majd's texts in black font on a white background. All conversations can be read up any time in the game. On the start of each day within the game, the date (day and month) is given. Sounds used are also similar to those of a smartphone messenger app. The map used to show important points in Nour's journey is similar to maps found on the internet (f.ex. Google maps). Although the characters are depicted with drawings, these are so detailed and natural, so that players get a feeling who Nour is. Aesthetics and graphics match the story and the framing without any contradiction.

### Framing

The last aspect of the SGDA Framework deals with the framing of all the before mentioned elements in relation to the target group as well as their play literacy and the broader topic of the game. The game does not address a certain target group – basically anyone being interested in the game's topic should be able to play it. The game controls and the user interface are easy to use – there is not

much the player can do anyway. Most of the time the player's task is reduced to reading as not all of Majd's messages can be influenced. So, players need to be able to read quite well in order to follow the unfolding story. The topic of the story – Syrian refugees and their dangerous journey to Europe – is addressed in a rather emotional way and relies on the player's bonding with Nour and wishing her to arrive safely in Germany (which is the target destination). There are no additional educational resources provided – showing that the game was not directly meant to be used in classrooms. As the app provides 19 different endings and a lot of different conversations depending on the choices taken before, there is a high degree of replayability.

## Conclusion

As it is stated in the SGDA Framework, the game's purpose needs to be reflected in the individual elements to present a coherent and cohesive game system. When having a look at the relation between the game's content, its fictional context and the mechanics, the following can be stated: The purpose of the game is to show players which obstacles and dangers Syrian refugees have to overcome in order to live a life in safety. The play wants to create understanding and empathy by showing how difficult this goal is to achieve. By telling about the lives of refugees and those left behind in a very personal way, the game succeeds in providing information and facts without leaving the narration. The game's disadvantage of leaving the players rather passive and not allowing them many choices (as only pre-formulated answers can be chosen from time to time) is at the same time mirroring the actual impossibility of influencing a beloved person's fate because of only being connected by a smartphone. Thus, the game shows how important this device becomes for refugees as it is often the only connection to their family and friends. Of course, if the game can really evoke empathy with the players, cannot be answered by having a look at the game elements. However, this analysis shows that a game like *Bury Me, My Love* has a great potential to influence players and address the objectives of human rights education in the before-mentioned category of learning by human rights.

As shown in this paper, many serious games address topics that cover human rights education. Many of them like the example of *Bury Me, My Love* discussed, try to evoke empathy with the player. Not all these games reach this aim. This is

specially the case when the purpose of the game is not reflected in the other elements as stated in the SGDA Framework. However, to make sure that players really learn something from the game, guided reflection and discussion of the game content might be needed additionally.

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# The Usage of Game-Based Learning in University Education.  How to Motivate and Foster Creativity among Adult Students through Board Games

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### ABSTRACT

In the last decade, the emergence of innovative teaching methodologies such as Game-Based Learning, Flipped-Classrooms or Problem-Based Learning have meant an important change in the way students learn. All these turn the student into the core of its own education process and use participative and cooperative techniques that encourage 21$^{st}$ century skills as well as motivation improvement. The purpose of this paper is to analyse and evaluate the potentialities of Game-Based Learning methodology with commercial board games in higher education with special focus on students' motivation. This investigation was an exploratory two-stage process. The first one involved three experimental interventions in courses of six bachelor degrees of Communication and Biochemistry studies (n=196 students). In these interventions, teachers introduced commercial board games that were related with the contents of the courses and organised games among students. The second stage was data-driven. It was gathered through a survey among the students that had participated in the GBL interventions (n=87). It included questions related with the teaching methodologies experienced at university, their perceptions about games as a teaching method and the benefits of the GBL sessions with board games. Results show that GBL sessions significantly motivated students; promoted their active participation in class and developed transversal skills such as teamwork and communication.

**Keywords:** Game-Based Learning; Board Games; Motivation; University Education.

**Introduction**

Playing and games have always been elements closely linked to teaching, but today they are claimed as a strategic innovation tool to improve learning processes. In the last decade, several theoretical and practical perspectives have emerged that approach this issue such as *gamification* (Deterding, *et al.,* 2011; Kapp, 2012), *pervasive games* (Montola *et al.*, 2009), *serious games* (Ritterfeld *et al.*, 2009) or *Game-Based Learning* (Tobias, Fletcher & Wind, 2014). Although they offer different approaches, their nexus is the usage of the principles of games or even games themselves as tools to influence learning and increase motivation and engagement of students. All these methodologies turn the student into the core of its own education process and use participative, experimental and cooperative techniques that encourage 21st century skills (critical thinking, creativity, collaboration and communication) as well as motivation improvement.

Although boundaries between the concepts are in many cases diffused, the terminological debate is placed in the pedagogical/ludic axes and created games/gaming experience. For example, while gamification is considered the design of activities which use "game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012) and are more concerned about the global experience of the participants than in the usage of a particular game (Cornellà & Estebanell, 2017), serious games put emphasis on the learning objectives rather than in the playful structure. As Wu & Lee (2015, p. 414) exemplify:

> Climate change games are considered 'serious games' that are designed to have underlying objectives beyond mere entertainment such as instructional goals. Game characteristics such as goals, rules, or the use of fantasy not only promote player engagement, but also influence learning.

Within this debate, some authors see contradictory the usage of games in education, because they would be the opposite of serious (Wechselberger, 2013). On the other hand, Rubio (2013) states that educational games do not always achieve their goals because they forget to design the most playful aspects, which are the most influential in the effectivity as a pedagogical tool according to experts (Gee, 2008). However, those elements that stress on the characteristics of the game

(interaction, decision-making, fun, challenge, competition, etc.), arouse greater interest in the participants, without detriment to the learning process.

Within all these trends, Game-Based Learning (GBL) is a methodology based on the creation of games and simulations or using existing ones, preferably digital, as teaching resources in the classroom. Close to the serious games technique, its main difference would be the usage of playful characteristics of *noneducational games* to produce and improve the experience and learning. A relevant aspect to consider is that knowledge and game culture are caught on among new generations. This means working with familiar tools to several students. As Hamari *et al.* (2016, p.176) state:

> Serious games present the opportunity for indwelling, when familiarity with ideas, practices, and processes are so ingrained that they become second nature. However, because these ideas, practices, and processes are components of tacit knowledge, they are difficult to measure.

These learning instruments are not exclusive of primary levels of education, but they are used in multiple ways at higher education. Although most gamification and GBL experiences are based in digital resources and videogames (de Freitas, 2006; Zin, Yue, & Jaafar, 2009; Crocco, Offenholley & Hernández 2016), board games are experiencing a new boom and their several options open new possibilities to the usage of physical resources in higher education classrooms. In this sense, new commercial board games turn to be a privileged resource to bear in mind as a valid option.

However, there is a gap of academic studies focused on the usage of board games as a tool to apply in GBL or gamification. For this reason, our objective is to analyse and evaluate the potentialities of Game-Based Learning methodology with commercial board games in higher education with special focus on students' motivation.

### Advantages of Using Contemporary Board Games at Higher Education

*Contemporary board games* refer to those commercial board games that have appeared in the last twenty years and include titles as *Catan* (1995), *Cascassone* (2000) or *Ticket to Ride* (2004). This new generation of games focuses in the

playful elements of the game with the aim to reach a transversal and wide public. This new universe of games is a fruitful field to work in GBL as they balance the tension between learning objectives, ludic dimension and the game experience.

Following this path, we find several examples of the application of analogic noneducational games in higher education. Huang & Levinson (2012) assess the usage of commercial games such as *Air Baron, Metro, Rail Baron, Rail Tycoon, Empire Builder, China Rails* and *1870* to learn the planning of transport systems in civil engineering. Berland & Lee (2011) use the game *Pandemic* to analyse how logical and *computational thinking* processes of collaborative strategy games players work. And, Castronova & Knowles (2015) have changed the game $CO_2$ to explain and discuss the functioning of climate policies. There is also an inverse case such as *KEEP COOL*, which is a board game that was specifically design to spread climate change among "families, students, journalists, and politicians, environmentally concerned and game enthusiasts, consultants, and nongovernmental organizations (NGOs)" (Eisenack, 2012, p.329) and that later became marketable.

Apart from the terminological complexity of the field or the specific format of games, studies suggest that games may produce some advantages in education such as its motivating potential, the possibility to generate an active learning, its impact in personal and emotional skills (overcoming challenges, self-confidence...) which favour interaction and sociability and allow learning by competencies (Romero y Gebera, 2015) as well as give a general overview to complex issues. But, above all, they place participants in the core of the learning process (Garris, Ahlers & Driskell, 2002).

> [Games] help to motivate students and to involve them into the teaching and learning process by providing the necessary tools to put them in the centre of the teaching action and making them main characters of their learning (Cornellà & Estebanell, 2017).

Nevertheless, demonstrable evidences do not always support these statements and some authors claim that more studies should focus in the evaluation of real effects (Crocco, Offenholley & Hernández 2016, p.406).

In cases that board games were used, the most valuable aspects are direct interaction between players and presence:

It should be a board and not a computer game, as face-to-face communication is a more appropriate way to simulate real-world climate negotiations. Moreover, a face-to-face game encourages discussion and questioning; thereby, direct experience from the game provides a natural starting point for debriefing (Eisenack, 2012, p. 333).

Other authors valued aspects that were directly related with the physicality of games and its components because avoiding the complexity of digital systems and a technological mediation one can be more flexible with the rules or can deepen into the psychological aspects of the simulation (Meijer, 2015, p.531). On the other hand, Castronova & Knowles (2015) argue that commercial games offer additional advantages due to the range of topics and existing options that are in the market and that could be the base for inspiration to a modification or redesign of the game that fit the desired goals. It is also remarkable to highlight that using these games in the classroom may also be problematic as players need to know the rules and it is difficult to create a correct learning curve due to the possible loss of participants' interest (Eisenack, 2012). These problems may become more pronounced with existing commercial games if the level of difficulty is not correctly valued (Huang & Levinson, 2012).

Apart from evaluating the efficiency of these learning techniques, research have also gained in-depth knowledge about students' learning perception of games as teaching methods at higher education and their consequences. Some studies about the specific usage of GBL state that students admitted "higher levels of interest, enjoyment and confidence compared to traditional methods" (Crocco, Offenholley & Hernández 2016, p.407). It seems that the motivation increase, immersion and engagement were also aspects identified and most valued by students (Vandercruysse *et al.,* 2013; Hamari *et al.,* 2016). However, most of these experiences applied to Digital GBL interventions. Consequently, there is a lack of studies about students' perception of usage of board games in university lectures.

## Methodology

This investigation on Game-Based Learning experiences in higher education was exploratory, two-stage process. The first stage involved three experimental interventions in three courses of six bachelor degrees involving 196 students of

Universitat Rovira i Virgili (Tarragona, Spain). Students were attendants of the following courses:

a) History and Structure of Communication —second year of the BA in Journalism (38 students), BA in Advertising and Public Relations (44 students) and BA in Audio-Visual Communication (37 students),

b) Advertising Creativity —third year of the BA in Advertising and Public Relations 24 students) and

c) Legal, Social and Communicative Aspects of Biotechnology —fourth year of the BSc in Biotechnology (36 students), Double BSc in Computer Engineering and Biotechnology (6 students) and Double BSc in Biotechnology, Biochemistry and Molecular Biology (11 students).

The three interventions had different levels of application of the Game-Based Learning according to the objectives and contents of the course. These interventions will be detailed in the results.

The second stage was data-driven. It was gathered through an online survey among the students that participated in the experimental interventions, which included quantitative and qualitative questions with the objective to discover their previous assumptions about games and its usage as teaching methods at a university level; the appreciated skills that were practiced during the sessions; their personal engagement in the courses after the experiment. The survey obtained 87 responses. Although the results of the survey have limited representation due to the number of participants, the qualitative data collected is especially relevant.

## Results

### a) First Stage Process: Game-Based Learning Sessions

As mentioned before, the GBL sessions took place in the courses of *History and Structure of Communication*; *Advertising Creativity* and *Legal, Social and Communicative Aspects of Biotechnology* (see Table 1).

The impact of the board games differed in the three practices according to teaching objectives. In the case, of *History and Structure of Communication,* Game-Based Learning was used as a starting point for research about course contents.

Students experienced this method for a month whereas in *Advertising Creativity*, games were used in one session to spur imagination and creative writing among students. But, in *Legal, Social and Communicative Aspects of Biotechnology*, the objective was to show learners different ways to explore and communicate science. Current media environment should facilitate the comprehension of research by non-specialists and, when possible, to promote a two-way exchange and engagement between scientists, stakeholders and the whole public in order to improve the research' impact. Accordingly, GBL methodology took two sessions in this course. The former introduced the concept of Responsible Research and Innovation, which claims communication "from science in society to science for society, with society" (Owen *et al.* 2012, p.751) and the later presented the concept of Social Impact of Science:

> "[…] we are talking about beneficial changes that will happen in the real world (beyond the world of researchers) as a result of your research. This can include 'negative impacts' such as evidence that prevents the launch of a harmful product or law. […] Impacts occur through processes of knowledge exchange [management, sharing, co-production, transfer, brokerage, transformation, mobilisation, and translation] where new ideas are developed in relationship with the people who will put those ideas into practice" (Reed 2016, p.10).

Apart from the aforementioned aims, the usage of GBL was also to encourage motivation among students by introducing more participative, social and innovative methods in class.

The GBL sessions in the course of *History and Structure of Communication,* the activity was scheduled within a month. Their objectives were to work and get an experiential comprehension of the theoretical contents of the syllabus, documentation search and graphic design. For so, students were divided into groups and were introduced to the commercial board game *Timeline* of Asmodee, which organises famous events in a chronological line (inventions, music, history…). Once played to the original game, students had to select 20 key events of the history of communication within a specific thematic area (i.e. press, radio, advertising, internet…). Groups had to design and produce their own game elements (cards) that reproduced the original game. With the new cards of all groups, students created

a new and unique game. It was used as a final stage when students put their acquired knowledge to test in a game session.

In the case of the course of *Advertising Creativity,* the objective for the usage of GBL in class was to warm up lateral thinking with two commercial board games *Dixit* of Libellud and *Días de radio* of Mont Tàber Edicions. The teaching session consisted of three parts. First, in playing to these board games in small groups. Secondly, after two games (40-45 minutes), students were required to associate the concepts of a card of *Dixit* (picture) and *Días de radio* (word) with a commercial brand. The whole group had the same assignment: to write a story for a radio advert that contained the two selected concepts and created brand identity. Finally, each team shared their commercials with the rest of the group. Students could appreciate how prolific and different their ideas, stories and narrative styles were.

In the *Legal, Social and Communicative Aspects of Biotechnology* course, the commercial board games used were *Cytosis*, *Peptide*, *Virulence* and *Covalence* edited by Genius Games. As students were in their last bachelor year (fourth year), they had advanced knowledge of biotechnology. Thus, the main objective of board games usage was not the acquisition of new knowledge in their specialities but to show an original perspective from social sciences and humanities of how to communicate, transfer and socialise science to lay people in a ludic way. The teaching sessions consisted in splitting out students into groups and play the purposed games. Once played, students had to assess the mechanics, design and motivators of the games. Finally, sessions ended with a debate about their opinions and considerations of what could be useful in socialisation, Responsible Research and Innovation and Social Impact of Science.

Table 1. Courses, commercial board games used
and teaching objectives of the three GBL interventions.

| Courses | Degrees | Board games used | Specific teaching objectives |
|---|---|---|---|
| History and Structure of Communication | BA in Journalism<br><br>BA in Advertising and Public Relations<br><br>BA in Audio-Visual Communication | Timeline | Experiential comprehension of the syllabus<br><br>Documentation search<br><br>Graphic design |
| Advertising Creativity | BA in Advertising and Public Relations | Dixit<br><br>Días de Radio | Creativity<br><br>Communicative skills |
| Legal, Social and Communicative Aspects of Biotechnology | BSc in Biotechnology<br><br>Double BSc in Computer Engineering and Biotechnology<br><br>Double BSc in Biotechnology, Biochemistry and Molecular Biology | Cytosis<br><br>Peptide<br><br>Virulence<br><br>Covalence | Socialisation of science<br><br>Awareness of Responsible Research and Innovation (RRI) and Social Impact of Science (SIS) concepts |

Source: Authors.

### b) Second Stage Process: Surveys

In order to evaluate how the introduction of these practices were perceived by students, an online survey was send to the students that had participated in the Game-Based Learning sessions. A total of 87 responses were collected.

### Profile of the Sample

Most of the participants were students of Communication Studies degrees (63.2%) and the rest belong to Biochemistry Studies (36.8%). In short, the sample is mostly represented by the students of the BA in Advertising and Public Relations (33.3%), followed by students of the BSc in Biotechnology (27.6%) and the BA in Journalism (20.7%). With less representation there are the students of the BA in Audio-Visual Communication (9.2%), Double BSc in Biotechnology, Biochemistry and Molecular Biology (6.9%) and Double BSc in Computer Engineering and Biotechnology (2.3%).

In their leisure time, participants of the survey are more used to play to board games (64.4%) rather than videogames (47.1%), but videogamers play more frequently as 25.3% of participants play to videogames at least once per week in front of 14.9% of board gamers. And, among these weekly videogamers, 6.9% play daily whereas any participant plays to board games every day. These figures help to predict that there is a predisposition of participants to be open-minded about the usage of games at higher education (see Figure 1).
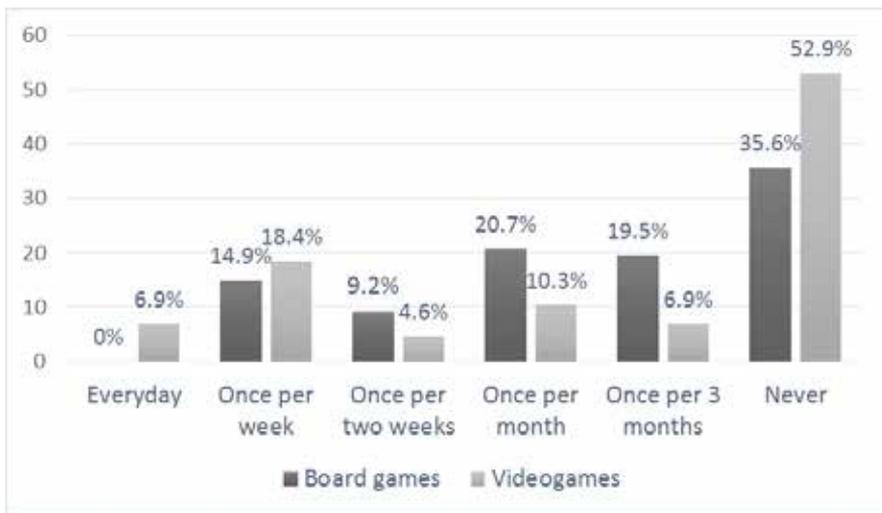


Figure 1. Gaming frequency in board games and videogames of the sample.
Source: Authors.

### Teaching Methodologies at University

When asked about what teaching methods students receive more frequently at university, students chose masterclasses (95.4%) and student oral expositions of the contents (79.3%) as the most common methods. However, these were the least preferred when asked about what teaching methods students would wish to receive at higher education (masterclasses received 10.3% and student oral expositions 9.2%). Workshops and experimentation in labs (51.7%) and Problem-Based Learning (23%) were the third and fourth most extended teaching methods at university. In these cases, they are also wished by students (47.1% workshops and experimentation and 43.7% for Problem-Based Learning).

Methodologies that were more expected at university were simulations and role playing games (67.8% of interested students) and Game-Based Learning (64.4%) but they are not fostered in current lectures (16.1% of participants found simulations and role playing in their lectures and 10.3% selected Game-Based Learning). Other methods that are not commonly used in lectures nor extensively desired among students were Flipped-Classroom, Gamification and Transversal Projects. Authors of this study deduct that these innovative methods had few support because students have poor knowledge about how they consisted in (see Figure 2).
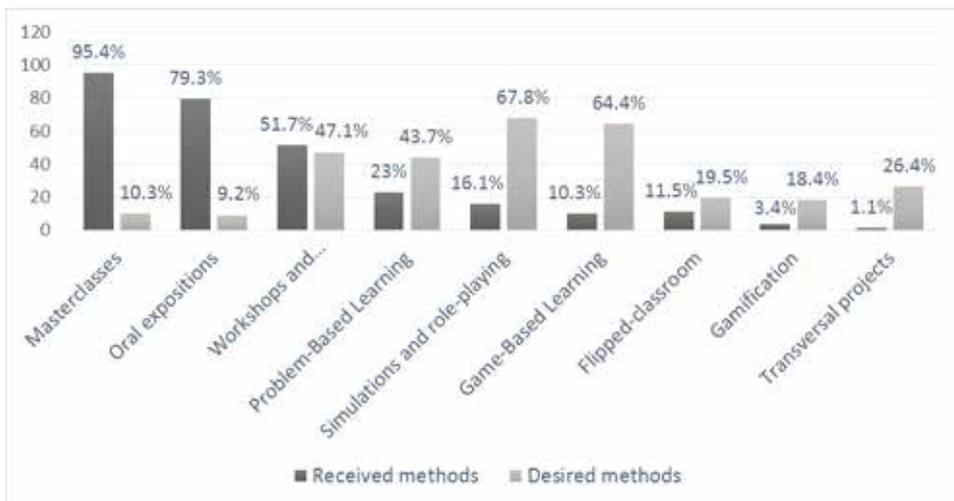


Figure 2. Comparison between received and desired teaching methods at university
Source: Authors.

### Perceptions about Games as a Teaching Method

Before asking about the GBL sessions experimented, researchers of this study wanted to check if participants had any prejudices about the usage of board games at higher education such as considering playing a childish activity or that videogames connect better with youngster motivations. Therefore, they were asked to answer their level of agreement about several assumptions.

Results clearly show that a majority of participants completely reject the assumptions that "playing is an activity reserved only for children" (87.4%) and that "playing is an unproductive activity" (77%). Less forceful, but still a majority of participants completely disagree in the assumptions that "games detract prestige to

higher education" (59.8%) and that "at university students should not play to board games" (57.5%). In fact, 55.2% of the sample is highly or completely agrees with the statement that "Game-Based Learning methods could support regular master classes" and a 29.8% of the participants feel neutral with the statement.

About the presumption that youngsters prefer videogames in front of board games, results of this study show the contrary. There is a timid preference for analogic games rather than digital ones as 41.4% of participants highly or completely agree with the assumption that "Game-Based Learning should use board games" whereas 34.5% of those polled highly or completely agree with the statement that "Game-Based Learning should use videogames".

### *Perceived Benefits of GBL Sessions with Board Games*

In the survey, 89.7% of students declared that they found motivated when the professor proposed the activity with board games, only 5.7% of those polled were not motivated. The rest 4.6% did not response it.

This question was accompanied with a qualitative one about why students considered that the activities with board games motivated them or not. They discourses emerged 9 different categories. Some of the quotes could be classified in more than one theme. In here, categories are ordered according its popularity:

1. **Active and new methodology**. *Game-Based Learning is a dynamic, different and not very extended methodology (mentioned by 34.2% of participants).*
"It is a different methodology in which you can actively participate during all the time without switching off" (participant 2, BA in Journalism).
"It has motivated me because it has helped me to learn in a dynamic, different and entertaining way" (participant 31, BA in Journalism).
"It is a new way of teaching that I have never experienced before" (participant 56, BSc in Biotechnology).

2. **Funny methodology**. *Game-Based Learning allows student to learn while having fun (mentioned by 26.3% of participants).*
*"It motivates for several things: mainly to win, then you have fun with classmates and you can learn concepts without being stuck on a book and without the pressure of having an exam"* (participant 46, BSc in Biotechnology).

*"The activity motivate me because you have a lovely time, you laugh… and you learn and contents are better engraved in the memory"* (participant 87, BA in Advertising and Public Relations).

3.  **Out of the routine methodology**. *Game-Based Learning helps to escape from the regular monotonous lectures (mentioned by 15.8% of participants).*
    *"It was something different from the routine and interactive way to learn. It was entertaining"* (participant 43, Double BSc in Computer Engineering and Biotechnology).
    *"The activity has been different to all the lectures I am used to and it was fun. I am sure that if there were introduced more board games and other alternative and active methodologies related with the syllabus, lectures would be more bearable and productive"* (participant 62, BSc in Biotechnology).

4.  **Support methodology**. *Board games may help to understand contents of the course (mentioned by 13.1% of participants).*
    *"It is a different way to learn where you put in practice several concepts that could not be understood with just a magister class"* (participant 1, BA in Advertising and Public Relations).
    *"It is a different way of learning that suits to people that find difficult to study"* (participant 69, BA in Journalism).

5.  **Sociability.** *Games help me to mix with classmates (mentioned by 10.5% of participants).*
    *"To me motivation comes when there is no pressure to do your best, and you have fun and you can relate with other people in an unusual way"* (participant 58, BSc in Biotechnology).
    *"It has been dynamic and fun to play with classmates. What is more, you talk with people that you have never done it before"* (participant 72, BA in Journalism).

6.  **Identification and design.** *Possibility to custom and personalise the game to feel it as its own (mentioned by 6.5% of participants).*
    *"Because the cards of the game were very personal and you try your best in its design"* (participant 6, BA in Advertising and Public Relations).

*"Because designing the cards we learned a lot and when we had them printed we felt totally fulfilled because they were very similar to the original game"* (participant 41, BA in Advertising and Public Relations).

7. **New perspectives.** *Games open up new ways of thinking and perspectives (mentioned by 6.5% of participants).*
   *"It has been a different way to explore communicative and creative aspects"* (participant 12, BA in Advertising and Public Relations).
   *"Games stimulate the brain, they are a good way of learning"* (participant 7, BA in Advertising and Public Relations).

8. **Setting challenges.** *Having objectives as mechanics for playing motivates to learn more (mentioned by 5.2% of participants).*
   *"Because you are more eager to learn, and thus, win"* (participant 9, BA in Audio-Visual Communication).
   *"When you have a goal, you try harder, and it is more entertaining"* (participant 27, BA in Audio-Visual Communication).
   *"I am a competitive person. Therefore, I concentrate and motivate myself to win. This favours my learning (since I pay more attention)"* (participant 85, BA in Journalism).

9. **Waste of time.** *Playing with board games at university is a waste of time (mentioned by 5.2% of participants).*
   *"The activity did not motivate me, I think we did not learn anything, it was a waste of time"* (participant 45, BSc in Biotechnology).
   *"The activity took me time that I had to invest in the projects of other subjects"* (participant 49, Double BSc in Computer Engineering and Biotechnology).

Finally, students were asked about what skills they had worked during the GBL sessions (see Figure 3). In here, the majority of participants considered that teamwork (80.5%) and communicative skills (78.2%) were enhanced. With less force, but also a majority opine that creativity (67.8%), problem resolution (64.4%), decision making (64.4%) and social skills (62.1%). Only one participant answered that any skill was enhanced. This participant also answered that he was not motivated at all by the GBL sessions.
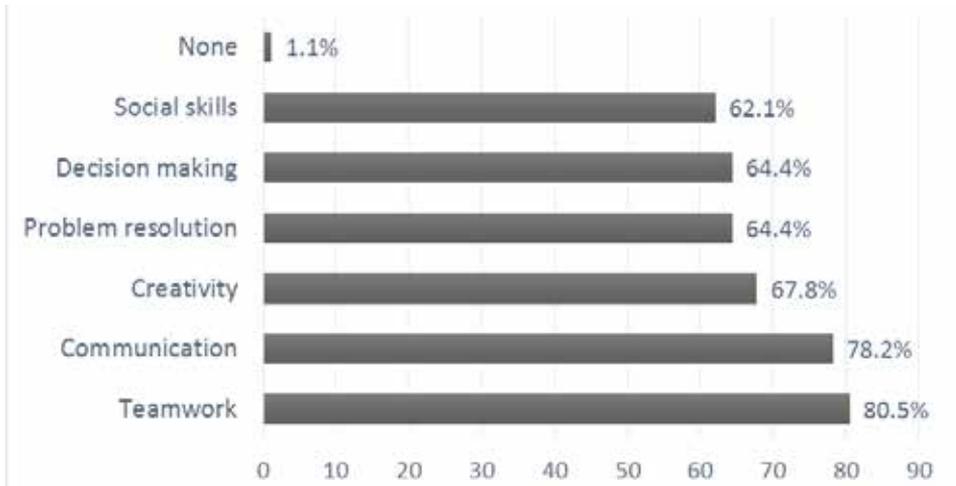
Figure 3. Perceived skills worked during the GBL sessions
Source: Authors.

## Conclusions

Results of the survey prove that students of the analysed Game-Based Learning interventions share a positive perspective on the usage of this teaching methodology. Answers reveal that the sessions generated high perception levels of engagement and motivation.

On one hand, participants appreciated the usage of active and dynamic learning techniques, which were different to the usual ones, but always as supporting sessions of traditional lectures. In this sense, the question remains to what extent novelty and breaking with routine really captivate the perception of students. On the other hand, participants admitted that playful aspects such as entertainment, socialisation, competitiveness and the setting of challenges influenced their involvement in the activity. Students identified elements and mechanics of the game as main driving forces of engagement. Hence, it seems that the application of noneducational games with high playful components that were strategically selected to fulfil the desired educational objectives influences in the effectiveness of the activity.

One of the most interesting results of this study is that over a quarter of the students are conscious that GBL sessions allowed them to learn while having fun.

Furthermore, a large majority do not have prejudices when introducing games in higher education classrooms, as they do not understand playing as an unproductive or childish activity.

In relation to skills, students also valued very positively some abilities linked to the characteristics of the games (problem resolution or decision making).

Nevertheless, we must take into account that a minority group did not feel motivated by the chosen teaching methodology, even completely rejected it. It is necessary to bear in mind that Game-Based Learning needs complementary tools to include and encourage all participants in their learning processes. It would be recommendable to discover why they were not attracted to the teaching practice. Maybe they did not like the proposed games or do not understand GBL practice at university or maybe there were external reasons for this analysis.

After this research, several issues remain to be studied in depth. For example, the results show that a significant number of participants had previous knowledge about games or were usual players either to board or videogames. Consequently, it still needs to be evaluated to what extent game culture familiarity is an element that facilitates engagement, motivation and, finally, learning.

In this study, students recognised that skills like teamwork or communication were worked through the usage of those games; but it remains to be assessed the learning of theoretical contents and other sorts of skills. It would be interesting that later studies could analyse the real influence of applying contemporary non-educational games in higher education at a long-term period.

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# HeriTeller 3D, a New Persistent Virtual-World Platform for Cultural Heritage Interpretation and Dissemination

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CH (Cultural Heritage) virtual reconstruction is a way to rebuild artefacts, structures and historical/archaeological environments in a digital form. In recent years there has been an escalation of visualization projects, mostly installed in museums and cultural centers, using this medium.

However cultural learning in virtual environment is probably the most difficult challenge. The pedagogical aspect of CH digital environments is in fact much more complex than beautiful virtual representation. Other unresolved logistic problems, such as initial costs, maintenance and technological outdating issues also remains when developing 3D contents for CH. For these reasons CH visualization, are often not sustainable (an aspect that is usually required for policies advocated by several guidelines such as the Londoncharter and the Seville Principles.

To solve most of these problems in academic or private initiatives, rather than creating closed applications or un-editable rendered images, it would be advisable to create one consistent environment. This could become always accessible by the interpreters for content creation and modification and, at the same time, always accessible by the public for the final optimal fruition. Unfortunately, this is not the case of many academic projects that never see the light or quickly disappear from the public domain so that their evidence only remains in academic papers.

Here we present a work-in-progress platform that seeks to optimize the process of interpreting CH (Cultural Heritage) contents using sounds, images and text annotation directly into a multiplayer persistent 3D virtual world. The aim is to empower historians, archaeologist, curators and academic interpreters, with a new easy-to-use virtual storytelling environment. All the requirements are discussed with the main users (the interpreters) to tailor the platform around their needs. An interactive 3D environment, which is automatically derived from the working platform, once its interface is hidden, will enable to propose to the final users (the public) an emotional and educative experience. The platform tries to incorporate three important features necessary to fulfil some important requirements for Digital Heritage visualization projects such as: being sustainable, upgradable and easy accessible. Several other features are also included such as the possibility to fully change the weather condition and the time of the day. Our aim focuses on maintaining a persistent virtual world, usable for any CH 3D visualization project, but especially on the implementation of a working platform that facilitate CH contents creation and interpretations. This is to propose the engagement of the public at an emotional and cognitive level

with the chosen material. Therefore, this platform serves as a bridge between the scientific/historical/ archaeological research outcomes and the final digital visualization for the public. Although the gamification aspect has yet to be explored we intend to propose a solution where it would be possible to insert updatable mini-games within the final model. This will permit the final user not only to freely explore the whole environment but also to concentrate in learning throughout playing within the proposed model.

**Keywords:** Virtual-Worlds; Cultural Heritage; Mini-Games; Virtual Learning Environment.
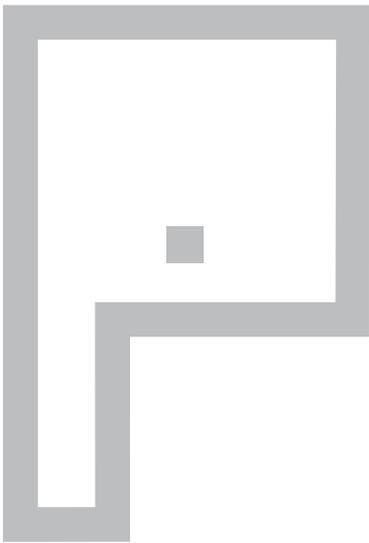
# Parallel Sessions 1

Gamification Across
the Curriculum

PLAY

LEARN

# "You and the Media":
# Play and Code to Learn

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### ABSTRACT

A School, as a space for developing skills and creating knowledge, should seek to be attentive to the world around it.

The "Student's Profile at the end of Compulsory Schooling", published by the Directorate-General for Education (Portuguese Ministry of Education) in 2017, assumes itself as an educational reference document providing an image of what is considered to be the student and citizen of the 21st century; it refers to the need to promote student's skills in the areas of Information and Communication, Reasoning and Problem Solving, and Critical and Creative Thinking.

Technology-mediated learning enables students not only to use the tools of their time (access to the Internet, computers, mobile devices, etc.) but also in doing so, developing their digital literacy, ie the efficient use of media around them; and do so with increasing critical thinking.

Given that the treatment of citizenship issues implies the treatment of diverse topics that are transversal to society, their insertion in the curriculum requires a transversal approach both in the disciplinary areas involved, as well as in activities and projects. In the project that will be described in this article two needs will be presented: that of educating the digital citizen and of accomplishing knowledge integration with interdisciplinary work.

According to the "Media Education Guidance" document, media are not only content and technologies that transmit it, but also the understanding that media implies looking beyond the physical media (screens or other) by analyzing their impact on the lives of people and communities, something that only very practical activities can provide. Among the areas that the Guidance privileges, it proposes the progressive treatment of several themes. For this work, topic 4 "ICTs and screens" was selected because it is pertinent to lead students to a meta-analysis of the uses they make of the media they have at their disposal, that is, what the media are and what are they used for, how to learn through media, what to learn, healthy behaviors when using media, will be knowledge that students are expected to master after using the game.

The game "You and the Media" consists of a playful and pedagogical videogame to work, in a first moment, the content already mentioned and, in a second moment, to be reused, using "remix" option in the context of work in various subjects (Portuguese language and Mathematics). It is developed within a interdisciplinary articulation assumption using project based learning methodology.

The game presents a narrative that includes a situation where the main character explores a maze; as you walk through the labyrinth, the character encounters obstacles; finding each obstacle reveals a prompt with a question about the chosen subject. After answering the questions, in the first level, students are invited to build other levels of play adapting the game itself to fit learning purposes and allowing students to reflect about a series of behaviors, attitudes and experiences with media.

## Introduction

21st century School is, more than ever, the place for the development of skills and creation of knowledge. But first, it must be an organism attentive to the world that surrounds it and that uses the tools of its time. An official document issued by the Portuguese Ministry of Education, "Students Profile at the end of Compulsory Schooling", provides an image of what is considered to be the student and the citizen of the 21st century. Among other specifications, this Profile refers to the need to promote in student's competences in the areas of information and communication, problem solving and critical/creative thinking

Technology-mediated learning allows students not only to use the tools of their time (Internet access, computer, mobile devices) but also to develop digital literacy, providing a more efficient use of the media around them; and do so with increasing critical thinking. It is therefore important to develop media literacy among students of all ages.

The various dimensions of Education for Citizenship are nowadays being addressed in many schools, either with the help of cross-curricular projects, or through specific curricular offerings or even projects that are implemented in schools according to their needs. Given that the treatment of citizenship issues implies the treatment of diverse topics that are transversal to society, their insertion in the curriculum requires a transversal approach both in the disciplinary areas and disciplines involved, as well as in activities and projects.

In Portugal, in 2017, the Ministry of Education launched the Curriculum Flexibility and Autonomy Project, providing the two hundred enrolled schools the opportunity to present and revitalize curricular flexibility projects in which interdisciplinary work and citizenship education must assume a central role.

In school context, in particular with regard to Education for Citizenship, Media Education can be an added value because of the multiplicity of themes it can

cover and also because it allows the use of strategies and tools that are somehow familiar to young people.

In this paper, we intend to pay special attention to the use of digital media tools that draw so many students attention and to which educational action cannot remain indifferent. On the other hand, the learning of digital language formats is becoming a new requirement to life in modern society. According to the "Media Education Guidance", published by the Directorate-General for Education in 2014, "learning [to understand digital tools] is necessary not only for the formation of critical, enlightened and reflective citizens, but also for the demands of everyday life, in terms of health, work, finances or relationships with public services "(Pereira, Pinto, Madureira, Pombo & Guedes, 2014).

Media Education aims to encourage students to use and decipher the means of communication, namely access and use of information and communication technologies, seeking the adoption of appropriate behaviors and attitudes towards a critical and safe use of the Internet and social networks. The implementation of Media Education will give children and young people the ability to appropriate instruments that will enable them to use the potential of the media, as well as the dangers through which they can be exposed (Pereira et al., 2014). Educating for media use presupposes promoting the ability to understand (read critically if we prefer) - the media and the social and cultural processes through which images and representations of the world in which we live are presented, using different languages. As a privileged means we have, of course, the press, music, photography, comics, radio, television, advertising, cinema, video, videogames, in both analog and digital formats, but also for digital platforms and networks, for mobile devices and other forms of message circulation and dissemination.

According to the benchmark proposed by the Ministry of Education, media not only respect the content and technologies that allow their transmission but also the understanding that media imply looking beyond the physical media (screens or other) seeing, on the one hand , professionals, organizations, logics and editorial strategies, laws and, on the other, users and consumers, what they do with the media and what is their impact on the lives of people and communities, something that only very practical activities can provide.

Among the areas that the "Media Education Guidance" privileges, it's proposed the progressive treatment of areas such as some of the following: 1. Communicate and inform; 2. Understand the present world; 3. Types of media; 4. ICT and screens; 5. Digital networks; 9. The media as social construction and 12. We and the media. Each of these encompasses sub-themes and objectives. For each area, from pre-school to secondary education, several performance descriptors are presented integrating a set of knowledge, skills, attitudes / values and behaviors necessary to achieve the intended learning.

For this work, topic 4 "ICTs and screens" was selected; we considered pertinent to lead the students to a meta-analysis of the daily uses they make of media they have at their disposal, that is, what we need to learn, healthy behaviors about media use, what media are and what they serve, how to learn through the media, will be knowledge that students are expected to master after using a game and after making themselves the remix of the game to work on small segments of disciplinary areas like Portuguese language and Mathematics.

In the scope of the different areas of education and teaching, the operationalization of this proposal also integrates the work of / with the school library, extending the time and place of learning outside the classroom and inducing new pedagogical practices. School libraries are a fundamental support for access to the world of information and teaching literacy, stimulating research, creating original works, respect for copyright, intellectual freedom and ethical and responsible use of information and average. We can say that, in this field, school libraries have a greater responsibility in their contribution to the development of skills that foster new ways of learning, interacting and communicating through the media.

One other official document, this one published within the Portuguese Ministry of Education, by the School Libraries Network, "Learning with the School Library", also dedicates some attention and concern to media literacy. It has as main objective to contribute for the critical analysis and understanding of the nature of the different media and products, communication techniques and messages used by them, as well as of their impact on individuals and society, providing students with critical and informed use as consumers and media producers. The activity proposed and explored here constitutes a strategy for the operationalization of this framework.

What are, after all, the assumptions of the work that fits this article? Digital citizenship is a transversal area that must be worked in a school context; the library is a privileged space of curricular articulation; digital media, in particular gaming tools, represent numerous educational assets; the use of gaming elements and techniques in educational activities can represent significant gains in terms of motivation for learning; guided by teachers, students can become content producers, through the media and the exploration of computational environments, builders of their own knowledge; collaborative work between teachers and students contributes to the professional development of teachers and to the realization of effective learning.

## Context, Purpose and Public of the Resource

The game "You and the Media", for students aged 10-12, consists of a narrative that includes a situation of exploring a maze. As the player walk through the labyrinth, the character encounters obstacles which returns a prompt with a question about the chosen subject to teach from the "Media Education Guidance" document, "ICTs and screens".

This work project consists of a simple playful and pedagogical video game (using programming language Scratch) to work, at first, a content of Media Education and, secondly, to be reused, through the option "remix" in the context of the disciplinary work, based on a game-project designed to teach the scratch language and to promote students reflection on habits and uses of the media. It results on a project thought by the Classroom Council (Portuguese, Math and ICT teachers) in articulation with the teacher who runs the school library. The game was design obeying the specific objectives of game construction and the subject which starts the game is topic 4, from the "Media Education Guidance" document, "ICTs and screens". By choosing this subject, teachers intended their students to learn and understand the different uses of ICT in different contexts and for different purposes, and the potential of ICT to research and learn.

It is expected that this project could be developed over three months, six 45 minutes lessons, distributed as follows:

- A Citizenship lesson, to take place in the school library, for project presentation and exploration of the game;
- A Portuguese language lesson in order to allow students to create a continuity narrative from the game they've already explored, and their oral reading for correction and improvement;
- A Maths less for exploring concepts of negative numbers and Cartesian referential, simplified approach to Boolean and variable concepts;
- Three ICT lessons for exploration of the game code, improvement of the narrative created in Portuguese and consolidation, in context, of the mathematical concepts approached in the Mathematics class, and for programming the next level(s) of the game.

Several games served as inspiration and example for the production of this work, namely those found in the galleries linked to the EduScratch project and available from http://eduscratch.dge.mec.pt/

## Media, Curriculum and School Libraries

According to the Program and Curricular Targets for Portuguese, Mathematics and Information and Communications Technologies (ICT), the reference document for Education for Citizenship *Media Education Guidance* and the document from School Libraries Network (SLN) *Learning with the School Library* are thereafter listed the associated learning which is expected for each of these curricular areas.

### *Citizenship/Education for the Media:*

- Discover and start getting used to a digital environment;
- Get to know the conventional means of information and communication;
- Be sensitive to the risks that may arise from the Internet;
- Be aware of the screen user requirements;
- Identify and understand the opportunities, risks and potentialities of the Internet usages;
- Determine the different ways of the impact of the technologies, in their lives, their friends', the families' and of the society in general;
- Share and reflect on the ways of being online and the use of digital means: websites and most visited and favourite videogames.

***School Library:***

The Guidance is structured in three areas – A. Literacy in reading; B. Media literacy; C. Information literacy; where learning is structured, considering knowledge/skills, capacity and attitudes/values.

(Reading Literacy area)

- To show curiosity
- To show interest and pleasure for reading.
- To take part in the exchange and the debate of ideas
- To manifest critical spirit.
- To respect different opinions.

(Media Literacy area)

- To be conscious of the role of the media and its social impacts (positive and negative) according to the way they are used.
- To use the media and the environments online so as to use messages, interact and communicate with a definite intent.
- To apply basic procedures of safety associated to the use of the media and online communication (protection of personal data and privacy).
- To use the school library in order to achieve a greater dominium in the use of the media, digital tools and the possibilities given by the new social environments of learning.
- To reveal creativity in the use of the media.
- To act in a civic way and committed within the media content where they are participating.

(Information Literacy area)

- To identify main ideas, infer and elaborate conclusions on the information selected.
- To work collaboratively with their partners, presenting and defending their points of view.
- To comply with associated standards of copyright.
- To share learnings performed in a traditional environment or uses, with some autonomy, online environments suggested by the teacher for that effect.

- To assess the research process and product, reflecting on improvements to introduce.
- To use the school library, in an orientated way or with some autonomy, in order to use the information.
- To respect copyright and corresponding
- To demonstrate initiative and creativity in problem solving.

### Portuguese:

(In the Literary Education area, Context: Narrative text: characters – main and secondary – narrator, temporal and spatial contexts, action, relationships between characters and literary Genre events: tale)

- To use procedures to record and retain information.

1. To fill in recording grids.

2. To take notes

3. To ask for information or complementary explanations.

- To plan the writing of texts.

1. To record ideas related to the theme, directing them and articulating them appropriately.

- To write narrative texts.

1. To write small texts, integrating the elements who, when, where, what, how, why and respecting a sequence that contemplates: present the scenery (time and place) and characters; occurrence triggering the plot; action); conclusion; emotions or feelings caused by the narrative outcome.

- To review written texts

1. To check if the text respects the proposed theme.

2. To check if the text obeys with the category or indicated genre.

3. To check if the text contains ideas foreseen in the planning. (….)

7. To check the linguistic correction.

- To read and interpret literary texts.

1. To read and listen to literature texts for children and youths, of popular tradition, and classic adaptations. (…)

8. To realize the paths used in the constructions of the literary texts (figurative language; expressive resources – onomatopoeia, enumeration, personification, comparison) and justifying its usage.

9. To distinguish, from data criteria, the following genre: tale

### *Mathematics:*

In the program of Mathematics its three main purposes are highlighted; of these, we will address especially two, purposes 1 and 3:

1. The structuring of thought - The apprehension and hierarchy of mathematical concepts, the systematic study of their properties, and the clear and precise argumentation proper to this discipline play a primordial role in the organization of thought, constituting itself as a basic grammar of reasoning hypothetical-deductive. The work of this grammar contributes to the ability to produce objective, coherent and communicable analyzes. It also contributes to improving the ability to argue, to adequately justify a given position, and to detect false fallacies and reasoning in general.

3. The Interpretation of Society - Although the applicability of mathematics to students' daily lives is largely concentrated in simple uses of the four operations, proportionality, and sporadically in the calculation of some measures of magnitude (length, area, volume, capacity, …) associated in general with elementary geometric figures, the mathematical method is an instrument of choice for the analysis and understanding of the functioning of society. It is indispensable for the study of several areas of human activity, such as the mechanisms of the global economy or demographic evolution, electoral systems that govern Democracy, or even campaigns for the sale and promotion of consumer products. The teaching of Mathematics thus contributes to the exercise of a full, informed and responsible citizenship.

For the construction of the game, and in addition to all the advantages that we consider transversal to the whole teaching of mathematics, due to the opportunities it

creates in the development of problem solving strategies, we consider that for its graphical questions this can also be very important in learning related to Cartesian graphs. Cartesian graphs are presented in the following domains of fifth grade.

### Organization and processing of data - Cartesian graphics

1. To construct Cartesian Charts

1. To identify a 'Cartesian referential' as a pair of non-coincident numerical lines intersecting their respective origins, one of which is fixed as 'abscissa axis' and the other as 'ordinate axis' (the 'coordinate axes'), to designate the Cartesian referential as 'orthogonal' when the axes are perpendicular and 'monometric' when the unit length is the same for both axes.

2. To identify, given a plan with a Cartesian reference, the "abscissa" (respectively "ordinate") of a point in the plane as the number represented by the intersection with the axis of the abscissa (respectively ordered) of the line parallel to the axis of the ordinates (respectively abscissas) that goes by and designate the abscissa and the ordinate by "coordinates" of.

3. To construct, in a plan with an orthogonal Cartesian reference, the "Cartesian graph" referring to two sets of numbers such that the whole element of the first is associated with a single element of the second, representing in that plane the points whose abscissa are equal to the values of first set and the ordinates respectively equal to the values associated to the abscissa in the second set.

We also emphasize the importance, already mentioned, of problem solving. Thus,

> "on the whole, and in an integrated way, these performances must compete, from the most elementary level of schooling, for the acquisition of knowledge of facts and procedures, for the construction and development of mathematical reasoning, for communication (oral and written) appropriate to Mathematics, to solve problems in various contexts and to a view of Mathematics as an articulated and coherent whole" (Portugal. Ministério da Educação. Direção-Geral da Educação. Programas e Metas curriculares).

*Information and Communication Technologies (ICT):*

In the Portuguese curriculum, Information and Communication Technologies discipline (ICT) intents "to promote the development of knowledge and skills in the use of information and communication technologies that allow widespread digital literacy (...). Students should be encouraged to critically analyze the role and power of information and communication technologies and to develop in them the ability to research, process, produce and communicate information through technologies, alongside research capacity in traditional formats (books, magazines, encyclopedias, newspapers and other information media) (...) and to advance to the domain of the development of the students' analytical capacities, through the exploration of computational environments appropriate to their age "(Horta, Mendonça and Nascimento, 2012)

ICT will be extended from the 5th to the 9th grades as of the 2018/2019 school year. Given that the essential learning for the future discipline is not yet in the public domain, we take as reference the curricular goals previewed for the 7th and 8th grades. It is true that by reading the official curricular documents, it is clear that the areas of computational thinking and programming will be included throughout all the years with a deepening progressive level.

To create an original product in a collaborative way with a defined theme, using tools and computer environments appropriate to the age and stage of cognitive development of students, installed locally or available on the Internet, one must somehow develop a computational way of thinking, centered on the description and problem solving and in the logical organization of ideas. Therefore, in that area. the aims are:

1. To identify a problem to solve or design a project developing interdisciplinary perspectives and contributing to the application of knowledge and computational thinking in other disciplinary areas (languages, sciences, history, mathematics, etc.);

2. To analyze the problem and break it down into parts;

3. To explore structural components of programming (variables, decision and repetition structures, or others that respond to project needs) available in the programming environment;

4. To implement a logical sequence of problem solving, based on the fundamentals associated with programming logic and using structural components of programming;

5. To integrate content (text, image, sound and video) based on the objectives established in the project, stimulating the creativity of students in the creation of products (games, animations, interactive stories, simulations, etc.);

6. To respect the copyright and intellectual property of the information used;

7. To analyze and reflect on the solution found and its applicability and, if necessary, reformulate the logical sequence of solving the problem in a collaborative way;

8. To share the product produced on the Internet.

**Structure and Narrative of the Game**

The game "You and the Media" occurs in the context of a narrative, consisting of a maze with two levels, each level includes 3 obstacles, and each corresponds to a question.

The initial character of the game is Giga (you can find a walking version of this scratch character by clicking in https://test.scratch-wiki.info/w/images/thumb/d/db/Giga_Walking.gif/90px-Giga_Walking.gif

Figure 1. A game character

The game starts by students clicking on the green flag on the screen. The story takes place: on the first day of school, for the first time alone in a huge one, Giga is lost ... Shall we help Giga to find the first classroom? This is the main question presented to students to introduce the game.

The narrative continues. Students visualize Giga entering the polyvalent space and finding a wallpaper. From this first event, the story takes place during the exploration.

*First Level:*

Question 1 - This is the school wall newspaper and is it important for Giga to get to know it because ...?

- for get to knowing the activities related to the school: 2 points
- to know which the last movie premiere in the cinema is: 0 points (message: the school wall newspaper addresses activities related to school and the community).

Question 2 - Here Giga can read an interesting news about the reception to the students, who will have written it?

- a journalist: 2 points
- the photographer: 0 points (message: photographic reporters shoot photos about ongoing events)

Question 3 - What kind of Media does that photo have?

- static (image, text): 2 points
- dynamic (audio, video and animation): 0 points

Question 4 - Giga read a story about an activity on the computers of the school library, and she was thinking "can I go to Facebook there?". Can she?

- yes: 1 point (message - Facebook usage is only allowed from 13 years onwards)
- no: 2 points

*Second Level*

This level is not contemplated in the scratch version presented in which, at the end of a first level, the students are challenged of being the ones who build the next level, based on the issues presented in the context of the Education for the Media, in Portuguese or Math classes, or in another subject of the curriculum.

Other question possibilities: Giga is tired. The day before, she was very enthusiastic about school start and she was chatting in WhatsApp with Nano. When she logged off it was already passed midnight. Was she right? Yes - two points;

No - zero points (message: you should try to sleep the right number of hours of sleep regarding your age; electronic devices should be off by 6 PM. Giga is doing a school task and sends it to the teacher by email. Pico wants to use Giga's email and asks for her password; what should Giga do? Give the password - zero points (message: only you and an adult you trust should know your password); not giving the password - two points.

## Game Play and Storyboard

When starting the game, the user is faced with a narrative that contextualizes him in the game situation that will be challenged. Once the narrative is finished, the player must go through a maze, along which he encounters some obstacles. At each stop, to overcome the obstacle, a question is presented which the student must answer in order to be able to continue until the end of the maze. As he answers the questions, the student reflects on some usage of media essential to a healthy use of the media. The mechanics of the game are accessible to students so that they can then retrieve it for other purposes to learn other content.

The narrative is divided in two parts: a first one, more contextualized, in which students are introduced to the character who arrives at a new school, and a second one in which the adventure is entrapped by the labyrinth.



Figure 2. Initial screens
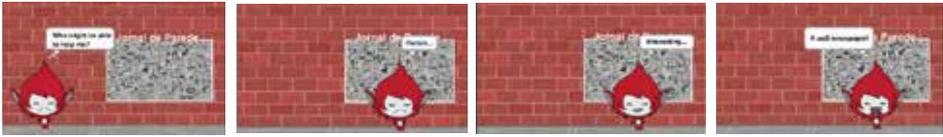
Figure 3. Narratives' first moment



Figure 4. Labyrinth with example of question
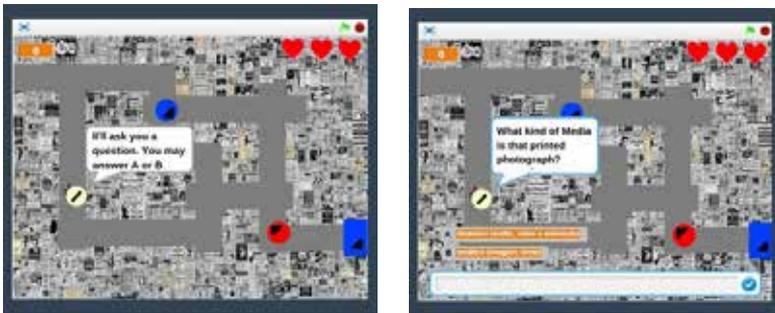


Figure 5. Obstacle prompting a game question



Figure 6. Moment the player wins points

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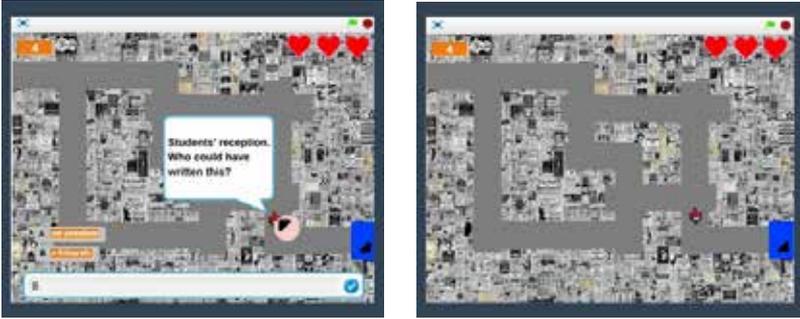
Figure 7. Moment the player loses points
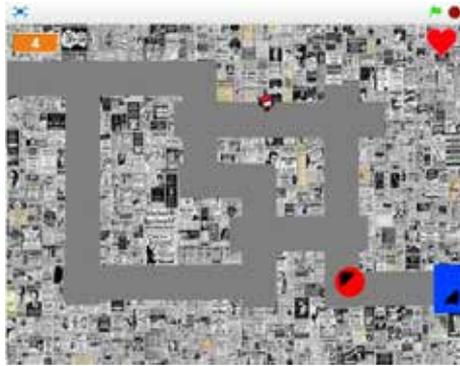


Figure 8. Moment the player loses lives
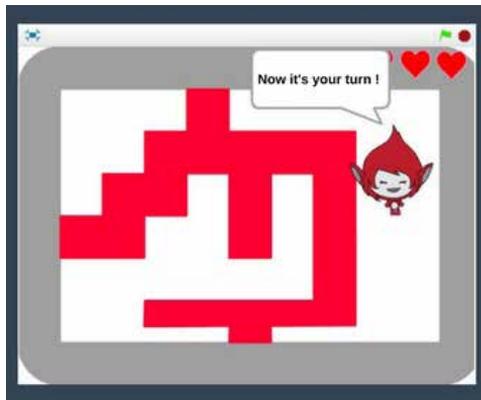


Figure 9. End of the game

The following diagram explains the different frameworks of the game and respective sequence.
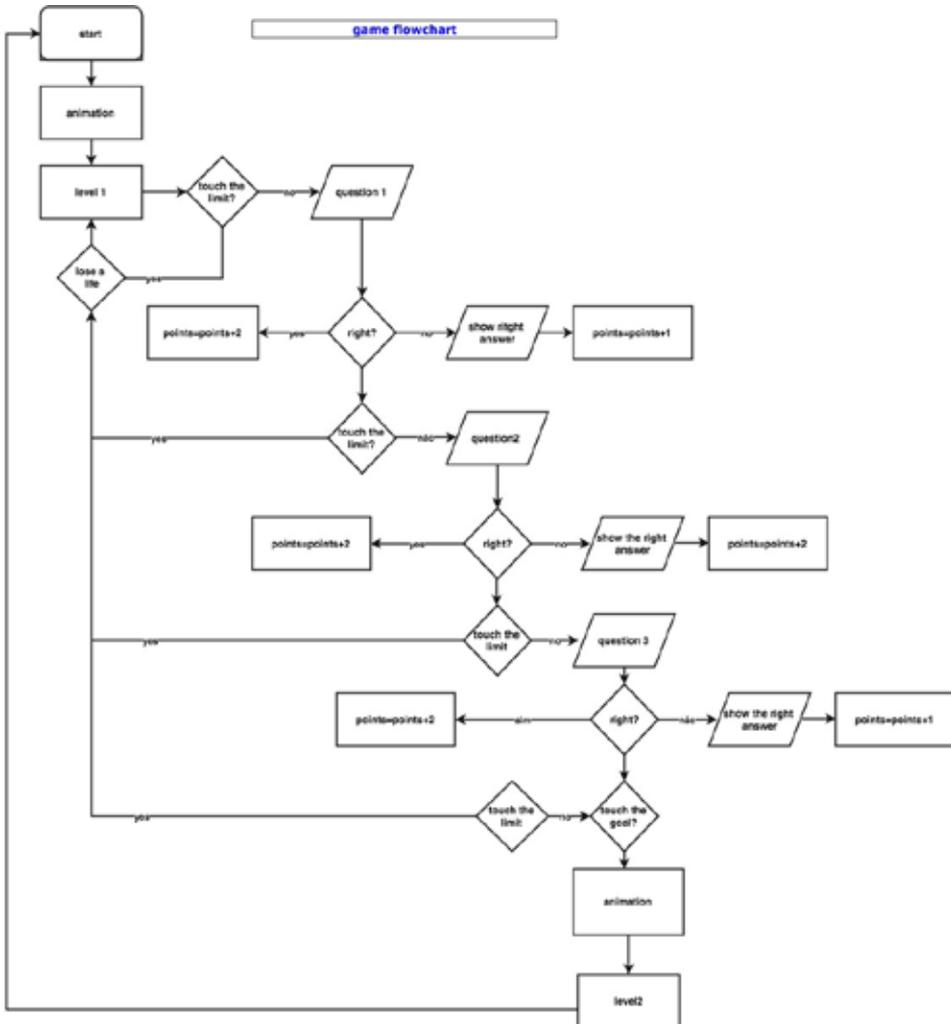
Figure 10. Game design flowchart

The main resources used to build the game and to be used with students in classes are Scratch (https://scratch.mit.edu/) and ColorADD® (http://www.coloradd.net/ )

"You and the Media" it is intended to be an inclusive game so that the objects to be introduced will respect the Color Identification System for Daltons developed by ColorADD®, in the form of objects that, during the game, will be presented to the characters. ColorADD® is a monochrome graphic code created by the Portuguese designer Miguel Neiva that received, among other things, the Gold Medal commemorating the 50th anniversary of the Universal Declaration of Human Rights awarded by the Portuguese Parliament. The system is based on universal concepts of color interpretation and unfolding that facilitates the identification of color for the color-blind, thus contributing strongly to the full integration of a color-blind public. Color blindness is a disturbance of visual perception characterized by the inability to differentiate all or some colors, which affects 10% of the world's male population, and about 350 million individuals. Based on the three primary colors, represented by graphic symbols, the ColorADD® code is based on a process of logical association that allows the color-blind, through the concept of adding colors, to relate symbols and easily identify the entire color palette. White and Black appear to guide the colors to the light and dark tones. From this option is assumed a simple graphics and with some sound effects, which is familiar to the student, but different in its way of communicating ideas and with intentionality in the discourse.



Figure 11. ColorAdd schemes

## Using and Assessing the Game

The game "You and the media" was conceived to be presented to classes of 5th/6th grades within a media literacy project promoting collaboration between teachers and students. The first and second sessions should occur at a school library

which usually, in Portugal, have available a group of computers for students to use. The teachers (Portuguese, ICT or Math teacher and the school librarian) invite the students first to play the game and, after, to understand its mechanism. This activity will take up two classes of 45 minutes each. The students will be invited to use and adapt the game mechanism to the subject they're working on, building questionnaires and then remixing the game.

In an intermediate stage and at the end of the project, students will perform formative assessments according the following performance descriptors: interest and commitment when accomplishing activity tasks, collaboration, presented works quality.

It will also be both necessary and valuable to appreciate the impact of this work; this will be accomplished by an analysis of the student's commentaries on each other's projects, the number of views of each game in Scratch platform, the number of likes, times a game is chosen as favorite and games remixes.

The work development of this collaborative project, between teachers and students, will use a collaborative platform for e-learning (for example, Moodle, Sapo Campus, etc.). Collaboration between teachers will take place in a space created for this purpose; collaboration between groups of students as well.

The game will be presented to the students and then, from their exploration, students will be called to participate in writing, registering their views on the game; the quality of student interventions will be assessed through a rubric; students with higher quality entries will be offered to receive badges. Students will collaborate in assigning the badges to each other (gamification).

When researching for this game, several games were used as inspiration and example for the production of this work, namely those found in the galleries linked to the EduScratch project and available from http://eduscratch.dge.mec.pt/

You can reach the playable version of the game "You and the Media" by clicking in the link  https://scratch.mit.edu/projects/187504813/

Figure 12. Game's first screen

## Conclusion

The analysis provided by this research provided the authors with some facts: schools, teachers and students, in the innovative school environment of the 21st century schools, can beneficiate from collaborative work giving students the center role in their learning process. Critical thinking and collaborative problem solving are competencies that must developed in a parallel process within core competencies such as reading and arithmetics. Schools must now forget to educate the digital citizen so media literacy issues should be also discussed by students. programming activities using tools such as Scratch offer various possibilities. Video, gamification and game play should be used to provide new approaches to teaching and learning, benefiting from students' motivation and personal interests. Remixing the media is an approach that should be used to address both curricular and media education among school projects benefiting from collaboration.

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# A Journey to the Future: the Conception Paths of a Gamified Strategy for the Vocacional Education of SENAI DR-BA

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**ABSTRACT**

The most traditional paths of professional education have been put in check with social changes and the development of information technologies. On the one hand, technologies have transformed the form of knowledge construction of the last generations, beyond that, there is a tendency in the labor market to value people who have developed reflection skills and are more apt to make decisions. Gamification is presented as a possible educational strategy to offer solutions to the stated problem. This paper presents the research results in the context of the pre-production of a development project of a gamification strategy for technical education. For this purpose we did documentary research techniques, bibliographic research, analysis of similar; and research techniques focused on game development (using the user-centered approach), using the iteration process (design, prototyping and evaluation), having interviews as survey instruments and questionnaires and focus groups as instruments for the evaluation of the first prototypes. As a result of this research, we analyze the profile of the public to be attended, we described the system requirements and propose a conception solution that's accord to the specific needs of the technical education students of the institution in which the strategy will be used. The gamified solution was conceived as a journey to the future that students aspire to their future occupation.

**Keywords:** Vocational Education; Gamfication; Game Design.

## Introduction

The first educational initiatives linked to digital technologies appeared with the advent of the Internet in the 1990s, but rare technological resources limited a more effective application. Besides that, from the methodological point of view, the technologies were used in educational environments from an instrumental perspective. Reinforcing and propagating the logic of reproduction and transmission of knowledge. The current scenario presents a new reality. Internet access, digital games and the popularization of smartphones have changed the way knowledge is built up over the past generations.

SENAI-DR BAHIA begins its first works using digital technology for educational in 1993 and evolves consistently generating a representative variety of productions. The institution counts, for example, with the development of EAD courses (elaboration of didactic material and digital media), audiovisual productions, assistive technologies, creation of multimedia resources, games, among others. However, all the advances presented in this area were not reflected in the way professional education was being offered in presencial education at the SENAI units.

Vocational education teachers, who generally follow a conventional classroom pattern, find it difficult to engage students in proposed activities and to prepare them for current labor market demands, after all, the industry currently values people who develops thinking skills and are able to make decisions.

Gamification strategies are a possible answer to the presented problem. Gamified practices have expanded considerably in education since the popularization of the term gamification in 2010. The persistence of the phenomenon for almost 8 years, having already passed the initial moment of novelty and faced severe criticism, suggests that such practices should remain and win space in the educational scenario. Gamification is recognized for its potential for engagement and can be an excellent resource to stimulate student leadership in the process of building knowledge and encouraging systemic thinking.

In this context, the Bahia regional department of SENAI has propose to develop a gamification strategy linked to a virtual platform that covers all of its technical education courses. This paper presents the results of the research perfomed during the pre-production phase of the Gamifica SENAI project, from which it defines the theoretical assumptions, analyzes the profile of the public to be attende, discusses educational conceptions against the requirements elicited in the development process of the system and proposes a concecption solution that's accord to the specific needs of technical institution students.

In order to achieve these results, we have drawn a methodological approach that included documentary research, bibliographic research, similar analysis and research techniques focused on game development (using a user-centered approach) using the iteration process (design, prototyping and evaluation), with interviews as survey instruments and questionnaires and focal groups as instruments for the evaluation of the first prototypes.

## Theoretical-Methodological Perspectives

The project Gamifica SENAI was based on a methodological course build on documentary research, bibliographic research, similar analysis and field research.

The documentary research, in this context, had two fronts. The first one concerns in the alignment of the project with the teaching methodology of the institution, the SENAI Professional Education Methodology. Therefore, it was necessary resort to the documents that define it (SENAI-DN, 2013).

Then, we did a bibliographical research, in order to define the theoretical approach more adherent to the methodology of teaching and to the profile of the students. This bibliographic research aimed to consolidate the consistente educational references with the SENAI Professional Education Methodology, analyzing which approaches about the game and gamification best apply to this proposal.

In a consistent way with SENAI Professional Education Methodology, which is based on competency-based education, we seek references in Perrenoud; strengthening our theoretical base in the education field, we also brought Paulo Freire's (2016) reference, in the sense of seeking the creation of a gamification strategy, that respects the knowledge of students and teachers, allowing them to enter into the process of construction of knowledge in an autonomous way. Aligned with this educational perspective, we have chosen as the theoretical basis for the definition of the game, the French philosopher Jacques Henriot. Henriot (1989) who understands that the notion of play is defined in the context of culture. The bibliographic research also offered us the possibility of knowing the ways of development and / or application of other gamification strategies.

Beyond the case studies described in the literature, verified in the bibliographic research, we also performed a similar analysis, interacting directly with other gamified systems destined for educational purposes, searching for already used strategies that can be applied for the purpose of this project and seeking innovations in relation to what already exists in the market, attending with greater specificity the demands of the context of the institution; We analyzed the following systems: Classcraft, Ascend Math, Kahoot, Perguntados and Qrânio.

As a methodological perspective for development, we are using the user-centered approach. To validate our conceptions with the users of the system, we work with

an incremental prototype, taking it to the test and making the necessary modifications from the observation and analysis of the data collected through interviews, questionnaires and focus groups. We conducted a survey moment, interviewing 2 teachers and 1 student in order to anticipate key questions, before testing the prototype.

The first test was focused on validating with students the concept of the system, its basic functionalities and its narrative hook. Therefore, we chose a basic Industrial Learning Course class during the Curricular Unit Programmable Logic Controls. We had the collaboration of the class teacher to produce questions in which we test the main functionalities of the system with the students. To collect data, we observe the use of the system in the classroom, filming the entire interaction of the students and eventually consulting them. After the last use of the prototype in the classroom during the first test, we applied a questionnaire to the students.

With the answers to the questionnaire, we made two focus groups with the objective of allowing a more complete evaluation of the system by the students, in which they could develop better their points of view and be more purposeful. We also conducted a semi-structured interview with the class teacher in order to verify its perception of how students reacted to the proposal and to raise requirements that would attend the teachers.

## The Context

SENAI is a private non-profit institution with units located all over Brazil's capitals, whose mission is to serve the industry through professional training (qualification, technical or improvement), technical and technological services achievement and research and development focused on innovation. Founded in 1942, it has trained 64.7 million people preparing them for the job market.

SENAI has developed the SENAI Professional Education Methodology that includes from the definition of the Professional Profile with mapping of the necessary competences to attend a given occupation, definition of the curricular design going to the guidelines for teaching practice. In this way, from the analysis of the professional profile it is possible to realize the demands of the world of work by structuring them pedagogically into competences, deployed in capacities:

- technical skills: knowledge, procedures, technologies, standards
- management capacities: social (interpersonal relations), organizational (work context) and methodological (self-development-creativity, research, autonomy)

Capacities are grouped into curricular units, which compose the curricular design of the training. The teaching practice, in turn, breaks with the traditional view of teaching focused on the reproduction of contents and the passive condition of the student proposing a praxis aligned to the teaching by competence through learning situations.

"Within this Methodology, Learning Situations is understood as a set of actions that pedagogically planned promote significant learning through the use of Challenging Learning Strategies (problem situation, case study, project and applied research) and different teaching strategies (dialogue or mediated exposure, demonstration, guided study, technical visits, among others)."

SENAI Professional Education Methodology, in this perspective, is in line with the Kuenzer (2006) perception that understands vocational education beyond a qualification focused only on work practices but mainly on the articulation between the cognitive, affective and behavioral domains where the subject mobilizes his theoretical and tacit knowledge to solve problems. In this sense, it is based on the concept of competence, defended by Perrenoud (1999), as the capacity to mobilize knowledge and skills to solve a complex situation, overcoming the focus on simple assimilation of knowledge and the execution of a given task.

The gamification strategy, presented here, was conceived in an integrated way to the Methodology in order to potentiate the development by competence and to foment an innovative pedagogical practice that privileges an education focused on the logic of the interaction with significant and fun learning experiences. In this sense, it was fundamental to understand the characteristics of the students, seeking the creation of a gamified strategy adherent to their needs, preferences and their perceptions about the best way to learn. To do so, we analyzed a survey performed in one of the SENAI Units, Cetind, in the city Lauro de Freitas, with 207 technical students in the morning, afternoon and evening shifts between June and July 2016. The research contained 27 questions grouped into 7 parts: general

data, technologies and education, distance learning courses, smartphones, virtual reality, games and awards preferences.

From the data analysis, were created two student profiles composed by the combination means of the most frequent answers of the questionnaire questions. As described below:

### Profile 01

Male, between 18 and 25 years old, single, with high school completed. Does not work at the moment and has access to the computer at home. Likes games and eventually plays using mainly his smartphone and the console. Play for fun, especially sports games and strategy games..

He is dissatisfied with the format of the classes, believes that technology can help learn and moderately believes that games can support learning, occasionally being inserted into the classroom as well as simulations, videos and animations. He never took a distance course, he thinks it can work, but he believes that in face-to-face course, learning is greater. He has a smartphone, uses it to do searches on the internet and would like to access educational content through it. He knows what Virtual Reality is and it should be used in the classroom. Prefers a job offer as a performance award.

### Profile 02

Male, between 25 and 35 years old, married, with a technical course completed. Employee for 40 hours, with access to the computer at work. He does not like games and never plays them. He is satisfied with the format of the classes and believes that technologies such as simulation, animations and videos can collaborate for learning. He does not believe in the educational potential of games. He never took a distance course, he thinks it would not be useful and believes that in the presential course the learning is greater. It has a smartphone, uses it for internet searches and would like to access educational content through it. Do not know what virtual reality is. He prefers a full scholarship in courses as a performance awards.

The creation of these profiles potentiates the understanding of the target audience functioning, allowing the mechanics, scoring system and recognition to be

designed to meet their needs. Consequently, the gamification strategy is more likely to promote engagement and objectives achievement.

## Theoretical Bases of Gamification Proposal

In this work, we adopted as a theoretical framework for our understanding of the game, the work of Henriot (1989), dialoguing with works of digital game researchers that Bonenfant's (2010) classifies as adoptants of a contemporary approach about games.

In Henriot's (1989) perspective, the game does not constitute as an object of concrete existence and despite the existence of words in different cultures that can be translated as game, no one can attest that different peoples have named the same object with these words. The game is, therefore, for Henriot (1989), the thinking about the game, it is constituted from the experience of a player, within a given socio-cultural context.

When analyzing the use of the term game (jeux) in his language, Henriot (1989) identifies three main meanings. Although the terms jeux have a different comprehensiveness from the way other cultures name phenomena that are usually translated for French with that term, Henriot's (1989) findings are significant for a cross-cultural perspective of the game. The first meaning of the term is related to the game material. This meaning of the term jeux in French is also present both in the Portuguese term jogo and in the term game in English when we use the term board game, for example, to refer to the material used to play.

The second meaning refers to the structure of the game, its system of rules, as when, for example, we say that it is not possible to make a certain movement in the chess game. The third meaning of the term jeux refers to the playful attitude adopted by the player, in English that meaning is best covered by the term play. Henriot notes that more than distinct meanings these three uses of the word denotes complementary meanings fundamental to understanding the play activity. It is in this sense that he affirms that the game happens in the relation of game and play, of the structure or game material signified by a way of using it. A chessboard is not a game if it is used as a door weight; on the other hand, an object that was not intended as a game can be interpreted as such and so it will be a game.

In the context of the game contemporary approach, the french researcher Sébastien Genvo argues that a video game is designed within certain conventions that try to convince the user that "this is a game" and invite him to play. Taking the terminology of rhetoric, Genvo (2014) calls ludic Ethos, this set of attributes with the function of persuading the player that a given object is a game. If the user is convinced that a given object is a game and accepting the invitation to play it is necessary that this object and / or system of rules is playable. The playability is the characteristic of a given material and its system of rules that allows the player to make the exercise of the possible, given certain contingencies (Genvo, 2014).

Henriot's notion of game (Henriot, 1989) and the importance of the ludic ethos and playability in game design for Genvo (2014) are fundamental to the conception of our gamification strategy. Gamification for us is as the process of making more playful and structured like a game an object initially not understood as a game. In this sense we align more with the perspective of Werbach (2014) that proposes the definition of gamification as "the process of making activities more *game-like*."

In our case, the proposal is to develop a strategy, based on a virtual platform that makes the educational process in technical education more similar to a game experience. Therefore, it is fundamental that the students associate the teaching-learning process supported in the platform to playful practices. And more than that, the environment must offer the player the means to express himself, to do the exercise of the possible within a set of rules that create contingencies.

## A Journey to the Future: the Gamification Strategy

In order to develop our strategy, we needed to consider the profile of the students we wanted to achieve, the SENAI Professional Education Methodology and the game design and gamification we adopted. First, we specify the objectives of the strategy and then define the behaviors that it should stimulate in order to achieve the proposed objectives. We also considered the types of SENAI Professional Education Methodology capabilities.

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| Goals | Increase performance | Innovate teaching methodology | Increase student engagement | Increase the chances of getting a job |
|---|---|---|---|---|
| Behavior | Create and maintain study habits | Improve the skills required for your job | | |
| Capabilities | Organizacional | Methodological | Social | Technical |

Figure 1. Goals, Behaviors and Capabilities

Analyzing the two characters that we created from the research of the students profile, we realized that what approximated them was the search for a better professional future. The goals definition in terms of user experience was based in the conjunction of the perception that we had of the students from the definition of characters that represent them with behaviors that we want to stimulate to achieve the educational objectives of the strategy. In this way, it was defined that the experience should provide the constant search for a personal improvement focused on professional future.

Then we seek the most conducive kind of games to the creation of this experience. The game genre is a fundamental attribute in the construction of a ludic ethos and to create a strategy that approaches an already known genre would make our gamified environment more easily recognizable as an object that you could play. Digital Role Playing Games (RPG) are known for their experience focused on the constant upgrading of a playable character. The RPG genre was therefore quite adequate to our proposal. As the gamification strategy is aimed at about 10,000 students simultaneously and among the skills to be developed for all occupations are social capabilities, it would be even more appropriate to refer to Massively Multiplayer Online Role Playing Games (MMORPG)

Besides the game genre, another important attribute in the composition of a ludic ethos is the narrative genre. Some narrative genres such as high fantasy and science fiction are commonly associated with digital game contexts. With this perspective, we transform the aspiration to build a better professional future in a journey to a better future. Therefore, we adopted the narrative genre of science fiction, with the hypothesis that students of courses directed to industry would be interested in universes focused on technology.

## At this point we come to the High Concept of the gamified strategy:

> High concept: Gamified strategy focused on presential teaching of the SENAI technical course, it seeks to engage students through a fun experience with elements of an MMORPG, strengthening their sense of community, providing them with a mapping of their performance and enabling them to improve the necessary abilities for their future occupation from tasks, quizes, challenges and games. (SENAI-ITED, 2017)

With this concept in view, we continue to develop the proposal of structuring the virtual environment of gamification from the metaphor of a journey to a better future. On this trip, the students are inside a ship, their class, and travel together to the future that they build. As a class, students are part of the same crew that achieves the best results with collaboration. Individually, they can make choices related to driving strategies for their future. The teachers present themselves as flight controllers, in a metaphor for the mediation of the learning process.

In order to build the experience described in abstract terms, we have developed the mechanics of the gamification strategy. "Game mechanics are the verbs of a game. They are the basic processes that drive the action foward and generate player engagement. "(Werbach & Hunter, 2015, position 284 from 536). The table below shows core mechanics groups related with learning capabilities and narrative aspects:

| Core Mechanics | Individual strategies | Collective strategies | Duel | Challenge | Play games |
|---|---|---|---|---|---|
| Capabilities | Methodological, organizational and social | Social skills | Technical | Technical | Methodological and organizational |
| Narrative aspects | Control panel that unlocks talents to assist in a journey to a better future | Ship control panel | Friendly disputes between two travelers for training | Individual or collective recognition missions. In that they disarm bombs, unraveling puzzles and unlocking portals of acceleration for a better future. | Training the brain for the functions necessary for good performance |

Figure 2. Core Mechanics, Capabilities, Narrative aspects

Victor Cayres, Marcelle Minho, Ricardo Lima, Luís Alberto Breda Mascarenhas

## The Beginning of Iteration Cycles

We began the first phase of testing with a probing step which we conducted semi-structured interviews with one egress student and two teachers. This stage was fundamental to initiate a process of approximation with the universe of the subjects studied.

The first survey interview was conducted with a student graduating from the course of Oil and Gas. This student was chosen for having participated in a team that did in his Integrator Project, a game as didactic resource for technical education. It was someone, therefore, who thought of playfulness as a solution to improve the experience of his course. Throughout the survey with the student, we identified that some teachers already used gamified approaches with good results in the student's perception; we identified the gamified systems with which the researched subject and his group had contact during the course and some gambling strategies without using the digital resources with which the class interacted

The survey with the student allowed us to ratify the paths already established for development and, let us think about new requirements. Some requirements were closely linked to the traditional logic of teaching: the demand for content (videos and handouts) and for questionnaires, for example, or the expectation that the activities would be evaluated in terms of grades. We chose not to have content repositories on the platform, although teachers and students can share videos and images in a timeline. We have decided that the platform will be a place where the student always actively positions himself in relation to learning. The questionnaires, in a way, were already contemplated, adopted contextually in the narrative and with elements of play in two types of mechanics: quizzes and battles. Given the requirements that have emerged since this phase of development we also seek to create scores and rewards that recognize the students' effort and not just their performance. The creation of a narrative in which the students were represented was a requirement at that time and was reinforced in other stages of the research. The proposed narrative of a journey to a better future apparently served part of this desire, but there are expectations that the narrative will dialogue directly with the course of each student. Viable ways of meeting this requirement are being studied.

The survey with the teacher brought relevant information to development. We interviewed two teachers, the first one, with more than fifteen years of institution and little familiarity with the digital environment and gamification; The second teacher with greater familiarity with the digital medium, but without contact with gamification practices. This second teacher would be the one who would teach the classes which we would test the prototype for the first time. At this point, we realize that vicarious pride (McGonigal, 2011) is the fundamental motivator of the teacher. Teachers have shown that they feel rewarded in their profession by seeing the personal and professional development of their students and alumni. We reinforce, therefore, the idea that we needed the system to recognize the teacher's effort to guide the student towards a better future by assigning him a role in this narrative. We then defined that teachers would be represented as flight controllers in student travel, in a metaphor for the mediation process.

We found in these interviews fundamental information so that we could advance the interface of the system with which the teacher would contact, some of the requirements found in this survey would be fundamental even for the application of the system in the first tests. Among these were the need for quizes and battles to contain images that are fundamental to the issues of some Curricular Units and this was the case of the discipline that we would test the first prototype. Not having images in the questions would significantly limit the use of the platform in the first test in the classroom, so that we prioritize the implementation of this requirement.

We used the system for the first time in a class of Programmable Logic Controllers in an Industrial Basic Learning Course with 18 students. At this point, the main interest of the research was to validate the main mechanics of the system, besides the general line of the narrative. We then asked the teacher to create questions for the mechanics available at the time and we registered them ourselves in the system, since the interface for the teacher was not yet ready at this point in development. We promoted two tests of the platform with the students during class time, with the material completely prepared by the teacher. In the first test we worked with questions related to the fundamental concepts of the discipline adapted to the formats of the mechanics of the platform. We observed each of the mechanics in practice, the enthusiasm was evident, although the system still presented flaws.

During the test, students explored the platform, used the timeline to talk, interacted outside the platform talking and collaborating to resolve issues and play. In the second meeting, battles, already with images, were used for more complex issues involving technical capabilities related to programmable logic controlers. Even during battles, which is the mechanics of strategy with a more competitive character, the students remained collaborating and discussing the issues. The teacher also registered a mission to the students create a PLC. The students did not do it, they also did not notice the talents and badges they won. The notification and feedback system, which was not yet ready, therefore became a priority for the next test.

After the test in the classroom we applied a questionnaire with the students. The questionnaire was structured in 5 parts. The first part, with 6 questions, was dedicated to understanding the data of the searched subjects. These data were useful to us to verify if this group had profile similar to the general student population of the institution and to understand its access to the technology and its contact with games.
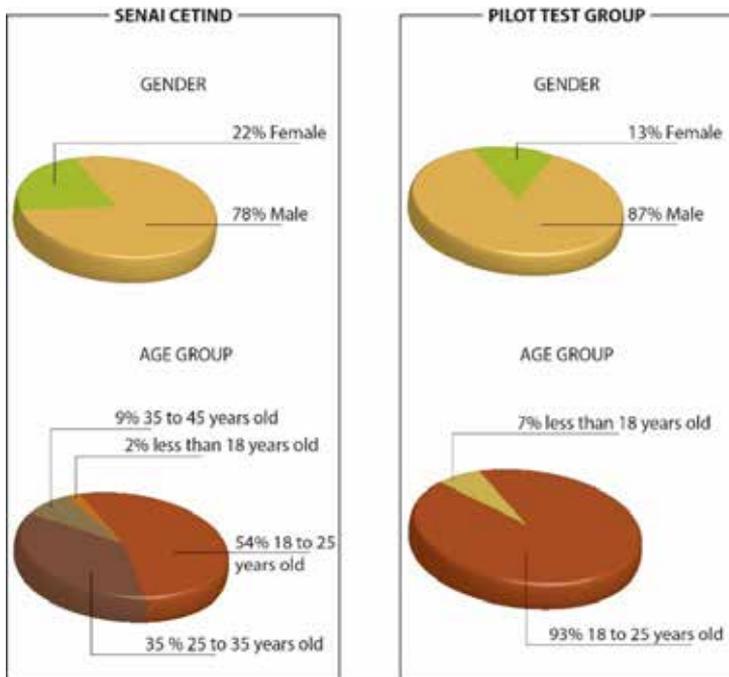


Figure 3. Gender and Age Group

We found that in the first class we tested the platform, there was a higher percentage of female students in relation to the total unit. Also in this group were not represented groups with age groups above 25 years. Although we tested the system in a group whose age group was the most present in the institution, at this point, we defined that, later tests, should be performed in classes with a more diverse population. It was also defined that, afterwards, we would test the system in night classes, since these groups concentrate the older and professional age groups already inserted in the job market.

**On which platforms you interact with games**

| Platform | Value |
| --- | --- |
| Smart phone | 12 (80%) |
| Tablet | 0 (0%) |
| Computer | 9 (60%) |
| Console | 3 (20%) |

**Do you usually play**

| Category | Value |
| --- | --- |
| Digital games | 10 (66,7%) |
| Board games | 2 (13,3%) |
| Card games | 4 (20,7%) |
| Play sports | 9 (60%) |
| Others | 1 (6,7%) |
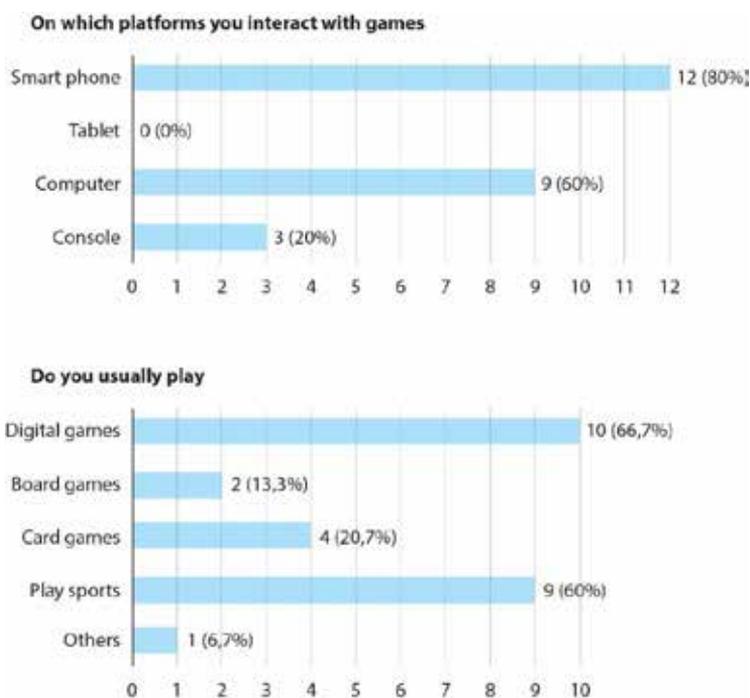
Figure 4. Games and plataforms

We noticed that digital games are the most popular among students in the class, and the platform where they played most is the smartphone, followed by the computer; both platforms for which we prepare the platform. With these data, the need to maintain and reinforce the development approach that prioritizes the adaptation of the platform to various screen sizes and performance capacities, considering the diversity of mobile devices available on the market today, is evident.

124    The second part of the questionnaire, with 7 questions, was dedicated to iden-
tifying their familiarity with gamification and their perception of the relationship
between gamification and learning and their interest in the possibility of to gamify
other disciplines. We verified that they believed in the strategy of gamification to
potentiate in their learning and that they believed that the test itself had already
made a difference in this process. In this second question, seven of the 15 stu-
dents who answered the questionnaire were positioned in a neutral way, which
was expected from the punctual character of the intervention in the group for
research purposes.

**The use of gamefication can enhance learning**

| | |
|---|---|
| 5 | 10 (66,7%) |
| 4 | 3 (20%) |
| 3 | 2 (13,3%) |
| 2 | |
| 1 | |

0  1  2  3  4  5  6  7  8  9  10

**The use of gamification increased learning**

| | |
|---|---|
| 5 | 5 (33,3%) |
| 4 | 3 (20%) |
| 3 | 7 (46,7%) |
| 2 | |
| 1 | |

0  1  2  3  4  5  6  7
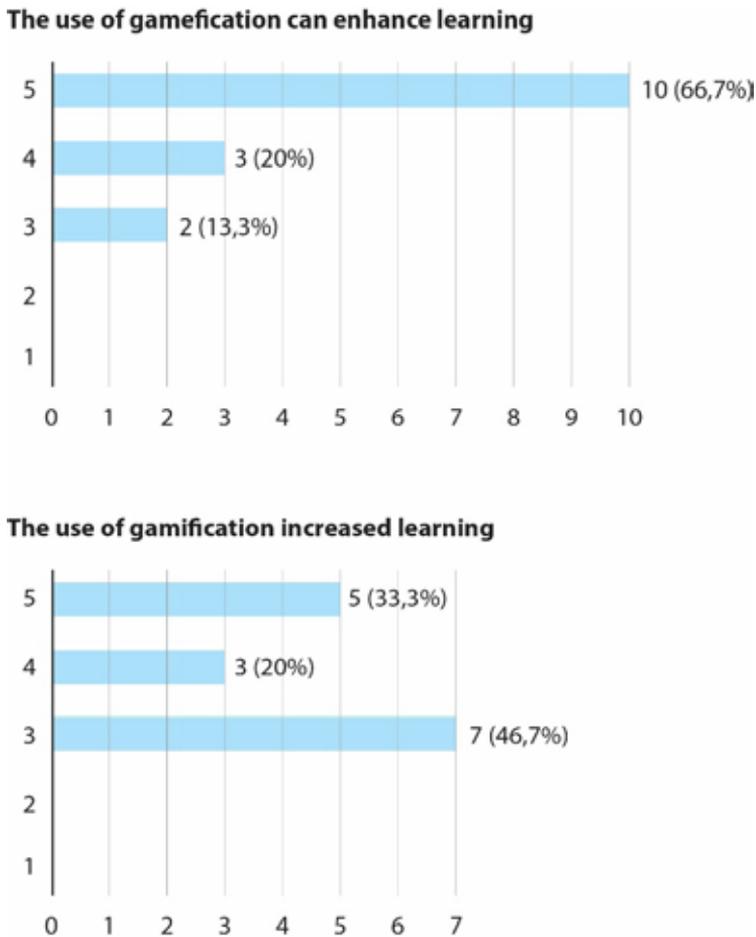
Figure 5. Gamification and Learning

The third part of the questionnaire, with 20 questions, was based on the Game-Flow framework (Sweetser & Wyeth, 2005), which adapts to the flow theory of the psychologist Mihaly Csíkszentmihályi for the heuristic evaluation of games. We use Gameflow to create statements that students could agree or disagree on the likert scale about their concentration, challenge, immersion, their perception of ability, control, goal perception, feedback perception, and immersion. Social aspects were observed during the interaction with the platform.We had also as a reference a similar use of this framework to evaluate a serious game (Ribeiro, Cayres, Silva & Moraes, 2015). Below the results of some questions of this part of the questionnaire:
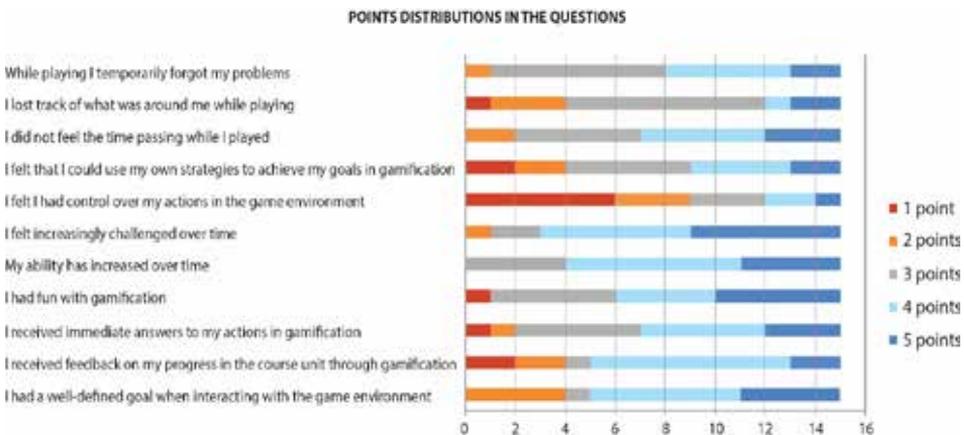


Figure 6. Gameflow questions

Although the system had a provisional interface and its mechanics were still not fully adjusted and implemented, the strategy was able to engage the students to the point where they felt immersed in the activity. We were able to note the degree of immersion of the students also through observation. This degree of immersion was presented as a first indication that the functionalities of the system and the fictional context were able to establish effective communication with the student.

Control-related indexes were satisfactory for this point of development, but we intend to expand it when we have the platform running optimally.

Although we created a system of progression in levels based on the effort and the performance of the students, we had not yet created a system of progression of the difficulty of the presented missions. The teacher, however, has prepared more

challenging questions in a progressive way. What evidenced the importance of the process authorship of the teacher in their pedagogical practice for the perception of the platform by the students.

As for the skills of the students, we verified that the system is intuitive and allows for constant improvement. Nonetheless, as we raise challenge levels and add more resources we will need to be mindful of keeping the system easy to use, perhaps by presenting resources progressively over the course of the semester.

Parallel to these data, we verified during the observation in the classroom and confirmed in the focus groups that, part of the students did not notice some functionalities of the system, which we attribute to the incompleteness of the feedback system. Not by chance this is the lowest index.

The absence of a complete system of notifications and feedbacks has also impacted student's perception of goals, so we intend to improve these indexes in future versions.

The number of students who maintains their sustained attention during interaction with the system is greater than those who believe that the system has elements that attract their attention. This is an interesting result for the point of development that we performed this first test, because we had not ready yet all the resources available to get the attention of a student familiar with digital technologies and especially with the games, but at the same time, even without all these resources the main mechanics were able to keep the attention of the students.

The fourth part of the questionnaire, with 10 questions, sought to validate the specific paths of design and narrative. We validated the idea of constructing a narrative about a journey into the future and validated choices related to the interface.

The fifth and final part of the questionnaire with 7 open questions was intended to open space for students to evaluate the system more freely, make criticisms, suggestions and propose functionalities. In the open questions the good acceptance of the platform was reinforced and new requirements were elicited. The students demanded at this point of development, mainly that: the system was faster; that there was some kind of chat, beyond the timeline through which they can communicate; that the games were more diversified; that there was a greater variety of types of enigmas.

Finally, we conducted two focal groups with the class in order to allow students to express themselves more freely so we could collect more complex data. At this point, we could discuss more deeply narrative and interface aspects, identifying which paths for them would be most interesting. We probed the receptivity to the idea that the interface of the system was represented as the panel of the ship where the trip is made for the future, with an excellent response. The students were enthusiastic and also suggested that the character who would guide their course was a hologram sent from the future, instead of the assistant robot we had used as a placeholder. We also probe their interests for specific awards that would motivate them. It was confirmed the interest for scholarships in courses of qualification in the own institution, "differentiated technical visits" in companies that aspire to work, but what seemed to them more motivating was an internship in the own institution. This last possibility raised the question of a possible exarcebated competition among the colleagues, which made us reflect on the possibility of reinforcing the collaborative activities, reinforcing the idea that what is being proposed is a collective journey and that all are in the same nave towards a better future.

## Conclusion

Throughout this work we present the research about the pre-production of the strategy of gamification of professional education of the SENAI DR-BA. This strategy constitutes a unique initiative for the vocational training of a regional department of the institution, with a target of reaching about 10,000 students a year. From a methodological approach that went through similar analysis, probing and interviews with teachers and students, tests, questionnaires and focal groups with students, we arrived at a concept for platform, a list of requirements and the validation of the main mechanics, of the narrative and interface paths, in addition to anticipating possible problems and thinking of solutions to solve them.

Because of its broad scope, it is possible to identify in the project a tension between the need for the strategy to be generic enough so that it can attend the various courses of the institution and the student's demand that the initiative connect directly with its course. The theme of the trip to the future, in a way, connects with all the target public, who is in the institution seeking a better future related to its position in the labor market. In any case, we will make the effort to develop

narrative and visual aspects that are customized according to the course in which each student is enrolled.

We seek to meet most of the requirements we elicited at this stage of the research in the conception of Gamifica SENAI. Part of the requirements, however, raised questions about the very nature of the project. We have found that students and teachers often set their requirements from references in content teaching practices that can reduce the strategy to an instrumental perspective. We need, therefore, to maintain alignment with the institution's teaching methodology, to reinforce the approach based on the creation of learning situations.

At the time of writing, we are already in the production phase and a second phase of testing has already started. The focus of this second moment of evaluation are the ways that teachers take ownership of the gamification strategy. The analysis of the data collected in the next stages of development are presented as possibilities for future publications.

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# Using Digital Badges in Middle School Education: Impacts on Students Motivation and Performance

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Colégio Casa Mãe

A badge is a digital representation of a skill, learning achievement or experience and are usually used to set goals, motivate behaviors and communicate success. They also provide a more complete picture of the learners' skills, achievements and qualities (Mozilla Open Badges, 2014). Numerous education groups, organizations and web entities currently issue badges, such as The Khan Academy, Microsoft Education Community and edX, (an online learning platform sponsored jointly by MIT and Harvard University). Badges can represent an opportunity for education to rethink what is of value and recognize achievements that could be codified and assessed but currently are not (at least not explicitly). They support multidimensional and continuous learning, not just through traditional school assessment (such as tests scores) but also by assessing the kind of knowledge and skills that come from initiative, investigation, critical thinking and other 21st century skills. On the one hand, they can be used to recognize /represent and validate achievement and learning; and on the other hand, they can be used as a method of motivating learners to undertake activities that they might not otherwise (although some research points out that this motivation may not be sustainable). For digital badges to be broadly accepted as legitimate indicators of expertise, skill, or experience in the education community, badges must appear credible. This depends, at least in part, on the level of quality control for these awards and on the criteria used for issuing a badge. Bearing this in mind, a tiered digital badge system was designed which has one main objective: to create and use digital badges (with demanding criteria and clear evidence, necessary to be perceived as credible by the school community) to promote motivation and multidimensional learning in Geography classes. The badge system allowed for some systemic considerations such as badge per task, badge families and structure, meta badges and learning paths (Berge & Muilenburg, 2016). This study is conducting a quantitative research methodology, based on student's surveys (pre and post use of the digital badge system) and performance results, involving two classes of students (n=40) and the same Geography teacher. It analyses and compares survey data conducted amongst the students about the pupils' perceptions on the use of a digital badge system and its impact on their motivation/ dedication and performance in Geography classes and activities. It also analyses the impact of using digital badges on student's school performance, through a quantitative analysis of students' assessments along the school year.

**Keywords:** Gamification; Badges; Pedagogy.

# Gamifying Reading: Enhancing Pre-Reading, Reading and Post-Reading Activities Through both Physical and Digital Resources

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The comprehension of a text depends on factors resulting from the textual structure, the context and the reader (Giasson, 2000). Pre-reading, reading and post-reading activities shall be carefully prepared with the ultimate purpose of transforming the student "at all times into an active reader" (Solé, 1998: 114). In fact, an integrated approach of various domains, i.e. reading, writing, orality and grammar, is essential in textual understanding, since understanding involves "central language skills such as the ability to use syntax to anticipate words in a sentence and assign unknown words to the appropriate word class" (McGuinness, 2006).

Within a multisensory stimuli context (Odisho, 2007) and approaches based on a pedagogy of gamification (Foncubierta & Rodríguez, 2015), pupils may participate in pre-reading, reading and post-reading activities in a proactive and interactive way, by using digital applications and tools, such as Kahoot!, Plickers, Mentimeter or GoConqr, which allows them to anticipate, create motivational and critical links (Caballé & Clarisó, 2016) with the text or learn the functions and structures of scientific language (Mantzicopoulos & Patrick, 2011). In fact, when reading pupils are able to connect prior knowledge, identify key concepts, synthesize information, make inferences and prediction. The presentation aims at, on the one hand, discussing the implementation of gamified tasks in the reading process at primary school learning, by following an experiential communicative approach (Fernández-Corbacho, 2014), enriched by gamified tasks (Foncubierta & Rodríguez, 2015). Within this scope, we will reflect upon the importance of creating meaningful pre-reading, reading and post-reading strategies and physical and digital resources in the 1st Cycle of Basic Education. On the other hand, we will analyse didactic units conceived by primary school teachers, who participated in a professional development entitled "Strategies and physical and digital resources for the teaching of reading and writing at 1st Cycle of Basic Education". This professional development course took place at both Basto and Montalegre, Portugal, involving 40 teachers, in which they have explored the basis of reading stages and strategies, gamification pedagogy and multisensorial teaching procedures and later on experimented on and created their own didactic proposals based on gamification principles. By undertaking a document analysis, we will account for the most used applications, the selection of applications for each reading stage and the types of skills which can be tackled with some of the teachers' proposals.

Results show that teachers have seen gamified tasks can be a very good asset in the classroom, allowing for a better development of the reading process. Kahoot!, Mentimeter and GoConqr are the most used applications, but not all three are used at the same stages and for developing the same skills. Moreover, some teachers have also applied gamified principles in the creation of physical resources for the reading stages, by including kinesthetic activities which make children get a different but rich involvement with the text, too.
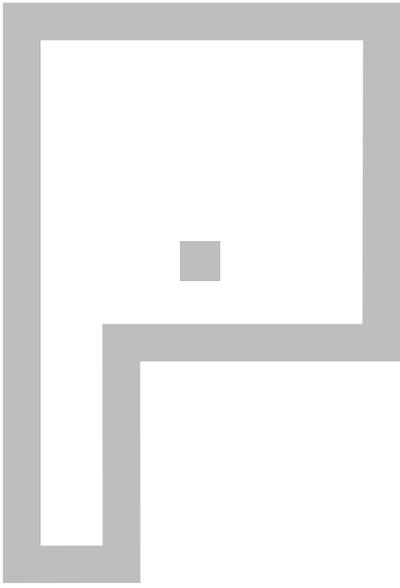
# Parallel Sessions 2
## Games for Well-being

# Should We Play or Should We Learn (First)? Findings from the Space Academy/MakEY

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"Should we play or should we learn?" summarises the negotiation that took place between two boys during their participation in one of the workshops that were given in the Romanian case study of MAkEY project. Workshops focusing on the concept of space had been offered by the makerspace staff together with academics to 7 years old children in an attempt to create some mobile makerspaces in schools for introducing young children in science knowledge.

Space Academy, the Romanian empirical study in MakEY project is set at the intersection of two main topics: 1. Tangential learning of STEM subjects in video games, 2. Cooperation and communication in tasks involving digital (video game), non-digital (artistic creation) and a blend of these two (robots). Moreover, we encouraged children to film and document their activities and to create visual data in a collaborative way. We were particularly interested in 1. how kids with various socio-economic status would engage in the making activities in these mixed environment; 2.  what are the benefits and the challenges of young children's long term engagement in makerspaces and 3. how do they develop their creative and digital skills during this engagement. To answer these questions we relayed on the data collected during 3 series of 9 workshops each, that have been offered to three groups of 10 children (7 years old) of various economic background. The tools that have been used during these workshops were Kerbal Space Program, Universe Sandbox, Cublets modular robots and 3D dooddlers, pearl beaders, plasticine and drawing. Data were collected with fixed cameras, mobile cameras operated by researchers and children and with chest- fixed Go Pro cameras.

We will present some of the empirical data and also discuss the methodological and ethical challenges of working with children under 8, while using video games.

**Keywords:** Young Children; Makerspace; Kerbal Space Program; Play; Learn.

# Educacaoacessivel.pt: A Case Study of Production and Application of Videogames for Teaching Mathematics to Deaf People

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## ABSTRACT

The pedagogical resources in Portuguese Sign Language (LGP) for the deaf teaching support are very limited, and largely dependent on teacher's dynamics and improvisation skills. A work with several obstacles to technical and pedagogical quality, such as the technical conditions that the school provides for this work, or the fact that these contents in general do not come out from the school.

The project Educacaoacessivel.pt aims to contribute to mitigate that problem, with the production and distribution of free educational videogames for teaching mathematics to deaf students.

This paper deals with two distinct project areas: the development process by students of the bachelor's degree on videogames of a Portuguese University (PU) and the videogames application in the math classes for deaf students on a Deaf Education Related Institution (DERI). About the development process, the paper focus is on the methodology used in the classroom and its critical reflection, as well as a brief description of the videogames and tangible interfaces already available; regarding the videogames application in DERI, it will give account of the process of adoption of those video games by the school and on the impact of videogames on learning process of deaf students.

At this stage of the project, some positive conclusions can be drawn: regarding the development of videogames, students are held accountable for a real project and it's clear that is possible to produce, in a unique two semester's discipline of a bachelor's degree, usable videogames for deaf students, despite the complexity of the resources and partners involved. As for the results of the videogame application in deaf students, it has been observed that the students are motivated to use the games and can contribute to the consolidation of mathematic principles.

**Keywords:** Videogames; Deaf; Teaching; Learning; Mathematics.

## Introduction

The project Educacaoacessivel.pt, rather than being a mere research project, is a collaboration between two institutions with a view to remedy as soon as possible a pedagogical problem identified in one of them. The institutions in question are the PU, via its research centre, and CPL through the DERI; already the pedagogical problem in question is the general lack of pedagogical supports in Portuguese Sign Language (LGP) for the school support of the deaf student in Portugal, which was delimited here to Mathematics teaching. The starting point of the project is as simple as an informal conversation between a DERI Mathematics teacher, who was looking for technical and creative support for her LGP contents and a videogames First Cycle Degree teacher looking for themes for his students with potential social impact.

This is thus a project that, at first, aims to respond to a need identified by a professional in a work context, and whose satisfaction with the results obtained in the first phase lead the institutions involved to continue it and invest on its disclosure to the outside. As an example we could point out the meeting "Mathematical Communication in the learning process of the deaf student"[1], which had as its motto the dissemination of the project to the Reference Schools for Bilingual Education of Deaf Students (EREBAS); this communication aims to contribute to a discussion about the pedagogical potential of the videogame for the deaf student as well as to identify pedagogical processes that allow for the development of projects of this type in a common curriculum of a Degree in Videogames. However, before describing the process of developing the Videogames at the PU, and addressing its application in the DERI, it is important to frame the study problem by means of a brief literature review.

## Videogames in the teaching of deaf students

### *Deaf Children and Learning*

The estimates from the General Directorate of Education and Science Statistics (Direção Geral de Estatísticas da Educação e Ciência - DGEEC), regarding the academic year 2015/2016, indicate that there were 63540 children with Special Educational Needs (SEN) attending basic education in the Portuguese educational system, both public and private. Of these students, about 19,3% have "serious

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difficulty" or "total difficulty" in communicating, requiring 16,3% of them the use of technologies to support learning and 0,5% of adaptations in the teaching process, mainly associated with the insertion of the Portuguese Sign Language (Língua Gestual Portuguesa - LGP) (DGEEC, 2016).

Because of the language delay in deaf children, the acquisition of multiple literacies and numerical skills can be significantly later and more complex than in their hearing pears (Edwards & Crocker, 2008). When considering the inclusion of deaf children in the educational system, there are several identified barriers, associated with different developmental factors. Firstly, about 98% of deaf children have hearing parents, and most of the times they are unable to speak the same language of their children (LGP). If we explore this problem, it's also possible to denote that most of the parents only notice their children's impairment around two or three years old, by which time they search for professional attention, affecting definitely the global developmental process. Secondly, and related with the first reason, it's common that deaf children only start to learn their own language (LGP) at three years of age, which induces a significant delay, comparing with hearing children of the same age. This aspect frequently roots difficulties in the acquisition of scientific notions that are more abstract or complex. Thirdly, deaf children's native language is LGP, which is different from the official scholarization language, Portuguese. Therefore, a deaf child in the Portuguese educational system represents the integration of a learning process in a non-native language, what is very demanding when compared to their hearing peers (Nunes, 2013; Barroco & Nunes, 2014).

In the specific context of mathematics learning, the severe lack of mathematical gestures in LGP adds another layer of complexity to concepts acquisition by deaf children, and even more complex when considering the non-existing adaptations in the curriculum, for this specific population (Nunes, 2013; Barroco & Nunes, 2014). In addition, it is estimated that deaf children are about three and a half years behind hearing children in mathematics achievement (Nunes, 2004), having more difficulties in basic concepts, operation and application (Noorian, Maleki, & Abolhassani, 2013). Nevertheless, research also supports that deaf children are not inherently behind in number representation. So, these difficulties can be due to the differences in how well deaf children can process simultaneous and successive information, affecting their performance in number representation tasks

(Nunes et al., 2008). Other type of explanations for this fact are the ones related with more contextual/systemic factors, like the language barrier as an obstacle to parents' and teachers' feedback and to the comprehension of complex mathematical problems (Swanwick, Oddy, & Roper, 2005).

### Games and Learning

Games have been applied in many educational contexts and their potential in the learning process has been extensively documented (Gee 2013), being able to be integrated into the educational process in several ways (Van Eck, 2006).

In addition, the potential of "serious games" in increasing cognitive functions has also been documented, revealing a significant and positive influence in several areas of cognition, when compared with interventions based on "traditional approaches" (Rosa et al., 2016). This potential of action on cognition is a key point in increasing multiple skills, resulting in improved performance in several areas of knowledge such as mathematics (Ke, & Grabowski, 2007; Barkatsas, Kasimatis, & Gialamas, 2009; Chang, 2009). A Meta-Analysis study, considering a sample of 14 experimental interventions in the field, concluded that Game-Based Learning (GBL) approaches can increase the learning process outcomes by at least 28%, and perchance by as much as 47% in comparison with traditional approaches, like expository or self-study, among others (Sousa & Costa, in press).

Moreover, a study conducted with teachers and pedagogical directors of the participating schools in GamiLearning research project show a positive attitude to videogames and learning in particular for Math, ICT, Geometry and Literature (Henriques, Sousa & Costa, 2017).  Notwithstanding, there are a lack of specific research on GBL regarding deafness in particular. Considering a recent literature review of peer-review article from scientific databases, from a sample of 52 studies in GBL, there were no studies referring deafness or hearing impairments and only two sources studied games as a pedagogical strategy for people with visual and motor impairments (Costa, Tyner, Henriques & Sousa, 2016). Although gamified pedagogical strategies have shown results in the enhancement and facilitation of learning and skills acquisition process in deaf students, similar to the results of their hearing peers (Mertzani, 2011; Bouzid, Khenissi, Essalmi, & Jemni, 2016; Kamnardsiri, Hongsit, Khuwuthyakorn, & Wongta, 2016).

In terms of game usability, tangible interfaces popularity has increased in education and videogames, since they reflect the idea of thinking as tied to a body that has experiences in the world (Gee, 2013). This aspect has a relevance, when considering the learning process of deaf people and how it relies mainly on visuospatial cognition systems (Mascio, Gennari, Melonio, & Vittorini, 2013; Melonio, & Gennari, 2013). The study of Shelton & Parlin reported positive outcomes with mobile games when teaching mathematics for deaf children, mainly regarding logical deductive reasoning, but also improvements in vocabulary, resulting from the process of playing (2016). Other studies also reported positive outcomes with deaf children, when using interactive interfaces involving, for example, gesture recognition (Lee et al., 2005). The complex relationship between game design and learning gains in GBL interventions with deaf children is also studied as process, which gains are improved when students and teachers are actively involved (Portugal, 2012).

When designing videogames for deaf children, the traditional usability heuristics and principles are not enough and new ones are needed mainly relying on adaptations to implement the gameplay, text amount and positioning, feedback and avatar usage, based on identified gaps in text comprehension, memory, visual attention, focused attention and social interaction (Mascio et al., 2013; Melonio, & Gennari, 2013).

In the Portuguese context, most of the pedagogical resources available online are mainly made by teachers, normally videos explaining concepts in the main school subjects in LGP. Since these resources result only of teachers' efforts, they are not frequently updated, neither adopt innovative pedagogical strategies, like GBL ("Academia LGP", 2015).

Considering the presented framework, this study intends to explore the potential of videogames in the deaf children's process of learning mathematics, through a game design process where multiple stakeholders are involved (game developers, teachers and students).

*Curricular structure*

As stated above, we are not aware of videogame development projects for the teaching of the deaf student in Portugal, and there are few examples of pedagogical resources with integration of Portuguese Sign Language (LGP)[2]. However, this lack of examples of studies identified with the Portuguese reality, was filled in this project by the long-accumulated experience of the DERI in the teaching of the deaf, whose structure is based on three pillars: teachers of the curricular unit, with and without specialization in the field of deafness, deaf LGP teachers and interpreters. It is in the dialogue with this critical mass of solid interdisciplinary knowledge, that it soon becomes clear that the development of the project implies a series of components and actors that would require not less than a school year for its conclusion. It was then decided to adjust the contents of a second-year course—second semester, with another of the third year—both taught by the same teacher.

Let us now proceed to a synthesis of the syllabus contents of the mentioned curricular unit[3]:

a) Project Jacob 1 (production dossier) - the objective of the curricular unit is the completion of a Dossier Project and study of mechanics in Unity with a view to the production of educational videogames, with integration of original tangible interface, for the teaching of mathematics to deaf students; it focuses on the following programmatic content:
- Introduction to the field of tangible interfaces—differentiating characteristics for videogame and immersive potential; application of the principles of affordance and emotion; techniques of drawing, visualization and prototyping;
- Introduction to Arduino platforms as interface support technology and interaction with Unity;
- Presentation and planning strategies in a real project;
- Particularities and objectives of serious games;
- Questions of communication and perception of the deaf person.

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b) Project Jacob 2 (Videogame and tangible interface) - the objective of the course is the completion of an educational videogame, with integration of original tangible interface, for the teaching of mathematics to deaf students; it focuses on the following programmatic content:

- Serious game conception with LGP integration and affordance principles adjusted to the deaf person;
  Design, prototyping and production of original tangible interface with laser cutter and 3d printing;
  Project management - budgeting, task planning and team management;
- Integration of tangible interface based on Arduino platform to control applications developed in Unity;
- Video capture and editing techniques for communication in LGP;
- Execution of simple electronic circuits - general principles and techniques of welding;
- Presentation and communication strategies with real clients;
- Structuring of documentation for the sharing of design methodologies and reproduction of prototypes.

The above structure could be summarized as follows: in the first curricular unit, the entire videogame production dossier is executed, and the technical and conceptual bases necessary for its development are taught, as well as some of the technical bases necessary for its production; in the second curricular unit, the technical and conceptual knowledge is complemented and, based on the production dossier approved by the project partner, the videogame and its tangible interface are then produced.

*Milestones*

Having presented the structure of the curricular units and general lines of the development of the project, it is important to identify the milestones that set the pace and are the guarantee of its conclusion.

Curricular Unit 1:
- Week 3 | Research at the level of serious games, tangible interfaces and deaf culture;
- Week 4 | Contact with the partner and target audience - visit to the DERI for dialogue with the project's teachers and deaf students;

- Week 7 | General design concept - general concept of videogame and interface sketches;
- Week 9 | Narrative and gameplay; main layouts of the graphical environment and characters; tangible interface definition (interaction, design, materials);
- Week 13 | Presentation to DERI students of the videogame based on: concept and objectives; synopsis; gameplay supported by storyboard logic with reference to interaction with tangible interface; realistic mock-up of the tangible interface; frame diagram/game sequence; main layouts (characters and environments);
- Week 15 | Closed and revised dossier, after feedback from partners, with: concept and objectives; synopsis; gameplay; diagram; all planned layouts; aesthetic argumentation; definition of the interface tangible with materials and technical drawings; technical, aesthetic and conceptual research; application in Unity with demonstration of the general mechanics of the game.

Curricular Unit 2:
- Week 1 | Delivery of schedule, distribution of tasks and budget;
- Week 3 | Three-dimensional study of the interface (object in cardboard or fast 3D printing);
- Week 6 | Presentation partners and test with deaf students of the mechanics of videogames (alpha version 1), graphic environment and formal basis of the tangible interface;
- Weeks 7 and 8 | Capture of videos in sign language;
- Week 9 | Delivery of the edited videos to the partners for review;
- Week 10 | Review of budget and final list of materials;
- Week 12 | Delivery to the partners of the videogame version completed at the content level for validation (alpha2 version); videogame test and final format of the tangible (non-functional) interface;
- Week 15 | delivery to partners of Beta 1.0 version of the videogame and tangible interface - the project will always be open to corrections and improvements.

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These milestones seek to reconcile a coherent logic in the production of a video-game with the schedule of the project partners, and the chronology and content have been corrected throughout the three phases of the project, which have been covered; the stages that we present here are already aimed at the fourth phase that will begin in February 2018.

## Particularities of a Project for Deaf Students

It has been evident that there has been a gradual increase in the complexity of content throughout the three phases of the project. This is since it has risen from each study cycle (see "Educacaoacessivel.pt: videogames and tangible interfaces"). As would be expected, questions and concepts increase in complexity and abstraction as the cycle progresses, which justifies the introduction of glossaries with explanation of concepts in some of the games for the third cycle. By itself this is a factor that differentiates the games of the first and third cycles at the level of the time to be assigned in the planning for the capture of the videos in LGP. This planning, cannot be done solely based on the texts that will be interpreted for LGP, under penalty of becoming misaligned. This is so, because the process of interpreting the message of the Mathematics teacher for LGP is quite distinct from a simple reading, since she will always be an interpreter of LGP, which will not only guarantee good communication between the parties, but will also play a crucial role in the good performance of the gesturing deaf (the native of the language in question); it will be by his/her gestures that he/she will perceive or not the exact content of the original message. Since LGP is a language of visual acquisition and motor spatial production, generally applied in a concise and direct message (dactylology[4] is always a last resort), it is sometimes complicated to transmit abstract concepts as is the case of much of Mathematics.

Referring again to examples of this project, in questions like "how many wheels a tricycle has?" (Rodopia game - first cycle), it was enough to read the text and a brief exchange of ideas between the interpreter, Paulo Ataíde, and the deaf gesturing Marisol Coelho, so that progress could be made for the LGP video. Already when the term "arrival set" was gestured for the Math Quiz game (third cycle), although there was already a gesture filmed in the DERI for reference, the explanation of the concept was considered unclear and could be improved. Since the mathematical concept did not say anything to the gesturing person or to the interpreter, it was

necessary to explain it first to him so that he could transmit it to the gesturing person in a rigorous way; Once the concept was acquired, a three-way analysis and discussion process was followed until a more efficient gestural sequence was found. For this contributed the fact that the gesturing person not only has extensive experience in this kind of work, as she is herself a teacher of LGP; also, relevant, was the fact that she was accustomed to working with that interpreter in her day-to-day professional life. We conclude that it would not be possible for these videogames to efficiently promote the mathematical communication to the deaf student in the absence of the competences of one of the three mentioned players: teacher of mathematics, interpreter and deaf gesturing person.

Regarding the formal issues of the videos, special attention should be paid not to create any type of visual noise that would disturb the LGP message. At the level of minimizing shadows, such as the hands on the body or the silhouette projected on the background, or any kind of strange irregularity on the background surface.

Another example of how the visual acuity of the deaf influenced the development of videogames, has to do with their graphic interface and in particular with the informative elements of the game, such as points, time and the like. In the dispersion of these elements and their animation. This is a constraint that we have removed from the test of a game of the second cycle, phase in which the games began to have a more competitive strand. Although the concentration of the informative components of the game and the avoidance of the animation of these components seem to us consistent with the general good practices of usability applied to videogames, it was evident in that particular case that if this was a usability problem that did not deserve special relevancy to the players who tested the game, it was unanimous for the deaf people to point out that the animation of informative elements and their dispersion on the screen were a distracting factor of the main action to be avoided.

Also related to the visual perception of deaf people, it should be noted that there was a widespread preference among deaf students for bright and saturated colours, especially when, invited to comment on the very saturated and luminous colours of the Triple File game, they were especially pleased with them at the expense of a less saturated colour palette. Another reference in this field has to do with the background chosen for the videos, where the saturation of the blue

chroma did nothing to disturb the deaf gesturing person, demonstrating even preference for it when, in the games of the second cycle, it was confronted with the grey background option adopted in the first games.

## Educacaoacessivel.pt: Videogames and Tangible Interfaces

With the questions of the design methodology and the peculiarities of a project for deaf students dealt with, it is now important to divulge the games produced so far, and it is opted not to put the third phase here as they enter now (February 2018) in the validation phase. Let us go on to a brief description of the first and second phase games, organized by name, cycle, game synopsis, interaction format, and authors.
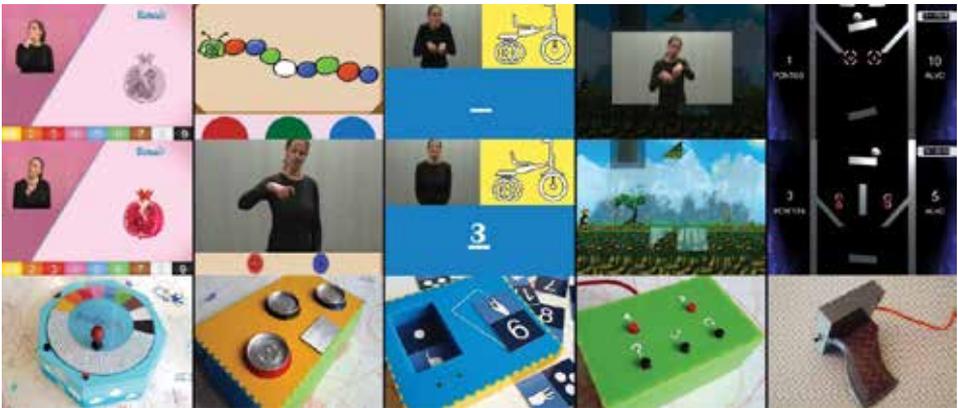


Figure 1. Phase 1: 1st cycle and preschool: Rodopia, Magic Box,
Card Box, Forest Game; 2nd cycle: Pinball.

## Rodopia

Synopsis: mini-game aimed at pre-school children. It is based on the logic of the Quiz with multiple answers (16 possibilities), combining questions asked in LGP with association of illustrated forms. It deals with colours by associating them with everyday objects, and numbers by counting these same objects; also contributes to the knowledge of LGP's basic gesturing.

- Interaction: with tangible interface - answers the questions by turning the wheel and confirming the answer by pressing the black button; To repeat

the question press the red button; with keyboard - answers the questions by pressing keys 1 to 9, whose numbers appear on the screen associated with colour; To repeat the question press the "R" key. Authors: João Henriques, João Rodrigues, Daniela Policarpo, Christian Rigstad.

## Magic Box

Synopsis: mini-game indicated to pre-school children and first cycle. It is based on the logic of the Quiz with multiple answers (3 possibilities), combining questions asked in LGP with association of illustrated forms. It treats the sum and subtraction up to 10, sequences of shapes and colours, and contributes to the acquisition of the basic LGP gesturing.

- Interaction: with tangible interface - answers the questions by touching the can with the colour corresponding to the answer that appears on the screen; with keyboard - answers the questions by pressing the "A/S/ D" keys. Authors: Alberto, Diogo Coelho, Diogo Reis.

## Card Box

Synopsis: mini-game indicated to students of the first cycle. It is based on the logic of the Quiz, combining questions asked in LGP with an association of illustrated forms and numbers. It deals with the basic gesture, quantity, counting, addition and subtraction.

- Interaction: with tangible interface - answers the questions by supporting at the top of the interface one of the fifteen available letters; with keyboard – one answers the questions by pressing keys from zero to ten. Authors: Artur Rosário, Diogo Simões Melo, João Fernandes.

## Forest Game

Synopsis: mini-game indicated to students of the first cycle. It is based on the logic of the Quiz, combining questions asked in LGP with an association of illustrated forms and numbers. It deals with the basic gesturing, quantity, counting, addition and subtraction.

- Interaction: with tangible interface - answers the questions by supporting at the top of the interface one of the fifteen available letters; with keyboard

- answers the questions by pressing keys from zero to ten. Authors: Filipe, Sérgio, António Cabaço.

## Pinball

Synopsis: mini-game for students of the third cycle. It is based on games of motor skill and mental calculation, where the goal is to subtract or add numbers along a course of mobile platforms to arrive at the proposed result. Treats the sum and algebraic subtraction of integers.

- Interaction: with tangible interface - control of the ball's course by tilting the interface to the right and left, and a button starts the game or pauses it; with keyboard - follow the above functions using the directional keys and the Enter key. Authors: Andreas Capri Melo, Bruno Catarino, Fernando Soares.



Figure 2. Phase 2: 2nd Cycle Games: Jacob's Quest, Jacob's Knight, Funthastic Math, Labyrinth, Math Hero

## Jacob's Quest

Synopsis: mini-game indicated to students of the second cycle. It is based on the logic of the Quiz with multiple answers (4 possibilities), with questions asked in LGP and by writing, in which the player must complete three areas of study organized in the form of continents. It treats the powers, the criteria of divisibility and geometry.

- Interaction: with tangible interface - responds to the question by turning a knob to four-positions, which corresponds to the lighting of a LED, and confirming the option by pressing the red button; with keyboard - answer the questions by pressing the "1/2/3/4" keys plus the Enter key to confirm. Authors: David Filipe, Gonçalo Moura, Gonçalo Reis.

## Jacob's Knight

Synopsis: mini-game indicated to students of the second cycle. It is based on the logic of the adventure game, where a warrior has to clear a path full of strange geometric compositions answering the questions posed, in written form and in LGP, selected one of the six available geometric forms. Treat geometry.

- Interaction: with tangible interface - answer the question by pressing the button with the corresponding geometric shape; with keyboard - answer the questions by pressing the "1/2/3/4/5/6" keys which in the graphic interface have an associated geometric shape. Authors: André Fernandes, André Reis, Eric Spenner, Rodrigo Bulhões, Luís Picareli.

## Funthastic Math

Synopsis: mini-game designed for students of the second cycle. It is based on the logic of the adventure game, in which the punctuation depends on the answer to the problems presented during the course of a deaf superhero, by three distinct environments; some problems require the rapid association of other forms, others are questions posed in written form and in LGP. It deals with Geometry.

- Interaction: with tangible interface - responds to problems by putting the corresponding three-dimensional form at the top of the interface; with keyboard - responds to problems by pressing the "1/2/3/4/5/6" keys which in the graphical interface have an associated geometric shape. Authors: Tiago Oliveira, Marco Rodrigues, Rodrigo Azevedo, Tiago Jesus.

## Labyrinth

Synopsis: mini-game indicated to students of the second cycle. It is based on a labyrinth, in which the doors that block passages open with the right answer given to problems that are presented in written form and in LGP. It deals with divisibility criteria.

- Interaction: with tangible interface - the pathway is controlled and answers the questions by pressing the three directional keys of the interface; with keyboard - follows the above functions using the directional keys. Authors: Vitor Pais, João Santos, Ana Brito.

## Math Hero

Synopsis: mini-game indicated to students of the second cycle. It is based on the logic of the adventure game, where a superhero has to fight various animals and robots to complete, within a limited time and lives, each of the six scenarios presented; its success depends on how it responds to multiple-response problems (3 possibilities) that are presented in written form and in LGP. It deals with divisibility criteria.

- Interaction: with tangible interface - opponents are selected to fight by means of a joystick and to answer the questions by pressing one of the three available buttons; with keyboard - select the opponents with the mouse and answer the questions by pressing the "5/6/7" keys. Authors: André Santos, João Almada, Rafaela Pereira.

We conclude this synthesis with a general observation regarding the tangible interfaces, which were defined from the beginning as a mandatory part of the project, not only because their study and prototyping are competences that the structure of the Videogames degree leaves for the disciplines involved, but also considering by the DERI that its immersive and playful potential would be an asset to the deaf student. Since in technical terms there has been an evolution of processes, in which in the first phase we used primarily acrylic laser cutting techniques, in the second phase we have already combined that technique with 3D printing and integration of more advanced input systems appealing in the third stage, which we did not document here, all the commands were made in 3D printing and the laser technique used in the storage boxes.

As for the processing-sensor platforms used in the interfaces and the software used in the production of the game, in the first phase, two of them used Adobe Flash (AS3) in conjunction with the Phidgets platform, while two others resorted to Unity with MakeyMakey. Both options produced good results, however the choice of Phidgets raises issues of dissemination and updating, as it requires the

installation of drivers and an operating system configuration; as far as Flash, it no longer makes sense from the moment the degree removed it from the curriculum. Unity's conjugation (degree curriculum and degree software) with MakeyMakey proved to be the best solution, by avoiding the previous problems, although the rather high cost of the board was considered a problem. So, in the second and third phases, the Arduino platform was chosen in its Leonardo and Micro models, which also allows us to work with the keyboard input logic that characterizes MakeyMakey and at a more affordable price.

## Application of Videogames in DERI

It is important to mention that there is a systematic study of the application of videogames among students, these supports being taken for a team of Mathematics teachers of the DERI as a tool of daily work without scientific study objectives. For this committed and dynamic team of teachers, the urgency expressed in the seminal project meeting remains the same: to improve the way of communicating Mathematics to the deaf student in a reality where the pedagogical support resources in LGP practically do not exist. The following brief text seeks to frame the application format of videogames, identify problems and gains, while pointing to a positive response from the deaf student to this pedagogical format that serves us all as an incentive.

## Classroom Application Methodology

Videogames have been applied regularly during the weekly 45 minutes that the 28 deaf students have foreseen in the time for application and development of the Mathematics Incentive Project. Usually students play in pairs, taking into account that there are no computers for everyone, and in the second and third cycles of Basic Education, that game dynamics also has a pedagogical purpose, in the sense that one of the students registers the answers so that they are later discussed in group and with the teacher. In addition to the project curricular units, videogames have also been used in Mathematics classes, when it is intended to consolidate or revise a topic already addressed in one of the videogames. The videogame is then applied in the performance of consolidation exercises or review of learning through a non-traditional approach, and that is very appealing to the deaf student: "playing" on the computer.

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## Problems, Capital Gains and Results

These videogames have contributed to fill some of the problems felt in the teaching of Mathematics, such as there are no pedagogical or playful materials for deaf students, or the fact that the Portuguese Sign Language does not have gestures for most of the mathematical terms. This deficit is, in general, circumvented by the autonomous creation of codes within the classroom, information that the student loses when he or she changes school or teacher, since its validity boils down to that school or room. The glossaries of terms that were integrated in some of the games of the third cycle, will be an asset here, as they will allow the expansion of that gesturing beyond the DERI.

Other positive factors that stands out in these videogames are their dimension of pedagogical tool for students, teachers and families that do not dominate LGP. Its playful nature encourages the informal learning of Mathematics and contributes to a more solid learning that will tend to endure over time.

Regarding the observation of the impact that the games have had on the learning of Mathematics, it should be noted that its application is still recent, and no sustained analysis of results has yet been made, however some suggestions are already possible. First, the fact that we have not observed any problems of understanding the gameplay or the handling of the tangible interfaces. This is a general indicator that contributes to the notion of a positive impact of videogames on the learning of deaf students with a specific individual curriculum, a conclusion supported by the fact that, despite the above-average learning difficulties, they are also able to answer questions that are proposed until it becomes common for students to stand out, in spite of having with greater difficulties in relation to the curricular unit. The game in pairs, being the answers discussed and explained in pairs, proves to be advantageous, since students use the game to communicate and discuss mathematical reasoning.

## Conclusion

We conclude this exposition, with an observation regarding the quality of the games, the commitment of the students and the interfaces. Thus, it is important to note that we place these mini-games at a level that allows them to be applied in the classroom in an area as deficient in pedagogical content as the teaching of Mathematics to the deaf, but we are aware that they would have to be profoundly improved, to attain a level of commercial demand. However, in line with the DERI, it has been decided to make all the games available, if they are functional and correct in their content, leaving the validation process in the hands of the deaf students and their respective teachers. An example that this may be a wise decision, can be found in the game Labyrinth, which, although strict in content, we consider having problems of layout and gameplay that called into question its delivery. However, it has proved to be one of the most sought by Jacob's deaf students.

As for the commitment of the students of the Videogames degree throughout the two curricular units involved in the project, it is necessary to emphasize a common sense of responsibility that is expressed in the conclusion of all projects that have reached the stage of development (the second discipline), although many of the times it has forced a logic of commitment to the students that went beyond the moment of evaluation. As such, it was common to most projects to request improvements and corrections of contents at a date after the conclusion of the course.

Regarding one of the most obvious problems in the games, the fact that short-term ones quickly exhaust their pedagogical potential for the same student, in two of the games of the third phase has already been included a question-and-answer editor that will allow teachers to update problems as they see fit.

At the time we publish this text, we are already working on the fourth phase of this project. The approval of both partner institutions for a further cycle and the positive impact on the learning of deaf students observed in the DERI, leave a validation aspect that is indispensable to the continuity of the project, however, we are aware that this is an opportunity of excellence to make a study, according to the good practices of gauging the collection and study of data, of the effective impact that videogames have on the learning of deaf students: "does mathematical knowledge differ among deaf students who use these supports from those

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who do not?", "the results obtained by deaf students are different from those obtained among hearing students?", "is the tangible interface really an asset in the interaction with the game?". These are just some of the questions that need to be answered in future studies.

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## Notes

1  The meeting "Mathematical Communication in the learning process of the deaf student" took place at the Centro Cultural Casapiano, 12 January 2018 and was organized by DERI with communication support by HLHT.

2  The LGP Academy is an exception, and consists of a repository of LGP videos for various areas of study; is a project that results from a partnership between DERI and the Portugal Telecom Foundation and has an address at <http://videos.sapo.pt/academialgp>.

3  We opt in this case for giving a general name to the curricular unit because the current name does not reflect its contents.

4  Dactilology consists in the formation of words by means of the reproduction of the respective letters in manual alphabet.

# Video Games, Flow and Subjective Well-Being. An Exploratory Study With University Students in Portugal

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### ABSTRACT

Immersive technologies have transformed online gaming into a multiplayer mode of play in a social presence logic characterised by a flow. This concept is often termed as "optimal experience" and reflects the state in which the individual is fully involved immersed in the action. Flow is a state of mind related to how a person is immersed, has the pleasure and is engaged in performing a particular task.

"A flow of experience in video games reflects subjective well-being?" is the research question that guided the exploratory study with the objective of assessing if there is a correlation between immersion and subjective well being through technological mediations in video games. The study was developed with a sample of 120 university students and operated through an extensive qualitative methodological strategy. The majority of respondents are male, with an average age of 27, a public higher education student in an area within the Exact Sciences, living in an urban area and not living with the parents.

The results showed that the experience of flow does not reflect into subjective well-being, mobilising negative affection instead. It was verified that the flow is directly related to an immersive experience, a dimension of absorption of video games and the idea of presence. In this regard, it was found that the higher the flow, the more significant are the other dimensions of engagement in video games (absorption, immersion, and presence). It was concluded that there is a prevalence of subjective malaise associated with the gaming experience in its four dimensions. It follows that emotions such as fear, nervousness, and disturbance are present in the negative affection that correlates with the dimensions of engagement in video games. The more involvement in the game, the higher the negative affect and the less the positive affection.

**Keywords**: Flow; Subjective Well-Being; Immersive Experience; Emotional Experience

## Introduction

The use of technology in Portuguese society is evidence proven by several scientific studies. According to a report of the Regulatory Entity for Social Communication, "96.3% of individuals between 15 and 24 years of age are regularly enrolled in the network; in those over 65, this figure is only 11.5%" (ERC, 2016, p.15). One of the relevant aspects referring to different studies is that video games are an integral part of the everyday life of the younger generations.

A report by OBERCOM (2014) indicates that the generation of 15-25 refers to playing video games over the Internet as the 11th activity (27.9%). Amaral, Reis, Lopes and Quintas (2017) analysed practices and consumption of Portuguese youth in digital environments, concluding that 43% of respondents consider playing online as the 3rd preferred. A study developed by Brand, Lorentz, and Mathew (2012) reveals that 90% of people between 16 and 25 years old play video games. However, video games are no longer a solitary activity, 70% of gamers does it collectively (Brand et al., 2012).

Ortoleva (2009) emphasises the impossibility of dissociating technology from social processes, which inevitably refers to its condition of "social presence". The author considers that the social processes are directly associated to the technical alterations, affirming thus that "technology being as much a socio-cultural reality as literature or religion, modern societies being made of people and artefacts" (Ortoleva, 2009, p. 2).

The appropriation of technology and technological mediations in online games often allow the construction of the persona and the extension of the self (Amaral, 2008). Turkle refers to virtual environments as "self-consciously reflexive space, an arena where 'you are who you pretend to be' and where the self is the sum of these mythologies distributed over the net as a whole" (1995, p. 192). Virtual spaces as immersive environments (Amaral, 2008) refer to the notion of flow.

Flow is one of the concepts that begin to arouse interest in the scientific community for the study of virtual environments. This concept was developed by Csikszentmihalyi and reflects a state in which the individual is fully involved in the action, occurring when the subject consider that the challenges are balanced with their skills and take pleasure only for the execution of the task itself. Flow is a state of

mind related to how a person is immersed, takes pleasure and is involved in the process of performing a specific task (Csikszentmihalyi, 1990). It is a state also referred to as the optimal experience.

This exploratory study aims to answer the following research question: "A flow of experience in video games reflects subjective well-being?". The purpose of this paper is to assess whether there is a correlation between immersion and subjective well-being through technological mediations in video games.

## Video Games

The advancement of technologies has contributed to video games becoming part of the daily lives of Internet users, particularly in the context of youth cultures. Amaral considers that "the phenomenon of 3D environments on the Internet that provides immersive experiences and the growing adherence to these alternative universes has been a dominant note in the evolution of Cyberculture, giving it its own socio-cultural character" (2008, p. 325).

The idea of transcending boundaries of space and time, associating virtual spaces of play with "shared social construction" that allows the significations shared by groups "that presence is replaced by belonging" (Amaral et al., 2017, p. 110). In the same line of argument, Gadamer (1997) suggests that gambling is the extreme of art and vice versa. Thus, the work of art and the game itself have always transcended the limits of temporality and, consequently, of spatiality, by allowing the encounter of horizons separated by different distances and differences.

Ramos explains that the human "has made use of instruments to ensure their survival. These instruments function as mediators between man and the world, expand their physical and mental capacity, make it possible to overcome barriers and enable their own evolution" (2008, p.52). Given this relationship we establish with the instruments, Galimberti (2006) states that we are in the age of technique. In this sense, it is essential to understand the appropriation that individuals, singularly or in groups, make of technology.

According to Ramos (2008), video games agglomerate possibilities of development and relational and cognitive transcendence. Cognitive in that work the reasoning speed, manipulation of variables and controls, concrete and abstract

challenges, command and control strategies. And relational because from these arise new relationships with the device, the video game itself or with other users. In communities and with players, the relational dimension occurs in a mediated way through online or online communication technologies.

The technical evolution allows us to understand that we are in an era where the technological resources of the games are materialised to work ludic aspects, imaginary, fictional and immersive. These types of games turn to an audience able to manipulate various resources of Communication and Information Technologies (ICT). According to Rushkoff (1999), this generation is called "screenagers" and interacts with remote controls, joysticks, mouse, Internet, as well as thinks and learns in a differentiated and discontinuous way.

Video games have been analysed from emotions that trigger the players. Bernhaupt, Boldt, Mirlacher, Wilfinger and Tscheligi (2007) argue that one of the main reasons players engage in a game is to change their emotions. Happiness, irritation, surprise, and anxiety are expected emotions that encourage players to play.

Gallo (2003) emphasises that many considerations are divided into two approaches to the nature of video games and their influences on man and contemporary society. These two approaches are summarised as apocalyptic and integrated. The first is the most widespread and alleges that, by trivialising violence, the game provokes aggressive behaviour among its users. Such statements are usually supported by tests and experiments of the type comparative between the social behaviour of people who play with those who do not play video games. The integrated approach understands that the contact with a video game is an almost irreversible process in contemporary culture and should be used for more "useful" activities, such as in the treatment of problems of motor coordination, development of exercises of reasoning, logic, reflex and integration, initiative and cooperation activities. Gallo argues, "'the medium is not the message', that is, the video game can acquire its own characteristics according to its use" (2003, p. 2).

Alves (2003) states that violence presented in these technological supports favours a therapeutic effect that enables subject a catharsis, in which channel their fears, desires, and frustrations in the other, but also the characters that represent them in games of images universe. Gamers identify themselves with the winner, sometimes with the loser. Thus, "violence is considered constructively, as a driving force for the development of these individuals" (Alves, 2003, p. 438).

An investigation developed by Alves aimed to study the influence of electronic games on players' daily lives and their possible implications for "violent" behaviour. The findings have revealed the video games allow "the construction of concepts related to social aspects, cognitive, affective and cultural" (2003, p. 437). According to Alves, video games of different narratives and contents "act in the Zone of Proximal Development of the subjects, in a playful, pleasant and attractive" (2003, p. 437).

## Well-Being And Subjective Well-Being

Defining well-being is a difficult task because it can be influenced by several variables such as gender, age, socioeconomic level and sociocultural level. Well-being is identified when a person experiences satisfaction with life. The frequent presence of positive emotions and the relative absence of negative emotions translate the notion of well-being. Giacomoni states, "the relative preponderance of positive affect over negative is referred to as hedonic scales" (2004, p. 44).

Paiva (2014) reports that the hedonic tradition began with the philosophers Aristippus, Epicurus, Bentham, Hobbes and Lock, who argued that well-being was related to the positive emotional states arising from the satisfaction of desire. In this sense, "the experiences of pleasure, unconcern or happiness translate the concept of well-being" (Paiva, 2014, p.19). According to Giacomoni, (2004), different approaches regarding the quality of life of individuals were analysed over time:

> Economics evaluates the quality of life of societies through the number of goods and services that are produced by the communities. Social scientists, on the other hand, add critical social indicators such as low crime rates, life expectancy, respect for human rights, and equitable distribution of resources to the objective assessment of the economy. A third approach to defining and assessing the quality of life is subjective well-being (2004, p.43).

Galinha and Ribeiro (2005) consider that the concept of subjective well-being in the last decades has been of interest in the field of Psychology. The authors explain that

> Subjective well-being is a positive dimension of health. At the same time, it is considered a complex concept, which integrates a cognitive

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dimension and an affective dimension, and a field of study that encompasses other significant concepts and areas of research such as Quality of Life, Positive Affect, and Negative Affect. It is a recent concept that has aroused in the last decades the widespread interest of many aspects of Psychology, and that has been reinforcing its identity, as studies confirm its structure and system of associated concepts (2005, p. 204).

In this line of thought, Galinha e Ribeiro define subjective well-being as

> an enduring (long-term) affective state that is composed of three components: the accumulated experience of Positive Affect in salient domains of life; accumulated experience of Negative Affect in salient domains of life; and evaluation of Global Life Satisfaction or in important domains of life (2005, p. 211).

According to Giacomoni, the main theories and models that explain subjective well-being can be divided into "two large opposing blocks called bottom-up versus top-down" (2004, p. 45). The author states that "the main initial theories of subjective well-being were focused on identifying as external factors, sociodemographic situations and variables affected happiness" (Giacomoni, 2004, p. 45). These approaches were called bottom-up and explained that satisfying needs produced happiness. The constant search for answers to needs could, in reverse, lead to unhappiness. The researcher explains that the degree of satisfaction that leads to happiness depends on several factors such as past experiences, personal values, level of aspiration, ability to adapt. Giacomoni argues that "other factors associated by these theories are the experiences of daily pleasurable events being related to positive affection, as well as their opposite, events that are not pleasurable associated with negative affection" (2004, 45). The top-down approaches to subjective well-being presuppose that individuals have a predisposition to interpret situations. This assessment can be positive or negative and directly influences how the individual understands their life experiences. Subjective well-being, depending on an assessment of the individual's life events, is directly related to "personality theories and their different models, the so-called discrepancy theories and the theories regarding coping and adaptation processes" (Giacomoni, 2004, p. 45).

Measuring subjective well-being is possible through the correlation of different variables that contribute to it (Giacomoni, 2004; Galinha & Ribeiro, 2005).

Satisfaction, positive affect, and negative affect are the primary components of subjective well-being.

## Flow

Flow is a state of mind that concerns the immersion of an individual in the performance of a specific task (Csikszentmihalyi, 1990). As we have previously mentioned, it is also termed "the optimal experience." Although the concept was not initially explicitly defined for the field of video games, over time researchers have found similarities between flow and game characteristics (Sherry, 2004).

Csikszentmihalyi (1990) has developed some theories to help people enter the state of flow. Since then, these theories have been applied to various fields of interactive experiences. One of his most inspiring achievements in these theories is the definition of the flow zone, also known as "the zone".

To maintain a person's flow experience, the activity to be developed needs a balance between the challenges and the abilities of the participant. If the challenge is higher than the participant's skills, the action generates anxiety for the inability to complete it. If the challenge is less than the individual's ability, it can lead to boredom. According to Csikszentmihalyi (1990), humans have tolerance, and there is a fuzzy safe zone where activity is neither too challenging nor too dull. Due to the unique relationship between challenge and skill/ability, the concept of flow has been used in areas such as sport (Csikszentmihalyi, 1990).

Csikszentmihalyi (1990) identified eight main components of flow: challenging activity requiring skill; merger of actions and awareness; clear goals; direct and immediate feedback; concentration on the on-going task; a personal sense of control over a given situation; loss of self-awareness; the sense of time. However, it is important to note that not all components are necessary for a flow experiment to be possible. In this sense, the flow can occur in any activity performed.

According to O'Neill, flow can be characterized as a state in which "the activity in which the individual engages takes to surrender totally offering all its capabilities, as these skills are going thus developing challenges have 3 to be larger to achieve the flow state" (1999, p. 35).

Nunes (2015) developed a study with the primary objectives of exploring the influence of the type of perspective (first person vs third person) in the flow, identifying

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the avatar and the feeling of presence in a virtual environment, and analysing the association between these variables according to the type of perspective. The research results revealed that the kind of perspective in video games influences the immersion and flow. The author stresses that participants who played in the perspective of the third person had higher levels of absorption and flow. The author also points out that from the study developed was found "a greater association between flow and identifying the avatar, between the flow and the sense of presence, between the flow and pleasure and between the flow and cognitive difficulties" (Nunes, 2015, p.37). Therefore, the video games are designed to maximise and prolong player engagement, increasing pleasure, which includes flow (Nunes, 2015).

## Exploratory Study: Video Games, Flow And Subjective Well-Being

### *Methods*

This empirical study aims to answer the following research question: "A flow of experience in video games reflects subjective well-being?". The primary purpose of this paper is to assess whether there is a correlation between immersion (flow) and subjective well-being through the technology in video games. This assumption implies the following specific objectives: i). Analyse the flow dimensions in the gamers; ii). Assess whether there is a correlation between flow and subjective well-being as measured by the individuals' emotional experience in online gambling; iii). Understand whether there is a link between subjective well-being and online gaming activity. The working hypotheses outlined for this research are as follows: H1). Flow is associated with subjective well-being; H2). The sensation of immersion is associated with the experience of flow; H3). Subjective well-being is related to the feeling of belonging.

The empirical study was operationalised through a quantitative-extensive methodological strategy using an online questionnaire survey. Sampling is non-probabilistic collected through the snowball process. The research involved the application of a set of instruments for data collection, which were grouped into a single questionnaire made available online to the participants. For the analysis and data processing, we used the software Statistical Package for Social Sciences (SPSS), version 23.0. Data were analysed using descriptive and inferential (bivariate) statistical analysis.

Descriptive statistical analyses were carried out allow to explore the socio-demographic characteristics of our sample. In the bivariate analysis, we used the

non-parametric Mann-Whitney U tests, the Kruskal-Wallis H test, the Chi-square test, and Pearson's parametric correlation coefficient.

The instruments applied in our research were four: 1). Socio-demographic questionnaire – the socio-demographic questionnaire is composed of open and closed questions, which allowed to collect more detailed information about the characteristics of the study sample, through the following variables: age, sex, educational establishment, the area of study, worker-student, professional occupation, workplace, residence, cohabitation with parents. 2). Questionnaire on digital consumption - the questionnaire on digital consumption consists of open and closed questions with the objective of collecting information about the frequency of access to the Internet, number of hours online (for daily access), equipment for accessing the internet, online play, the frequency of playing online, devices to play. 3). Game Engagement Questionnaire - the scale we used to measure the flow was the Game Engagement Questionnaire (GEQ) by Brockmyer, Fox, Curtiss, McBroom, Burkhart and Pidruzny (2009). It is composed of four dimensions of the flow: absorption (items 3, 4, 8, 9 and 14), flow (items 5, 6, 7, 10, 11, 12, 15, 16 and 19), immersion (item 18) and presence (items 1, 2, 13 and 17). This scale has been translated into Portuguese by Nunes (2015). Participants had to respond through a Likert scale of 1 to 7 (1 = Strongly Disagree and 7 = Strongly Agree). This scale presents a general Cronbach alpha of .80, .75 for absorption, .66 for flow and .28 for presence. Once the flow had a low Cronbach's alpha, Nunes (2015) decided to withdraw the items 12 (Play it seemed automatic) and 16 (Play made me feel calm), and the alpha has risen to .74. As the presence had a meagre alpha value, even removing two items, this measure was not used. 4). PANAS scale - the scale used to measure subjective well-being was the reduced version of the PANAS (Positive and Negative Affect Schedule), developed by Watson, Clark and Tellegen (1988) to measure Positive Affect and Negative Affect, defined as general dimensions which describe the affective experience of individuals. The negative affection translates displeasure and subjective discomfort, allowing understand that includes fear, nervousness, and disorder (Galinha, Pereira, & Esteves, 2014). The positive affection refers to pleasure and well-being positive, including emotions such as enthusiasm, inspiration, and determinism (Galinha, Pereira, & Esteves, 2014). Galinha and Ribeiro (2005) adapted the scale to the Portuguese version (PANAS-VRP). The temporal references used for the study sample were: "how you feel today", "in the last days",

"in the last weeks" and in general. The Cronbach's alpha value of this instrument was 0.77 for positive affect items and 0.84 for negative affect items.

*Procedures*

To collect a non-probability sample, it was decided to build and operate an instrument in digital format and simplified data collection. The questionnaire was submitted to a pre-test, sent by e-mail to 7 individuals, with the purpose of ascertaining if everything was working as intended. All responses from this step were not included in the final result database.

Participants were recruited through the Internet (via email and Facebook promotion - groups and personal profiles), and the instrument hosted in Google Drive, accompanied by the identification, scope, and objectives of the study.

All responses were anonymous and accompanied by informed consent that ensured informed participation. Obtaining informed consent was a prerequisite for completing the survey. Data collection took place from April 12 to July 12, 2017.

*Participants*

The study was developed with a sample of 120 participants. The requirements to participate in this study were to be a college student, to play online and, consequently, to access the Internet. All respondents accessed the Internet and are university students aged 17 to 39 years. Of the 120 participants, despite the stated requirement, 17 respondents do not play online. Concerning the conciliation between work and education, we found that 35% of respondents are student-workers. We found that 46 of the participants did not cohabit with the parents (38.3%), and the remaining 74 lived in the parents' home (61.7%). Our sample has a predominantly urban population (65.8%).

## Results and Discussion

Table 1 presents the socio-demographic characteristics of our sample. The majority of respondents are male ($n$ = 62), with an average age of 27.43 ($SD$ = 33.17). Most of the participants are students of public higher education (64%) in an area within the Exact Sciences (65.4%), are working students (65%) and perform functions in security services and selling (28.8%), live in urban areas (65.8%) and do not cohabit with parents (61.7%).

Table 1. Socio-demographic characterization (N = 120)

| Age | *n* | % |
|---|---|---|
| (*M =* 27.43*; MO =* 21; *SD =* 33.17) | | |
| 17 - 20 years | 21 | 17.5 |
| 21 - 30 years | 66 | 55 |
| 31 − 39 years | 7 | 5.8 |
| No answer | 26 | 21.7 |
| Sex | | |
| Male | 62 | 51.7 |
| Female | 32 | 26.7 |
| No answer | 26 | 21.7 |
| Educational establishment | | |
| Public | 75 | 64 |
| Private | 45 | 36 |
| Study field | | |
| Exact Sciences | 77 | 65.4 |
| Social and Human Sciences | 43 | 34.6 |
| Working Student | | |
| Yes | 78 | 65 |
| No | 42 | 42 |
| Professional occupation | | |
| Military professions | 3 | 2.4 |
| Intellectual and scientific activities | 3 | 2.4 |
| Security service workers and sellers | 36 | 28.8 |
| Work Regime | | |
| Full-time | 21 | 17.5 |
| Part-time | 25 | 20.8 |
| Residence | | |
| Rural | 41 | 34.2 |
| Urban | 79 | 65.8 |
| Cohabitation with parents | | |
| Yes | 46 | 38.3 |
| No | 74 | 61.7 |

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Table 2 presents the digital consumption of our sample. It is worth mentioning that 77.5% of the participants access the Internet daily, with the majority (48.8%) spending no more than 5 hours online. We also point out that 8.8% of respondents stated that they were online between 12 and 15 hours and 5.6% spent between 16 and 18 hours a day on the Internet. The relevance and preponderance of mobile devices are also evident in the data presented in particular regarding Internet access (laptop computer - 65%, mobile phone - 69.2%). Regarding online gaming activity, the laptop  (63.3%) is the most used device, and the desktop computer (22.5%) and the mobile phone (18.3%) have relatively close values.

Table 2. Digital consumption

|  | *n* | % |
|---|---|---|
| Frequency of daily Internet access | | |
| Daily | 93 | 77.5 |
| No answer | 26 | 21.7 |
| Daily number of hours online | | |
| 0 to 5 hours | 54 | 45 |
| 6 to 10 hours | 40 | 33.3 |
| 12 to 15 hours | 12 | 10 |
| 16 to 18 hours | 9 | 7.5 |
| No answer | 5 | 4.2 |
| Devices to access the Internet | | |
| Desktop computer * | 29 | 24.2 |
| Laptop * | 78 | 65 |
| Mobile phone * | 83 | 69.2 |
| Tablet * | 18 | 15 |
| Play Online | | |
| Yes | 103 | 85.8 |
| No | 17 | 14.2 |
| Devices to play online | | |
| Laptop * | 76 | 63.3 |
| Desktop computer * | 27 | 22.5 |
| Mobile phone * | 51 | 18.3 |
| Console * | 9 | 8.3 |
| Tablet * | 2 | 3.3 |

In this study, we sought to assess whether there is a relationship between the variable sex and the activity of playing online. Using the Chi-square test of independence was found that there was no significant association between variables "play online" and "sex" (, as demonstrated by the table 3.

Table 3. Double entry table with the variables "play online " and "sex"

|  | | Play Online | | Chi-Square Test |
| --- | --- | --- | --- | --- |
|  | | Yes | No | |
| **Sex** | | ***n* (%)** | ***n* (%)** | |
|  | | | | = .011 |
|  | Female | 35 (29.2%) | 6 (5.0%) | |
|  | | | | *gl* = 1 |
|  | Male | 68 (56.7%) | 11 (9.2 %) | ***p*** = .916 |

In this phase of the study proceeded to the analysis of correlations between the variables under study, by calculating Pearson's correlation coefficients. Preliminary analyses were performed to guarantee the non-violation of the assumptions of normality, linearity, and homoscedasticity.

Table 4 shows the correlation between the dimensions of the Game Engagement Questionnaire (absorption, flow, presence, and immersion) and PANAS scale (positive affect and negative affection) to understand the direction and the force between the variables. The associations between the different variables are most significant. It is possible to verify that the absorption has a strong correlation (*r* > .50) and positive with the dimensions of the flow, immersion, and presence, also relating positively but moderately (*r* > .30) with the negative affection. The results further demonstrate that the absorption has a negative ratio and poor (*r* < .1) with the average of the positive affection, which indicates that the higher the absorption is less positive affection. The flow dimension is positively and actively correlated with immersion and presence (*r* > .50), and is also positively and moderately related to negative affect (*r* = .298). We further noticed that the flow has a negative and low positive affect the relationship (*r* = -.082), which allows understanding that the higher the flow is less positive affection. These results contradict our first working

hypothesis (flow is associated with subjective well-being) and reinforce the second working hypothesis we outlined (the sensation of immersion is associated with the flow experience). The mean of the immersion dimension is positively and significantly related to the presence ($r = .568$) and the negative affection ($r = .267$), and it is negatively and weakly associated with the positive affection ($r = . 021$). Therefore, the higher the immersion, the lower the positive affection. The present relates to small and negative to positive affect, wherein the ratio is also low but positive linked to negative affect. Also, this result shows that the third working hypothesis that we advanced is not verified (subjective well-being is associated with the sense of belonging), and the higher the presence - and, therefore, the feeling of belonging - the less positive affection. The mean of the positive affect is weakly and negatively related to the negative affect.

Table 4. Pearson's correlations between the means of the dimensions
of the Game Engagement Questionnaire and the PANAS scale

| Dimensions of the scales | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Mean of absorption | — | .771** | .639** | .546** | -.084** | .357** |
| 2. Mean of flow | | — | .656** | .747** | -.082** | .298** |
| 3. Mean of immersion | | | — | .568** | -.021 | .267 |
| 4. Mean of presence | | | | — | -.183 | .172 |
| 5. Mean of positive affect | | | | | — | -.013 |
| 6. Mean of negative affect | | | | | | — |

Dimensions of the Game Engagement Questionnaire: absorption, flow, immersion, and presence. Dimensions of the PANAS scale: positive affect and negative affect.

**. Correlation is significant at the 0.01 level (bilateral).

Table 5 presents the analysis of the "flow" dimension in independent samples. The non-parametric Mann-Whitney U test was used to compare two different groups (female and male) whose requirements to apply Student's t-test were not verified. In the Mann-Whitney U non-parametric test no statistically significant differences were found regarding the "flow" dimension between males ($Md$ = 3.11, $n$ = 70) and females ($Md$ = 3.88, $n$ = 33), $U$ = 929, $p$ = 0.111.

The nonparametric Kruskal-Wallis test did not present statistically significant differences in the three age groups of the participants regarding the "flow" dimension (17 to 20 years, $n$ = 29, $Md$ = 3.11;21 to 30 years, $n$ = 68, $Md$ = 3.28; 31 to 39, $n$ = 6, $Md$ = 4.06; $p$ = 0.392).

Table 5. Analysis of the variable "flow" according to sex and age (categories)

| | | *n* | *md* | *U/H* | *p* |
|---|---|---|---|---|---|
| **Sex** | **Male** | 70 | 3.11 | 929 | 0.111 |
| | **Female** | 33 | 3.88 | | |
| **Age** | 17 to 20 years | 29 | 3.11 | | |
| | 21 to 30 years | 68 | 3.28 | 1,873 | 0.392 |
| | 31 to 39 years | 6 | 4.06 | | |

## Conclusions

In this paper, we aimed to assess whether there is a correlation between immersion, flow, and subjective well-being through technological mediations in video games. We analysed the flow dimensions in gamers, measured the individuals' emotional experience of online gaming, and sought to understand whether there is a link between subjective well-being and video games.

The study conducted shows that the flow experience is not associated with subjective well-being. It is found that the higher the absorption, the flow, the presence and the immersion, the less positive affect there is, that is, the less is the satisfaction with life and the subjective well-being. Conclusively, the correlations between the dimensions of the Game Engagement Questionnaire and the PANAS scale show that there are statistically significant differences. The results express that there are weak correlations between engagement dimensions in games (absorption, flow, presence, and immersion) and positive affect. In this sense, working hypothesis H1 is not proven (flow is associated with subjective well-being). We conclude that the flow experience does not translate into subjective well-being, mobilising instead negative affect.

The study results also allow concluding that the higher the absorption, the higher the flow of experience. As well as the higher the flow, the higher is the presence. The results show that the flow dimension is positively and strongly correlated with immersion and presence (*r > .50*), also being related positively and moderately to the negative affect as mentioned above. It was verified that the flow is directly related to an immersive experience, a dimension of absorption of video games and an idea of presence (which can be classified as a feeling of belonging). Accordingly, the higher the flow, the more significant are the other dimensions of engagement in video games (absorption, immersion, and presence). We then validate the working hypothesis H2 (the immersion sensation is associated with the flow experience).

The results also demonstrate that the presence is weakly and negatively related to the positive affect, and the relationship is equally weak but positive with the negative affect. Indeed, we note that subjective well-being is not associated with the sense of belonging, and the higher the presence - and, therefore, the feeling of belonging - the less positive affection. This result allows us to conclude that the working hypothesis H3 (subjective well-being is associated with the sense of belonging) that we have advanced is not verified. Being the feeling of belonging materialised in the presence, we found that the higher this dimension of the engagement in the video games, the less the positive affect. An important issue to highlight is that we have confirmed that there are no differences in the activity of playing online in independent samples such as sex and age groups.

The main conclusion of this paper is that there is a prevalence of subjective malaise associated with the gaming experience in its four dimensions. It follows that emotions such as fear, nervousness, and disturbance are present in the negative affect that correlates with the dimensions of engagement in video games. In this sense, the more involvement in the game, the higher the negative affect and lower positive affect.

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# Cyber-Detective - A Game for Cyber Crime Prevention

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## *ABSTRACT*

Technologies are increasingly becoming a part of the daily lives of younger generations and with no supervised usage of these technologies, teenagers are exposed to various threats. To raise the awareness of teenagers in ages between 14 and 17 years old, and to provide a methodological tool for educational professionals working with the young and even for enforcement professionals investigating the cyber cases, an educational game about cyber security was designed and prototyped.

A detective game was devised, where the player takes the role of a detective to investigate a cyber crime. To solve the case, the player must play several mini-games, where each one explores a specific thematic about cyber security. For example, in the prototype, the situation that the detective needs to solve is a ransomware case. The situations are introduced by a tridimensional animation, which appears as a cutscene introducing the game scene. It is an animation where one can see a teen trying to buy a pair of sneakers online and after downloading an application suggested in the website, his mobile phone is locked. Thus, he decides to search help from the police, where the detective will try to solve the problem. For that, the player has to solve several mini-games about sharing information in social networks, phishing and the importance of creating strong passwords. In these mini-games the player makes decisions and learns based on that, i.e., at the end of each mini-game each decision is explained to the player regardless of the choice being correct or incorrect. This way, the player is always informed of the various situations that can occur based on their behavior/decisions online.

The prototype was developed for mobile devices and some preliminary tests were performed with teenagers. The tests showed that the teenagers improved their cyber security knowledge after playing the game.

A cyber security educational game can be used as a tool for younger generations because it uses the technologies that are part of their daily lives and can contribute to the growing of their cyber security awareness.

In the future, we hope to develop the full game, where other thematic will be included, namely, talking with strangers in social networks, dangers related with the webcam and microphone, online piracy and cyber bullying.

## Introduction

Nowadays, technologies are increasingly becoming a part of the daily lives of younger generations of our society. Since a young age, children have contact with devices such as smartphones or tablets and the virtual world, namely the Internet. When they reach adolescence, these young people have an active virtual life through their computers and mobile phones, and this is often not accompanied by their parents (sometimes because many of them do not keep up with technological advances). As such, these teens are exposed to various threats through their devices. However, the teenagers also learn a lot in the Internet, for example when playing some video games. While most of the games have the goal of amusing their players, Serious Games have a major purpose besides the entertainment - transmit knowledge. According to the Discovery Learning Theory of Jerome Bruner, students who engage on play-based learning activities (such as video games) experience increased motivation, enhanced problem-solving skills and a greater sense of personal responsibility, among other benefits (David L., 2017). While playing a Serious Game, these benefits can increase the learning ability of the player. As stated by Michael & Chen (2006), serious games allow "the player to not only learn, but to demonstrate and apply what he or she has learned", and this is one of the goals of our game.

A good game should lead the player to reaches the mental state of flow, i.e., when a person performing an activity is immersed with focus, involvement and enjoyment in the process of that activity, losing sense of space and time (Csikszentmihalyi, 1990). Reaching the state of flow in a certain activity makes it an "optimal experience", since the user gets a high gratification from it. In order to keep a person in the state of flow, the activity needs to reach a balance between the challenges of the activity and the abilities of the user. If the challenge is higher than the skills of the user, the activity becomes overwhelming and creates frustration in the user because it is too hard; if the challenge is lower than the ability of the user, the user gets bored because the activity is too easy (Nakamura & Csikszentmihalyi, 2002). A game that can maintain the flow experience in its players is a game that is more likely to succeed because it retains the players, something that our project wishes to achieve.

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To educate the young and create awareness of the risks of using the Internet, there are several organizations and projects that focus on cyber security and create awareness between parents and educators. Together against Cybercrime International (TaC, 2016) is an example of one of these cyber crime fighting organizations. In the context of a collaboration protocol between TaC and the *Universidade da Beira Interior* (UBI) and to support the pedagogical actions on cyber security taken by this type of organizations or by educators, there was the intention to design and develop a smartphone video game addressing threats to which teenagers are exposed and to encourage a better online behavior.

The project main goal was to design and develop a video game prototype that reinforces the cyber security culture among young people and make them more aware of the risks and responsibilities online, eventually by turning them into active actors in the process. This prototype will serve as support for a complete game that will allow youngsters to take responsible actions on the Internet autonomously. A secondary goal was to define and apply a testing protocol to evaluate and fine-tune the game during field trials.

## Related Work

Nowadays there is a considerable amount of video games on the cyber security subject. However, most of these games have a completely academic nature (for example, quizzes) and, from those that are not like that, there are several games that use cyber security as the theme but do not provide any kind of knowledge as collateral, being merely playful. In addition to these points, there is also the fact that most of these games target young children. The target audience of the current project is teenagers. Therefore, the way that the topics are addressed in some of these games is childish and demotivates older players.

Of the existing games on cyber security, there are several that can be taken as examples in the scope of our project. Three games that stand out from the others are presented in the following paragraphs.

The first game, Digital Compass (Common Sense Education, 2015), is a digital citizenship game devised for children from 9 to 12 years old. This game allows

players to impersonate young characters with computer problems. The player can guide each character through a story related to a theme of digital citizenship, making decisions that will influence the outcome of the story. At the end of each story there are mini games related to each theme. This game, although it is not addressed to the target audience of this project, should be considered as it allows the player to educate itself about digital citizenship through a real application of the theme and gives the player the possibility of taking its own safety choices digitally.

The second game, Digizen (Childnet International, 2016), is a game focused on cyber bullying, and unlike the game presented above, it targets teenagers. The player impersonates a character who attends a school where it is taught notions about online safety. In addition to some quizzes about the digital world, made to the player in the classroom, the main narrative of the game involves the friend of the main character, who suffers from cyber bullying. It is up to the player to make decisions in the game narrative, considering the problem of his friend. This game, as mentioned above, should be considered as it introduces good practices in proximity of a cyber bullying case through an interactive narrative, where the player learns from its actions.

Lastly, Cybersecurity Lab (WGBH Educational Foundation, 2014), is a game whose goal is to educate teenagers on the cyber security issue, giving the player the possibility to assume the role of a newly created social network worker, supervising its security. From the games presented, this is the game that best combines the theoretical part with the playful part of the game and that is more suitable for a teen audience. It consists of four mini games:

- Server Protection against Cyber Attack Game: when an attack of a certain type occurs, the player must protect the network of the company using the coins earned in other mini games. Each coin protects one of the 6 network ports. Each attack strikes the network in 3 aspects, each of them has two respective ports. The player must choose, using cyber security knowledge, the ports that he must protect to lose the minimum number of users. This game aims to test the knowledge of the player regarding cyber security flaws in computer networks;

- Programming Challenge: with the help of code blocks, the player must create a program that allows a figure to cross a map. This game aims to introduce programming logic in the player;
- Decipher Passwords Challenge: the player is challenged by a spy from within the company to a password battle, in each chooses a password and then tries to unravel the password of the opponent, following certain methods used by hackers (for example, using the list of the 10 most used passwords to try to compromise the password). This game instills in the player better practices in choosing a safe keyword;
- Social Engineering Challenge: in a game similar to a discover the differences one, the player must find the differences between e-mails, websites, etc. and phishing attempts. This game educates the player regarding phishing signals that may be found in suspicious e-mails, websites, etc.

This game should be taken as a reference for our game because, by placing the player in an active position of the cyber security department of a company, he tests his knowledge and learns about the subject. As mentioned before, it has a good playful component that takes this educational game to an exciting level for the player.

With the evaluation of some existing related games, it was possible to establish some guidelines for design and development of our game.

## Cyber-Detective Game

The game devised aims to innovate in the cyber security area, as it will not merely be an educational game that focuses on testing the knowledge of the player through questions, like most games on the subject. It is envisioned the development of a game that, with an immersive narrative, makes the player an active character in decisions on the cyber security reality, using previously acquired knowledge and learning new things with the outcome caused by its decisions in the game. The game is committed to address the issue of cyber security applying it to real examples, so that the player can see himself in the situations and thus know the best practices to have. The game also wants to demonstrate to the young player that cyber crime is punished and that it is possible to punish cyber criminals.

The main audience of the game is teenagers, particularly young between the ages of 14 and 17. Considering this audience, the top games on platforms like PlayStore, Steam and Twitch were analyzed, as well as the paper that analyzed the most played games by students (Carvalho et al., 2014), to understand the gaming habits of the audience age group. Based on the results presented in the paper, it is possible to conclude that over 80% of surveyed secondary school students (ages 14 to 17 years old) would like to use games in school activities. It is also possible to analyze values from a survey about the preferred type of games for teaching subjects content. It was concluded that the favored three types of game that youngsters in this age group would most like to see in an educational game would be Strategy, Action and Adventure.

By investigating the target audience and its gaming habits, it was easier to pick the right direction to follow regarding the game type to develop.

"If we want to increase the appeal of our games, it is necessary to understand what makes an experience entertaining, and how such an experience can be created. The discipline that tries to answer these questions is called game design." (Jurie, 2007).

The main objective for our game was to offer the player an exciting experience while learning didactic content.

Bearing in mind the conclusions drawn from the analysis of the target audience about the preferred game types of teenagers for educational games, the three game types (Strategy, Action and Adventure) were combined, conceiving the idea for an investigation game, that would well fit in the cyber security theme. This investigation game will connect some cyber security issues and present them as a cyber crime. The player then assumes the role of a cyber-detective and, to help the victim of the crime should solve the case, winning some mini games related to some cyber security subjects. This strategy of using mini games to learn subjects was proposed by Barbosa et al. (2014), when they presented the learning mechanisms in the design and development of Serious Games. The full version of the game should contain numerous levels, each one representing a case. The full game should approach the many subjects of cyber security. The prototype developed represents one level of this complete game and should serve as a model for the development of other levels.

With the detective game concept mentioned, it was drawn the following list of stages for the unfolding of each case:

3. Introduction – animated cutscene illustrating the actions that led to a cyber crime;

4. Case Acceptance – in the cyber security department, the player, in the role of detective, accepts the case and objectives to accomplish (mini games);

5. Case Solving (mini games) – the player must solve some mini games to progress in the case solving;

6. Case Conclusion – Once all the objectives of the game are completed, a cutscene is presented, illustrating the resolution of the case.

(a) Teen surfing its social network.

(b) Appearance of the Ransomware message.

(c) The location transition with the closing-up of the Police station building.

(d) Teen asking the Detective for help.

Figure 1 – Introduction of the case and case acceptance.

So, the game is an investigation/detective game that aims to educate teenagers about cyber security and it takes place at a police station, specifically in the cyber

security department. This department contains a waiting room, a common office, the office of the cyber-detective and a laboratory with some research rooms. Figure 1 a) and b) show the introduction of the case and Figure 1 c) and d) show the case acceptance by the detective.



(a)          (b)

Figure 2 – Layout of the cyber security department.

The game purpose is to solve cyber crimes resorting to cyber security themed mini games, available in the laboratory rooms (see Figure 2). To successfully solve the mini games, the player must use his knowledge about the themes. For the developed prototype, the main theme chosen for the cyber crime was ransomware. A storyline was then created up to connect crime with the stages of its resolution, then producing a story with logic. The plot is divided in two parts: the crime occurrence, at the house of the victim (a teenager), and its resolution, at the cyber security department. It was decided that the victim of the crime would be a teenager, so that the audience target of the game could relate to the character. The storyline of the crime occurrence, presented to the player as an animated cutscene, goes as follows:

1. A teenager boy surfs his social networks on his smartphone;

2. In the social network feed, he finds an ad for a website claiming to sell branded shoes at an incredibly low price;

3. The adolescent check the website and then decides to buy a pair of sneakers;

4. Before letting the teen advance with the purchase, the website proposes him to download an application in exchange of a 10% discount on the purchase;

5. Without suspecting, the teen continues with the download and installation of the application;

6. The teenager is surprised with a ransomware message;

7. The ransomware message claims to have encrypted all the device files and demands a large amount payment in exchange of the decryption password;

8. Frightened, the teenager decides to seek police help;

9. The teen goes to the cyber security department of a police station, explains the situation to the cyber-detective and asks for help and the detective accepts.

The storyline of the resolution of the crime has the following order of events:

1. The detective decides to analyze the social network of the adolescent to find the ad that led him to the malicious website; to achieve this, the player must complete the Social Network mini game, that tests the knowledge of the player on making secure choices in Social Networks (see Figure 4);

2. The detective then decides to investigate the suspicious website and its phishing signs to find out who might have created it; for that, the player must solve the Phishing Detector mini game, where the ability of the player to identify phishing signs on the Internet is tested;

3. With the suspect website creators and their info, the detective tries to discover the decryption passwords of the files; to achieve this, the player must complete the Password Decoder mini game, that allows the player to come across with weak elements commonly used in passwords;

4. After solving the three mini games, the detective manages to clear the ransomware off the device and decrypt the files; the smartphone is returned to the teen (displayed to the player through an animated cutscene).

With the game design defined, it was possible to develop the prototype of this level of the game, as shows Figure 3.

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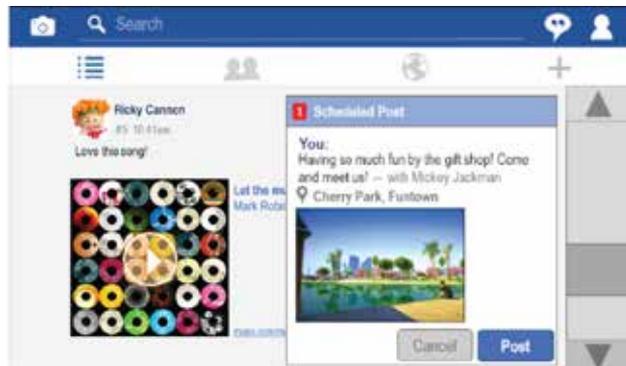
Figure 3 – Interface of the game.



Figure 4 – Layout of the Social Network mini game.

## Tests and Results

To evaluate the quality of the prototype developed, some tests were implemented with the target audience of the game. The tests were applied in *Escola Secundária do Fundão*, to a 9th grade class, with 14 students with ages between 14 and 17 years old, where 6 of them were boys and 8 were girls. The students were submitted to a knowledge quiz twice: once before playing the game (pre-quiz) and once after playing it (post-quiz). The students were observed while playing the game and making some comments about their experience. After playing, the students also answered a questionnaire to evaluate the game and their usability experience. With the results from the knowledge quizzes, it was possible to analyze the improvement made by the students after playing the prototype.

### *Usability Tests*

The questionnaire answered by the students approached four different subjects: the flow of the game, the thematic of the game, graphics and mini games, and didactic. The teenagers evaluated the game on these topics answering questions based on a Likert Scale.

Analyzing the evaluations made to the flow of the game, as seen in Table 1, it is noted that the students had some difficulties in understanding which were the correct actions to complete the tasks. This may have happened due to the language of the prototype, because not all the students were comfortable with the English Language.

Table 1 - Flow of the Game Evaluation

| Flow of the Game | Disagree | I do not agree or disagree | Agree |
|---|---|---|---|
| I always understood what the task was. | 0 | 5 | **9** |
| I have always found the right action to take, effortlessly. | 3 | **6** | 5 |
| I always realized that performing certain action would complete the corresponding task. | 1 | 5 | **8** |
| I was always aware of the progress made when completing tasks. | 0 | 3 | **11** |

About the evaluations made to the Thematic of the Game, summarized in Table 2, it can be concluded that almost a third of the students seems to have no awareness of all the dangers they face online every day, since they stated that they did not deal with the themes of the game on their daily life, although the answers to the questions "I use a smartphone/the Internet/social networks everyday" were so positive. The results also show that the students are concerned about cyber security and the dangers of the Internet. With these results, it can be concluded that, even with lack of knowledge, this age segment is worried and interested in cyber security, making it the perfect audience target for the current game.

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Table **2** - Thematic of the Game Evaluation

| Thematic of the Game | Disagree | I do not agree or disagree | Agree |
|---|---|---|---|
| I use a smartphone every day. | 0 | 1 | **13** |
| I use the Internet every day. | 0 | 1 | **13** |
| I use social networks every day. | 0 | 2 | **12** |
| I was always aware of the progress made when completing tasks. | 1 | 2 | 11 |
| The themes of the game are something that I deal with in my daily life. | 1 | 5 | **8** |
| Cyber security and the dangers of the Internet are something that worries me. | 0 | 2 | 12 |

Analyzing the evaluations made to the Graphics and Mini Games, as seen in Table 3, it is possible to observe that the students were pleased with the game graphics and mobility. The mini games evaluation results show that the mini games of the prototype were not too difficult nor too easy. With these values, it can be concluded that overall the difficulty of the mini games is well-balanced.

Table 3 - Graphics and Mini Games Evaluation

| Graphics and Mini Games | Disagree | I do not agree or disagree | Agree |
|---|---|---|---|
| The game graphics were adequate. | 1 | 1 | **12** |
| I understood the plot of the game. | 1 | 2 | **11** |
| The mobility in the game was good. | 2 | 3 | **9** |
| The social networks mini game was difficult. | 5 | **7** | 2 |
| The phishing mini game was difficult. | 5 | **8** | 1 |
| The passwords mini game was difficult. | 3 | **6** | 5 |

About the evaluations made to the Didactic of the Game, summarized in Table 4, it is possible to conclude that overall the students learned about cyber security with the game and would willingly play a full version of the game conceptualized. It is also possible to observe that the students think that learning about cyber security with a video game is appealing, comparing to the typical teaching methods.

Table 4 - Didactic Evaluation

| Didactic | Disagree | I do not agree or disagree | Agree |
|---|---|---|---|
| This game taught me about the topics approached in the game. | 0 | 3 | **11** |
| I think this type of game suits the theme. | 0 | 1 | **13** |
| I would like to play a full version of this game to learn more about cyber security. | 0 | 2 | **12** |
| I would rather learn about cyber security with a video game than with lectures/videos/classes. | 0 | 2 | 12 |

Lastly, the questionnaire had two open questions, "Have you found any problem in the game?" and "Which improvements would you propose for the game?". Regarding the problems found, two students found a bug that allowed the detective character to walk through a wall. This bug was identified and corrected. Regarding the second question, the students pointed some improvements that could be implemented in the prototype, such as that the detective character could walk faster, that the buttons of the game could be bigger, an improvement of the camera movement near walls or the addition of a "Skip Intro" button, for example.

### *Education Efficiency Tests*

Since the game of this project is an educational game (i.e. a Serious Game), it was imperative to evaluate the efficiency of its educational component. The students answered a knowledge quiz with questions about ransomware, phishing signs, passwords and social network security, themes approached by the game. To evaluate the growth of the knowledge of the students, the students were asked to take this quiz twice, once before playing the game and once after playing, and the results of both quizzes were compared. Regarding the comparison of the results for each question, as seen on Table 5, the two questions that got the worst results in the second round of the quiz were a question to evaluate if a screen was a phishing attempt and a question asking if it was safe to post a picture of a football player in a social network. In the question to evaluate if a screen was a phishing attempt, the screen presented was not a phishing attempt, just a simple bank account e-mail. Although that, the students were more hesitant regarding this question in the second take of the quiz. The question asking if it was safe to

post a picture of a football player in a social network had a positive answer, it is safe to post a simple picture of a football player. In spite of that answer, in the second take of the quiz, the students seemed more unsure of the safety of the post.

Opposing the results of the phishing question above, the question that had the better improvement rate was a similar phishing question, in which the screen presented is an e-mail with a phishing attempt. The combination of the results of these two questions conclude that the students were more aware of phishing attempts through e-mails after playing the prototype and were overly cautious about them.

The second question with better improvement asked the student to pick the safest password of a list. The improvement of the score of this question shows that the students improved their capacity of identifying a safe password.

Table 5 - Quiz Scores Improvement per Question

| | Quiz Questions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3a | 3b | 3c | 4a | 4b | 4c |
| Pre-Quiz Results | 21% | 50% | 100% | 64% | 100% | 64% | 100% | 100% |
| Post-Quiz Results | 36% | 71% | 100% | 79% | 100% | 79% | 100% | 100% |
| Improvement | 15% | 21% | 0% | 15% | 0% | 15% | 0% | 0% |
| | 5a | 5b | 5c | 6a | 6b | 6c | 7 | 8 |
| Pre-Quiz Results | 50% | 64% | 86% | 50% | 100% | 79% | 28% | 11% |
| Post-Quiz Results | 64% | 64% | 71% | 93% | 100% | 57% | 33% | 32% |
| Improvement | 14% | 0% | -15% | 43% | 0% | -22% | 5% | 21% |

Overall, it was possible to verify an improvement of the quiz scores, as seen in Table 6, where each row of the table represents a student of the class. The scores of the quiz improved on average nearly 7%. With these results, it is possible to conclude that the education component is efficient, since the students improved their knowledge on the subject. Although the language of the game, i.e. English Language, may not helped to achieve better results for some students.

With the results from the tests implemented with the target audience, it was possible to conclude that teenagers are sometimes unaware of the cybernetic

dangers that they might encounter in their daily life. However, these young students showed interest in learning about the subject to be safer, supporting the purpose of this game. It was also possible to verify an improvement of cyber security knowledge on the teenagers after playing the created game, confirming that this game can be used not only as a game, but also as a learning tool.

Table 6 - Ordered Quiz Scores Improvement

| Pre-Quiz | Post-Quiz | Improvement of each student (Ordered from low to high) |
|---|---|---|
| 68,8% | 67,7% | -1,0% |
| 83,3% | 83,3% | 0,0% |
| 58,3% | 58,3% | 0,0% |
| 58,3% | 59,4% | 1,0% |
| 78,1% | 80,2% | 2,1% |
| 77,1% | 83,3% | 6,2% |
| 71,9% | 78,1% | 6,3% |
| 51,6% | 58,2% | 6,6% |
| 68,8% | 76,0% | 7,3% |
| 56,3% | 63,5% | 7,3% |
| 71,9% | 83,3% | 11,5% |
| 60,4% | 71,9% | 11,5% |
| 52,1% | 70,8% | 18,8% |
| 78,1% | 96,9% | 18,8% |
| 66,8% | 73,7% | **6,9**% |

Students Results

Average

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## Conclusions and Future Work

It was possible to conceptualize the idea for a cyber security detective game for teenagers and to develop a prototype of a level of that game, in the English language. The prototype was developed in Unity 4.2.2 to be available for different platforms. The prototype was tested with a group of teenagers (representing

the target audience) and was proven to improve the cyber security knowledge of teens, making it a suitable base for a full game of the conceptualized idea.

Although the main goal of the project was achieved, the developing of a prototype, there are some improvements that can be applied to the prototype. Following are some proposed improvements for the prototype, such as the addition of sound and music to the cut scenes and game, a better flow of the game for the understanding of the player and the addition of multiple languages, for example. The support for other languages, as for example the Portuguese and French languages, is an important aspect, because some students in the tests showed some difficulties with the English language.

In the future, we hope to develop the full game, where other thematic will be included, namely, talking with strangers in social networks, dangers related with the webcam and microphone, online piracy and cyber bullying.

## Acknowledgment

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**Parallel Sessions 2**
Games for Social Learning

# Digital Games to Teach News Literacy to Children

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**ABSTRACT**

Studying news media literacy and finding ways to improve it is extremely important in an age of information crisis. Games are a tool which allows teaching children in news making scenarios in an enjoyable way. Some researchers have been studying how games can contribute to improve news literacy. However most of those studies only consider games for college students (Aayeshah, 2012; Bogost, Ferrari, & Schweizer, 2010; Cameron, 2004; Frasca, 2003). There is a lack in the literature examining news literacy games for younger children, even though a few of those games exist too.

This paper proposes to do a qualitative formative evaluation of six news literacy games for children, displayed at the Newseum in Washington D.C. (Digital Stemworks, 2013). We examined how game elements were incorporated to teach news literacy. We were particularly interested in seeking if the learning principles for news literacy education suggested by Renee Hobbs (2010) were followed and how. Our findings show that most of those principles were indeed present. For example, some games use real live case scenarios establishing a bridge between the learning experience and the world.

With the renovated and growth interest in news literacy education, people may expect that more games of this sort will be created. Our work extends knowledge of how news literacy is being approached in interactive digital platforms and, ultimately, how those approaches can be improved.

**Keywords:** News Media Literacy; Newsgames; Children; Journalism Education; Educative Games.

## Introduction

News literacy is being called upon as a possible solution for the spread of misinformation and disinformation in this post truth era, as well as a mean to empower young people to more critically engage in a participatory society. However, news literacy education may start even before teenage years, either in a formal or in an informal setting.

Traditional role-playing games were already used in journalism education classes. So one could think that the creation of digital games for teaching news literacy

for a younger audience would be an obvious development, especially since pretend play, role-playing, and simulations are such a natural method of learning for children (Gee, 2005; Jenkins, 2009). Indeed, several digital games to teach news literacy have been created. Some scholars have been researching those sorts of games that teach news literacy. However, most of the literature analyzes platforms which target college students (Aayeshah, 2012; Bogost et al., 2010; Cameron, 2004; Frasca, 2003). Less is known about news literacy digital games for younger children.

The goal of this paper is to fill that gap in the literature by examining how digital platforms support news literacy for children at elementary level. To do so, we qualitatively analyzed six cases available to the public at the Newseum in Washington D.C., in the United States (Digital Stemworks, 2013). Games were examined according to (1) news literacy lesson topics and approaches; (2) learning principles as defined by Hobbs (2010); and (3) game elements.

### Games and Learning

The perception about the role of play in the lives of humans has evolved throughout times - from the idea of the homo ludens (Huizinga, 1950) to the pedagogical approach of 'learning through play' (Piaget, 1975; Vygotsky, 1999). Pretend play and role-playing is considered a natural method of learning for children, according to Jenkins: "Most of children's earliest learning comes through playing with the materials at hand. Through play, children try on roles, experiment with culturally central processes, manipulate core resources, and explore their immediate environments. As they grow older, play can motivate other forms of learning" (Jenkins, 2009: 35).

Education can occur in a formal setting like a school or in an informal setting, like at home with parents or at the playground among peers. Media use and, in particular, educative computer games can be another sort of informal education setting too.

Previous studies have demonstrated that computer games and digital interactive storytelling about news gathering can be an effective method to teach about the news making process, at least among journalism College students (Aayeshah, 2012; Cameron, 2004; Spikes & Haque, 2015). However, most scholarly research

about media literacy has been more focused on the study of formal educative interventions, rather than informal ones. We sustain, nevertheless, that given the limited time and resources usually allotted to media literacy in most school curricula, as well as the lack of teacher's preparation in that regard (Hobbs, 2009; Moore, 2013; Powers, 2010), informal education can play a significant role in improving media literacy among children.

### Games and News

The creation of the term "newsgames" is usually attributed to Gonzalo Frasca (2003). According to his use of the term, "newsgames" refer to computer games about current events. Frasca also sustains that "newsgames" are close to the political cartoon genre (Frasca, 2003).

That concept has been expanded by Ian Bogost, Simon Ferrari and Bobby Schweizer (2010). According to them, there are other kinds of games about the news, such as the ones which are aimed at teaching individuals about good journalism and the importance of journalism to the society. They call those games "literacy newsgames" (Bogost et al., 2010). So, they say that both kinds of games end up educating the player. The first (newsgames) educate about current events, in other words, the news topics about what is going on in the world at that moment. The second (literacy newsgames) educate about the news making process.

Wajeehah Aayeshah (2012) uses the term "*journalism games*", a concept that could be perceived as a subset of Bogost et al.'s literacy newsgames category. "Unlike the newsgames, which simply instigate awareness about an issue, journalism games aim toward teaching journalists and training them for the required skills" (Aayeshah, 2012: 32). In other words, the author sustains that journalism games aim at training journalists.

In our view, literacy newsgames do teach about journalism skills, but they are not all necessarily designed for future journalists only. Some of the examples quoted by Bogost et al. and Aayeshah, like the commercial game Dead Rising, were designed for a general audience. These games may not even had education goals at their core. And some of the examples that were designed with journalism students in mind, can be equally useful in training general citizens and consumers of news.

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There are already a few digital platforms about the news which were designed for children (Newsella, 2013) and there are even a few digital games (Digital Stemworks, 2013; Krantz, 2012). However, very little is known about their characteristics.

Scholars have pointed out several advantages in the use of digital games for teaching journalism, such as contributing to analytical thinking and problem-solving, creating a greater sense of perspective among students, empathy and cultural sensitivity (Aayeshah, 2012; Bogost, 2008; Cameron, 2004). We consider the same advantages may be occur in news literacy games for children.

### Teaching News Literacy

News literacy is the knowledge and skills which help individuals evaluate the credibility of news stories and sources. It is the "discipline of skeptical knowing" (Kovach & Rosenstiel, 2010: 202). News literacy is usually considered a subset of media literacy. Media literacy is the sort of critical thinking that has been pointed out as crucial in the post-truth era (boyd, 2017; Leetaru, 2016; Mihailidis & Viotty, 2017).

According to Hobbs, when teaching news literacy to young children, there are seven principles which may contribute to create "a learning environment where learners can build knowledge, critical thinking and communication skills in ways that are personally meaningful and relevant to them" (Hobbs, 2010: 5). Those principles are:

> "(1) starting from the learner's interests; (2) connecting comprehension and analysis; (3) asking critical questions and listen well; (4) focus on constructedness; (5) use new ideas to directly support the practice of critical analysis and media composition; (6) use collaborative multimedia composition to produce meaningful and authentic communication; (7) make connections between the classroom and the world"
>
> (Hobbs, 2010; p. 4, 5).

So, in this paper, these seven principles are used as a lens to analyze digital games aimed at teaching news literacy to children.

We were particularly interested in finding out (RQ1) what kind of games are being designed to teach news literacy; (RQ2) how are those games structured in terms of (RQ2.1.) topics' approached (RQ2.2.) gaming elements and engagement (RQ2.3.) navigation and interaction structure (RQ3) and how are those games following Hobbs' news literacy learning principles?

## Newseum

In Washington D.C. there is a museum about journalism and the First Amendment to the American Constitution called Newseum. One of the six floors of that museum is dedicated to interactive ways of explaining the news. Because we could find more news literacy games for children in that area than in several online search attempts, we considered that these set of games could provide a good sample of analysis for this study.

### Procedure

We spent around six hours at the Newseum experimenting with all the games several times. In each game, we explored different paths to get better acquainted with its interactive elements and to explore how the game might give different feedback to different end results. Besides experimenting and taking notes about the games, we also filmed the screen so the game could be further analyzed later on.

### Geography of the Games

In Newseum's interactive room there are three spaces with games. The first space has games about journalism ethics. Given the complex moral issues posed in those games, they are probably targeted for more mature children. The next space has games about journalism practice, information gathering, freedom of speech, newspaper covers and personalities. Those seem to be targeting younger children given their cartoonish style. Then, there is another space where the visitor may be filmed presenting the weather or a live report with the White House on the background. Because those were not games, we left them out of this study's analysis. We also excluded from our sample, the game entitled "*Newsmania*" because it was about the knowledge of current affairs and not about news literacy education. But we included a game that was displayed in another floor of this museum.

All the games are quite short. One of the longest is "*Be a reporter*" and it takes between three to five minutes to finish it, according to the company that developed it (Digital Stemworks, 2013).

## Categories of Analysis

There were three main categories under analysis and two secondary categories. The main categories were: (1) news literacy lesson topics and approaches; (2) learning principles; and (3) game elements. The other two categories that contributed to contextualize each system and that were also examined were: (4) general characterization and navigation structure – including features such as platform type, node structure, main categories and interaction navigation structure) and we also took note of (5) differentiation elements (engagement, graphic layout and arts assets).

Under the first main category – news literacy lessons and approaches – the systems were scrutinized by their main purpose, what lessons were included and how lessons were delivered. To do that we searched for the presence of the following lessons: writing techniques, photos / videos; professional ethics and bias; freedom of information; reporting, sources and information gathering techniques; interview techniques; media systems.

Under the second category – learning principles – we searched for the presence or partial support of the seven news literacy learning principles as proposed by Hobbs (2010).

Under the third main category – games elements – we identified the game type (action-adventure; simulation; narrative non-linear, quizzes, puzzles); for how many players the game was designed for; what the storyboard was; how the score and/or rewards were given.

Under the fourth category – general characterization and navigation structure – we identified features such as platform type, node structure, main categories and interaction navigation structure. Finally, under the fifth category – differentiation elements – we looked at graphic and art assets which contributed to make the system unique and other engagement techniques which enriched the user experience.

## 1. What Would You Do?

"*What would you do*" is a single-player quiz presented in a touchscreen in a cubicle. The lessons included in this game are all about journalism ethics. On the main screen there are two rows of five thumbnails each. In each of those thumbnails there is a picture and a title. Oddly, the space for the tenth thumbnail is empty. Each thumbnail corresponds to a real situation that happened some time in the past. The player starts by choosing one of the nine cases. The hierarchy of navigation at this point is independent. By touching in one of the thumbnails, the user is directed to another screen. Then, the model in each one of the nine cases is exactly the same. It starts with a question about what the player would do. The player can choose between a 'yes' or 'no' kind of answer. For example, in the first case entitled "Pretend to be crazy", the question is "Would you pose as a mental patient to report on conditions at a mental hospital?" The options are: "Yes. It is the only way to find out the truth" or "No. It is deceptive." After making that choice, a new screen shows up. On the left up corner of that new screen there are three graphs under the title "This is what other visitors and journalists think". Under that, there are one or two short videos from journalism professors and/or journalists explaining why they answered the way they did. These videos offer an analysis of what the interviewee considers to be the right choice and wrong choice on that situation. Then, on the right side of the screen there is a box with information about what happen in the real situation.

Classifying this as a game may be debatable as there is no score and no real game storyline. Rather than a game, "*What would you do*" is perhaps more accurately classified as a digital learning platform. Nevertheless, we decided to keep it in our analysis sample because its goal is to teach about news literacy in a digital and interactive way.

We identified the presence of at least four Hobbs' learning principles. We consider that this game "focus on constructedness" as it explains how certain news stories were told and their ethical implications (principle 4). It also provides a broader context to the news story (principle 5). While providing this framework to true news stories it also improves comprehension and analysis (principle 2). While this game only deals with true stories it can be argued that it makes a connection between the player and the world (principle 7).

### 2. Newseum News

"*Newseum news*" is a quiz type of game presented in an oval interactive table. With a non-dependent hierarchy of navigation, the game can be played from one to eight players at the same time. There is the possibility of playing alone or in two teams of a maximum of four, against each other.

There are two lessons in this game. The main goal of the game is to teach about journalism ethics. But the game also teaches about journalism time management and editing by simulating the newspaper deadline pressure and making the gamer to choose which stories to put on the cover.

The table is divided in half and the game starts with an empty newspaper cover on each half. Coming out from the cover, journalist figurines start walking around the table. Each one holds a colored folder. No instructions are given. But as soon as the users move their hands over the table they realize they can drag and drop a journalist in a square on the boarder of the table. There are four squares of that kind on each side of the table. One square for each player.

Each time the player drags and drops a walking reporter the game pops up a question. Then the player must choose between a 'yes' or 'no' answer. Different sounds are heard according to a right or wrong choice. If the answer was wrong the screen shows the word 'Incorrect' and a sentence explaining why the choice was wrong. If the answer was right, the screen shows the word 'Correct - You filled a story on the newspaper' and, then, a blank space on the cover of the newspaper gets filled in. The colors of the folders that the reporters hold on their hands correspond to the colors of each blank space on the cover.

After a certain amount of time, the game warns that the deadline is approaching and that the opposite team may have their cover ready sooner. So there is an added pressure. The game is won by the team who fills in all the blank spaces on the cover first.

We considered that this game incorporates four learning principles as defined by Hobbs (2010). First, it connects comprehension and analysis of news as it requires the player to read the news and answer questions about it (principle 2). At the same time it "focus on constructedness" as it makes the player pay attention to how the story is written (principle 4). Although players are not required to build

new media, we consider that this game partially supports "collaborative multimedia" as it joins team players in the construction of a newspaper cover (principle 6). We also consider that it partially implements the connection between the classroom (in this case the participant child) and the world as the player has the option to choose which news to read and select throughout the game (principle 7).

### 3. Be a Photographer

"*Be a photographer*" is a single-player first person simulation about photojournalism, displayed on a touchscreen. The hierarchy of the navigation is dependent. The game starts with a video of an editor figure who introduces the game rules. The player assumes the role of the photojournalist. On that presentation video, the editor explains what the player/photojournalist has to do. He says that a little girl is about to drown and that the rescue team is trying to help. Then, the game starts with the parents of the little girl and the player/photojournalist on the shore of the river. All the images are live action. The player mission is to shoot the best image that captures the story. The game proceeds with three video reels. The player can choose which one to see in a bigger screen and on that bigger screen the player can click to take a picture. The three video reels show three different perspectives of the scene, always in real time and without the option to pause. So the player has to make decisions on where to look and what pictures to take in real time. The little girl has just fallen off a kayak and somehow she managed to grab a branch by the shore of the river. But she is almost drowning. Then, the rescue team crosses the river by boat to save her. They successfully grab her and bring her on board. While that happens, we can also see the parents discussing with other members of the rescue team on land. And two girls approaching the photojournalist/player complementing him for the great job he has. Meanwhile, the rescue team reaches the shore with the girl and brings her to an ambulance. Her father approaches her. He seems very relieved and happy for her rescue. After that, the editor shows up again. He asks the player to choose the best picture taken for the cover. Then, the player can see all the pictures that he or she took.

While the game does not exactly gives score; at the end the editor shows up again in a video. At that time, the editor gives feedback on the picture chosen. The feedback is different, according to the choice made. For example, the picture with the girl on the way to the ambulance with the father by her side, leads to a big

compliment. The editor says that the picture captured the whole story. Whereas a picture with the two "groupies" flirting with the photographer makes the editor fire the photographer.

We considered that this game incorporated six out of the seven Hobbs' learning principles. While setting the scene where the news is actually taking place it provides a sense of how news is constructed (principle 4). On the other hand, while the game requires the player to choose what pictures to take and later what pictures to select, having feedback on those choices, it guides the user through visual comprehension and analysis (principle 2). The game partially supports principle 3 too as it forces the user to listen well to what is being said in order to make the right choices in image selection. The feedback given by the editor directly supports the lessons given with context and in a natural atmosphere (principle 5). We consider that the game also partially implements principle 6, as the player has to collaborate with the system to produce images. Finally, we also consider it partially implements principle 7 as the simulation makes the player assume a stronger connection with how journalism is actually done in the 'real world', using real images in real time.

### 4. Race for Your Rights

"*Race for your rights*" is a single player quiz about the First Amendment to the Constitution of the United States of America. It starts with a screen where the player has to choose between adult or student level. The navigation hierarchy is dependent from then on.

This is a simple quiz game integrated in a graphic animation of a race between two people – the player and his/her adversary. The constant running gives a certain feeling of urgency to the game although there is no time limit. While those two characters run, questions pop up for the player to answer with multiple choice. The player cannot interact with the runners. But the runner may stumble or speed up if a wrong or right answer is given. The only way the player may learn is by noticing the answer was right or wrong. According to the number of failed and not failed questions, the racer wins or looses the race. We could not identify any of Hobbs' principles here.

"*Make a match*" is a single player game to match cards about journalism history with a non dependent hierarchy of navigation. On the right side of the screen a sentence presents information whenever a pair of cards is matched; but most of the times there is not enough time to read it because the game doesn't pause for that. To win the game, the player not only has to match all the cards but also do it within the time limit. Again, we could not identify any learning principles as defined by Hobbs (2010).

### 6. Be a Reporter

"*Be a reporter*" is a single player first person simulation about practical reporting skills - like information gathering and interview techniques - and also about more ethical and theoretical lessons - such as bias and balance and distinguishing between facts and opinions. Although there is a somehow linear storyline, the navigation structure is non-dependent. Once again, in this game the player assumes the role of a reporter, while the figure of an editor gives instructions and feedback. The scene takes place at a circus. Somebody has freed all the animals and the editor wants the reporter to find out who did it. Unlike the "*Be a photographer*" on this game there is no live action images, all the graphics are cartoon animated with a childlike style. Users can move in the scene almost like in a 360-degree video. Users can also ask questions to people around. The interview style is closed in the sense that the user has to choose the question to ask from a list of two or three possibilities. There are usually one or two obvious questions to pursue and one completely off task. If the player chooses that somewhat silly question, the editor shows up reminding him or her of the task to do. There are several characters around the circus to interview: a police officer, protestors, the circus director and other circus workers. Although it is not clear from the beginning, time does count. The goal is to file the story for the cover of the newspaper. At the end, the editor gives feedback about it.

This game incorporates five out of the seven learning principles defined by Hobbs (2010). As the player pretends to be a journalist, he/she learns about constructedness (principle 4) and the editor feedback presents ideas in context, related with the analysis (principle 5). The game requires the reporter to choose from the most

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pertinent questions to ask and to carefully listen to the answers to solve the mystery (principle 3). While collecting data to build the news story, the player extends comprehension and the ability to analyze the story that is presented at the end of the game (principle 2). It can also be argued that this game starts from the player's interest in the sense that it allows the user to choose where to go and with whom to talk with to collect information (principle 1).

Table 1. Newseum games' main elements.

| Game | NL Lesson Topics | Learning Principles | Game Type | Navigation |
|---|---|---|---|---|
| 1. What would you do? | Journalism ethics | 2; 4; 5; 7 | Single player quiz | Non-dependent |
| 2. Newseum News | Journalism ethics; time management and deadlines; news editing | 2; 4; 6; 7 | Quiz From 1 to 8 players | Dependent |
| 3. Be a Photographer | Image editing; News angle; Field work; and others. | 2; 3; 4; 5; 6; 7 | Single-player first person simulation | Dependent |
| 4. Race for your rights | First Amendment to the U.S.A. Constitution | 0 | Single player quiz | Dependent |
| 5. Make a Match | Journalism history: news people and news covers | 0 | Single player matching card game | Non-dependent |
| 6. Be a reporter | Reporting skills; information gathering; interview techniques; Ethical issues; and others | 1; 2; 3; 4; 5 | Single player first person simulation | Non-dependent |

To sum up, most games were designed for single player use in a variety of gaming approaches like quizzes or simulations, as shown in table 1. The summary scheme in table 1 also shows that the analyzed games covered a variety of topics like journalism ethics or journalism practice and they often included Hobbs' learning principles, although two of them had no learning principle as described by Hobbs.

### Discussion

This paper proposed to examine and describe how digital platforms support news literacy for children at elementary level; what elements are these platforms incorporating in terms of topics, gaming characteristics, navigation and interaction; and how are those games following Hobbs' (2010) news literacy learning principles.

As for the news literacy topics included in those games, we found that they were very diverse and comprehensive. For example, they included notions on journalism ethics, journalism history, journalism routines, reporting skills and image editing. Therefore we conclude that digital platforms and digital games in particular can support the same kind of news literacy lessons that are more commonly taught in a formal setting (Frey & Fisher, 2009). Furthermore games can to that in a multitude of approaches. However, in a lessons perspective, there are still topics that are not being covered. None of the analyzed games touched themes such as competition, media markets and how financial aspects may affect news coverage inside a newsroom or about notions like misinformation, disinformation, propaganda and sensationalism, for example.

We also observed that news literacy was incorporated in these six platforms mostly through diverse game genres: from simple quizzes to more complex simulations which, overall, use simple navigation structures. Nevertheless, we consider that this kind of games could include even more classical game elements like time limits and points. That could enrich the engagement experience, as it happens in other educative games (Charsky, 2010). However, the use of time limits and points should be done in conjunction with the learning process in a way that time doesn't remove attention from the lessons, as it was observed in the game *"Race for your rights"*.

Another topic this study proposed to examine was if the learning principles for news literacy education suggested by Renee Hobbs (2010) were followed and how. Our findings show that most of those principles were indeed present, but not in all games. A conclusion that strikes out is that the more complex the game is in terms of structure/design and news literacy lessons, the more learning principles it has incorporated. And the less complex the game is in terms of structure/design and news literacy lessons, the few learning principles it has incorporated. Indeed, we could not find any of Hobbs' learning principles in two of the simplest games. But in the simulation games we identified almost all learning principles. Therefore this finding suggests that simulations have a greater potential to incorporate those learning principles more in depth.

Our findings show that the first principle was the least present one. The first principle refers to starting from the learner's interest. By that, Hobbs implies that the

teacher uses contemporary news stories that are from the learner's interest. In our sample, none of the games used current news stories and, for that reason, our findings show that this principle was almost never present. However, that does not mean that the games were not from the player's interest and that in a way this principle was partially fulfilled. Even so, it is possible that in future games the link between the game, the player/ learner and the reality may be even stronger.

The use of an editor figure to provide feedback throughout the game contributes to foster at least two learning principles. That recap method helps establishing a connection between comprehension and analysis (second principle), while it also fosters a direct support of critical analysis of media composition (fifth principle).

In a limited way, some of the games also supported Hobbs' third principle about questions. Indeed, previous research had already demonstrated that digital games are effective way to teach about interview techniques, among journalism college students (Cameron, 2004). However, unlike Cameron's study showed, in our sample none of the games used bots to stimulate more critical questions. On the contrary, the array of questions was limited to a set of three or four at the most. Therefore, we identify potential ground for improvement in future games of this kind.

Then, in this analysis, we consider that the use of real live case scenarios may contribute to establish a bridge between the learner and the world, which is related to Hobbs' seventh principle.

### Implications for Design

Based on the analysis, there are some good examples worth highlighting for the design of future digital platforms aimed at improving news literacy.

- The use of the first person simulation may work well because it allows users to have an inside understanding of a craft that they usually only see from the outside. It may also contribute to create a connection with the learner's perspective.
- The use of a character like a news editor to pass along important news literacy lessons also seems to work well because it incorporates the lesson in the playful activity; it connects comprehension and analysis while making connections between the player and the world.

- The possibility of asking questions in an interactive way is another aspect that seems to work well because it grants users with the feeling of control.
- The use of real life cases as a starting point for the game or digital inter-action also seems to work very well. And the analyzed games show that to do that it is not necessary to have very up-to-date stories. Interesting historical examples in journalism continue to be interesting to explore in this manner. Furthermore, the use of real life cases contributes to make connections between the player and the world too.
- The use of several live action videos at the same time also works well as a way to simulate a real life scenario. It raises awareness of the difficulty of choosing where to look and where to go next. It also shows in a very practical and simple way how journalism discourse is a construction of the reality and how certain criteria guide journalists in how to better frame the reality. In a way, it also contributes to the practice of collaborative multimedia.

Also, based on this analysis there are four main suggestions for the design of future digital platforms aimed at improving news literacy:

- Prioritize the aesthetic experience as a way to create a bigger connection with the children's interests.
- Extend the story plotlines to other domains of news literacy, such as the issues of misinformation, disinformation, media markets, competition among news companies and sensationalism.
- Include more game elements. That may enrich the engagement experi-ence, as it happens in other educative games (Charsky, 2010). However, time constraint as a game element and engaging tool can be implement-ed in conjunction with the learning process in a way that time doesn't remove attention from the lessons.
- Continue exploring the possibility of expanding the option of asking ques-tions with the use of chatterbots for example (Cameron, 2004).
- Integrate more learning principles even in the simplest games to increase educative efficacy.

### *Limitations and Future Studies*

There are some limitations to this study. One of them is the subjectivity implied in a qualitative analysis of this kind. However, while our interpretation may only be

replicated in other studies with some limitations; it provides strong clues as a first exploratory study of games which teach news literacy to children.

In future studies these games could be studied with a more robust approach, such as interviews and tests with children as well as experimentation with new prototypes.

## Conclusion

In this paper we present a qualitative analysis of six games aimed at teaching news literacy to children that are available to the public in a museum in the United States of America. To do that we used an interpretative lens based on Hobbs' (2010) seven learning principles. We found that many of those principles were present and that the more complex the game structure was, the more principles it had included. However, two games had not included any of those principles.

Given the current user-producer paradigm and the excess of information flow on the web it is expected that the need for more news literacy educative tools is going to rise. Also, given the time that children and young people spend online, the role that entertainment has in their lives and the risks that a real-life simulation could present to them, one could argue that games can be a powerful setting to use when designing news literacy interventions.

Although there are some games that already do that, most of them target teenagers and older students. There are very few games targeting younger children. Most of the games that we could find which target younger children are at the Newseum. The six analyzed games present diverse game characteristics (quizzes, simulations, etc) and approach different lessons (ethics, reporting, and so on).

In terms of programming and design there is ground for improvements, in particular in the aesthetic experience and use of game elements. There are also news literacy topics still to be explored in gaming experiments. Future games with this aim should consider expanding from these examples into other news literacy topics, such as learning the distinction between misinformation, disinformation, alternative facts and fake news; the financial context behind news corporations; and so on. Finally, future games in this field may gain by integrating even more learning principles.

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# Interactive Media Production.
# A Learning Through Play Pedagogical Approach

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The main idea in this article is presenting the research focused on pedagogic approaches to teach new media and non-linear narratives to students by challenging them to create their own interactive videos. The design-based research approach will show the evolution of teaching practices based on the experience of over two years of teaching two consecutive full semester courses in the last year of a Multimedia Communication Bachelor. The two courses are mainly hands-on as students develop interactive video and publish them online. The work follows research previously done in other University contexts and provides insights on how some changes in the approach to students can result in considerable different results. It focuses on how technical constraints can result in major problems for students and rejection to new applications. Part of the teaching and learning activities are based in the idea that students should conceptualize their non-liner narrative before they start implementing it in an interactive video system. The interactive video system or application's capabilities is only explained to students in broad lines and only the minimum steps to create and interactive video are explained to all students. All other mechanism embedded in the system are discovered through play or through with tutorial support in class. This approach provides room for students to play or explore autonomously the features of the interactive video platform or publishing platform and assume cooperative learning strategies by helping themselves ways to use the interactive video system and publishing back office. Story complexity and engagement is evaluated as well as levels of students' frustration. Sometimes the system limitations make students work very hard or make it impossible for students to implement their idealized solutions. Technical problems regarding computers compatibility required extra determination from students to publish their videos online successfully. Through the proposed projects students are challenged to create materials to be accessed by their audience in different ways from static webpages to dynamic interactive videos. Some conclusions will be pointed out to show how to better judge the impact of platforms' limitations and the flexibility of students to adapt to new concepts.

Some student's project will be analyzed as well as students' reply to research questionnaires.

**Keywords:** Design-Based; Narratives; Play; Learning; Interactive.

# DIY Media: The Value of Play

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DIY media encompass various discursive moments of the interplay between the social and the technological, the civic and the commercial, the collective and the individual, the public and the private. Through this prism, challenges and questions for DIY media are raised concerning the nature, the realm, the purposes and the very value of their practice.

The paper incorporates these parameters in the theoretical discussion about communication, civic engagement and democracy, highlighting the need for the development of an overall framework that evaluates DIY media practices on the whole - encompassing diverse aspects of civic engagement along both orthodox (public, deliberative, political) and heterodox (private, non-deliberative, social) usages.

The analytic framework of mediation provides a useful tool to probe into the mutually shaping relationship between people's use of communication technology and action, articulated in the field of the lived experience, generating the renegotiation of social configurations, formations and imaginaries.

In the weaving of spaces, interests and activities across DIY media there is a sense of play that produces multiple meanings and ambivalent accounts of social actors' experience. "In play there is something 'at play' which transcends the immediate needs of life and imparts meaning to the action" (Huizinga, 1949). For those engaged in DIY media, the play implies a "free and unimpeded movement from or about a fixed point" (Melucci, 1996).

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**Keywords:** DIY Media; Mediation; Play.

# Becoming Entwined: Text based games as a literacy practice

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This presentation will present data from Storysmash, a project initiated by Nottingham Libraries to enhance young people's opportunities to creatively engage with text-based games. The project is a partnership between Nottingham: Libraries, The National Video Arcade and UNESCO City of Literature and is funded by Arts Council England. The Centre for Research in Creativity, Arts and Literacy based within The University of Nottingham's School of Education are the research and evaluation partner. The paper will focus on the way in which text-based games, such as Twine, enable the player / creators to draw on all their cultural resources in the creation of a multi-layered story, designed to be played by others. We will share examples of Twine 'gamestories', offering an insight into the way the rules, conventions and modes of narratives in different media are designed and redesigned (Kress, 2003) in newly transformed stories. In doing so the authors examine the extent to which Twine offers opportunities for playful engagement with narrative structure, coding and popular culture and, in particular, a tool which enables individuals to share and explore those film, television, games, websites and print texts which are significant and pleasurable to them. Finally, we reflect on the extent to which the use of games in libraries might provide much needed imaginative spaces to support children and young people in the creation of their own stories and games and developing their attitudes to reading and writing.

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**Keywords:** Text-Based Games; Young People; Narrative; Games; Stories; Popular Culture; Design; Coding; Play.
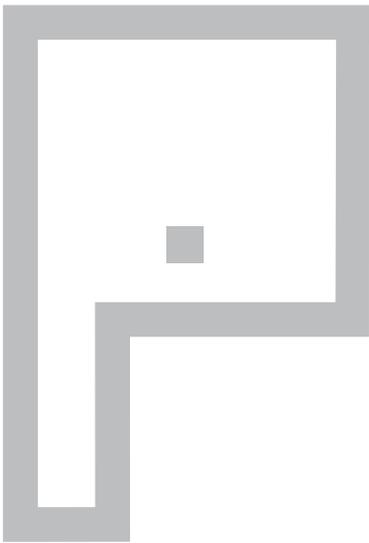
**Parallel Sessions 2**
Gamification Across
the Curriculum

LEARN

# Impact of Gamification Concepts in Geography Teaching

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There is a growing body of literature that draws on learning principles, theories and models to explain why computerized game-based learning is effective. Yet, there is limited research with practical guidance for how games should be incorporated into the learning process to maximize their benefits. In this context, educators applying game-based theories in their practice face many challenges, one of which is making the learning experience enjoyable (thus increasing motivation) but, at the same time, reconcile this with the need to achieve goals related to learning objectives, course contents and student's achievement. The present learning experience was designed to be able to deliver content about a particular subject area, provide opportunities for simulations where students could test theories and tinker with variables and increase student's motivation and interest. The more challenging and beneficial aspects to gamification such as challenge, sense of control, decision making, and a sense of mastery (Kapp, 2012) were considered. The present study aims to analyze the application of gamification concepts in Geography classes - use of gaming simulator "Sim City 4" and assignment of digital badges – to promote student's achievement and develop 21st century skills. This quasi-experimental study (no control group or random distribution) involved students from the eleventh grade (n = 15), who participated in a cooperative assignment in Geography during 9 classes (45 minutes each) , with a pre- and post-test for knowledge assessment (questions structured according to the SOLO taxonomy), as well as a student's questionnaire about their learning perceptions, at the end of the project. The project aims to encourage students to think critically about current urban problems, presenting possible solutions through urban planning, environmental management and socioeconomic development. The student teams used the game mechanics of "Sim City 4" to answer to a set of problems based on real cases (by working with available materials and a limited budget in the game simulation, students gained a systemic understanding of urban problems and different ways of solving them). Throughout the project a system of individual and team badges was also used. The badge system allowed for some systemic considerations such as badge per task, badge families and structure, meta badges and learning paths (Berge & Muilenburg, 2016). By analyzing the students results, it is possible to conclude that the assignment had a significant impact on the students' results (effect size - Cohen's *d* - 0.667), mainly in the relational and abstract extended levels (according to the SOLO taxonomy). The analysis of the questionnaire also shows a positive impact on the students' reflection and metacognition, as well as a high satisfaction level about the methodology used in classroom, which could lead to student´s greater interest and motivation.

**Keywords:** Gamification; Badges; Pedagogy; Geography.

# Gamification in Moodle "Sharing the Experience of the Use of Gamification in a Teachers Training Course Through Moodle"

*João Mouro*

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This communication aims to share the experience, the strategies and some of the possibilities, of the implementation of gamification components in an Moodle platform directed for training.

Whether for professional or research purposes, I have created some training courses (mainly aimed at teachers) through Moodle, being some face to face, others completely distance.

Especially for distance training one of the main obstacles is due to the very nature of training that requires discipline, work routine and self-motivation. In this perspective I adopted through some core modules and some additional modules, some functionalities based on gamification with the aim of motivating and checking other types of impacts on the trainees.

Some of the modules analyzed in the training were: Badges, LevelUp !, Progress Bar and Ranking.

Badges - Badges have been assigned as a way to serve as positive reinforcement, to create positive competitiveness, and to serve as evidence of achieved goals.

Level up - A system of hierarchical levels has been created. The various activities or actions have been assigned a points value. Each user who completes or performs the activity is assigned a certain value. When accumulating "X" points rises level. This evolution, once again serving as a motivator, also serves as a precedent to access other resources and activities, serving as an instrument for gauging some degree of knowledge or at least dedication time.

Ranking - Using the same mechanics of the points assigned to each activity, a "Ranking" table was created in order to publicly motivate the best performers. In order to avoid some perverse effects of the ordering lists, this block allows a weekly, monthly and global ranking. Whether for the trainees it functions as a motivator and generator of competitiveness, or for trainers, it gives information about the trainees' performance in a temporal and graphical way.

Progress Bar - A progress block was used for the trainees so that each trainee knows in terms of the expected tasks which they have successfully completed. Especially for the perspective of distance training this block is a very useful resource as it allows the personal management of each trainee in terms of the tasks to be performed. For trainers, it allows in a simple and graphical way to have a

general overview of the performance of their trainees and at the same time to gauge their own performance and quality of the resources created.

The results mentioned by the trainees (testimonials) so far are positive, with the first pilot groups still in progress, and therefore still in the stage of statistical analysis and treatment of the quantitative data.

I plan to use a simple presentation showing the components described above, sharing the procedures and the testimonials of the trainees.

**Keywords:** Moodle; Gamification; Levelup!; Badges; Progress Bar, Ranking; Distance Training; Teachers Training.

# From Input to Output Through Gamification in Primary English Teaching

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### ABSTRACT

Gamification is a new methodological approach that provides new experiences, using game elements in "non-game contexts" (Deterding, et al., 2011). This can be a strong ally in Primary English Teaching for reconciling elements with whom the twenty-first century learner is familiar with in the learning process, making it motivating, meaningful and experiential (Fernández-Corbacho, 2014).

With our project we intend to show that gamification can influence pupils' motivation and participation (Foncubierta & Rodríguez, 2015), during the learning process, and that it can consequently promote collaboration and competition among them. That's why we also sought to list the role of emotions in this process, showing that what does not attract emotion, does not capture attention and does not trigger meaningful learning, which involves pupils in the learning process (Mora, 2013; Fernández-Corbacho, 2014).

Our project was a case study with action research contours in a qualitative methodological perspective and it was carried out with fourth grade pupils from a private school in the Oporto area. The chosen data collection instruments were participant observation and content analysis (self-assessment worksheets and questionnaires). Its main goal was to answer the questions which led us to our investigation. The questions were: a) which is the contribution of gamified activities to pupils' academic and behavioural performance?; b) in what way can gamified activities be accomplished based on *Metas Curriculares* in Primary English Teaching? c) which attitudes do pupils reveal during the gamified activities performance?

Our main aims were the following: a) to enumerate learning behaviours in the classroom context; b) to verify what type of gamified activities contribute to the improvement of the student's academic and participatory performance in the classroom context; c) to observe the processes of the gamified pedagogy in the fulfillment of *Metas Curriculares* in Primary English Teaching; d) to verify pupils' reactions during the gamified activities accomplishment; e) to verify the effects of gamified activities on pupils' participation.

The results show that gamified activities can increase motivation and pupils' engagement during their accomplishment, arousing different emotions. We have also concluded that they can also be based on *Metas Curriculares* in Primary English Teaching, and at the same time it is possible to draw up strategies, to plan lessons, to predict attitudes and to structure evaluation elements.

**Keywords:** Gamification; Emotion; Primary English Teaching; Case Study.

## Introduction

Globalization brought people together and communication between them became crucial. Therefore, people were introduced to new languages and, consequently, to other cultures, enlarging new horizons for new places and people. In this way, it was necessary to make some changes in some areas and the education was no exception. Furthermore, the need to find new teaching methodologies became mandatory, as well as the implementation of information and communication technologies, and the inclusion of game elements to improve teaching and learning experience.

Taking into account that today's students are "digital natives" (Prensky, 2001) and they feel attracted for the various mobile and technological devices, we consider that their use in the English language teaching (ELT) classroom may be a benefit for increasing pupils' self-esteem and motivation. It is a successful way to reach their different learning styles and it can also encourage team work, as well as collaboration. We believe that the use of technology in the ELT classroom is an effective way to help pupils to develop both their technological and language skills.

Our main purpose with this article is to present the Gamified Pedagogy as a recent methodological approach, which is considered to be learner-centered. Gamification can also be an alternative to traditional teaching models in English Primary Teaching in the learning context. We believe that by applying game elements in "non-game contexts" (Deterding et al., 2011), several emotions arise and these have a main role in the learning-teaching process, because they call for pupils' attention and they make the learning process more experiential, memorable and meaningful (Fernández- Corbacho, 2014; Foncubierta & Rodriguez, 2015).

In the first part of this article, we aim to focus on the theoretical basis of gamification pedagogy. The practical component begins with the justification within the framework of the qualitative methodology, applied in a case study with action-research contours. We also present participant observation and content analysis as chosen data collection, in order to find out the answers to our three research questions. In section 3.2., we described three sessions of a unit plan in which we present some analogue and digital activities within the gamified pedagogy framework. Then, we present some considerations in order to answer to the questions, which were the starting point of this study.

## English Primary Teaching in Portugal and New Didactic Approaches

The English language was taught in Portugal in the scope of Curricular Enrichment Activities from the 2005/2006 to the 2012/2013 school year. This was rooted in the concept of full-time schooling (extended school schedule until 5:30 p.m.) and its main goal was to create the crucial conditions for quality education and to offer new learning opportunities to primary school pupils. In spite of being compulsory in all public schools, its attendance was optional. Therefore, some asymmetries were felt within the same teaching cycle as well as in the following ones, because pupils reached the 5th grade with different English knowledge levels, hampering the English teacher's work (CNE, 2014). Other obstacles were found, such as the lack of didactic teaching training for the early English teaching, as well as, teachers' recruitment, and the lack of a definition of the professional English teachers in Primary teaching. Furthermore, there was no agreement of the promoting entities in the creation of a consistent program of articulation between all the involved entities.

Besides the Curricular Enrichment Activities, there are in Portugal other experiences of curriculum integration and complementarity/enrichment of the language curriculum at the initial levels: "Bilingual Schools Project", the "Escola a Tempo Inteiro" project of the Autonomous Region of Madeira, and some private schools which provide the language teaching since preschool. These can be a few examples that reveal some of the inequalities related to English Teaching in Portugal, which seem to have been reflected in the "Preliminary English Test" results. These show that half of the examiners revealed having little knowledge of the language.

In order to diminish the gaps and to give more coherence to the English teaching, according to the Law Decree number 176/2014 of December 12, since the 2015/2016 school year, the English language has become part of the Primary English Teaching curriculum as a compulsory subject from the 3rd grade on. Thus, as it happened in other education cycles in 2012, a legal document entitled "Metas Curriculares para o Ensino do Inglês no 1.º Ciclo do Ensino Básico" (Bravo et al, 2014) was written. This document aims to ensure the homogenization of language teaching, guaranteeing a solid progress throughout the seven compulsory education language years, making it possible to achieve a more demanding and harmonized domain linked to the international references (Decreto-Lei 176/ 2014).

Being in a globalized world, in which pupils, or "digital natives" according to Prensky (2001), need to have an active role in their learning process in order to be prepared for the future, teachers need to use different strategies and new and appealing didactic approaches. So, concepts as "collaboration", "creativity", "problem solving", "communication" and "critical thinking" should be classrooms' everyday agenda (Cruz & Orange, 2016). As an example, we can talk about "Flipped Classroom Approach", "20 Time Approach", and last but not least "Gamification", which is the main focus of our paper.

## The Gamification Realm

Nowadays, there is a great concern in applying new methodologies in the classroom context, seeking to provide a holistic, meaningful and experiential learning (Fernández- Corbacho, 2014).  Thus, pupils' interest increases and they are encouraged and empowered to take more responsibility for their own learning process, since their experiences and interests are taken into account.

When the learning process is transformed into a game, it can be appealing, because it adds a playful dynamic to non-stimulant behaviours, which is the potential of gamification. This is a methodological approach, which aims at breaking up with traditional teaching models, by providing new experiences to both the teacher and the student by using game elements in "non-game contexts" (Deterding et al, 2011, p. 9). Therefore, it allows teachers to rely on game dynamics (emotions, narrative, evolution ...), mechanics (competition, collaboration, feedback, rewards, ...) and components (points, rankings, levels, ...) (Werbach & Hunter, 2012) to plan and organize their activities, in order to engage pupils, influence their behaviour (Star, 2015) and also their participation.

Motivation is a key element in the learning process and its two types seem to be influenced by the gamified elements. Extrinsic motivation is driven by external factors, such as the punctuation system and the ranking, in order to get a particular behaviour, such as encouraging the student to reach a certain goal or to perform a task (Ryan & Deci, 2000). Intrinsic motivation, on the other hand, is related to personal interests which lead pupils to proceed with the activities, because they feel pleasure and do not expect any external rewards (idem).

Connected to intrinsic motivation are the needs of competence, autonomy and relatedness of Ryan & Deci's Self-Determination theory (2008), which seem to influence pupils' participation during their performance in gamified tasks. The first one is related to problem-solving, to progression, to immediate feedback, and to the increased level of difficulty in the proposed tasks which awakens the pupils' sense of challenge (Werbach & Hunter, 2012). For example, pupils are competent when they feel able to face their schoolwork challenges. The second need is autonomy and it is associated to individual and group choices and to decision-making (Star, 2015). For instance, pupils are autonomous once in group, they are able to decide the role of each member or the task each member will do. The third one is the relatedness need and it is connected to the pupils' desire to be an important element, not only as part of a team, but also individually. This need is stimulated through teamwork, the sharing of achievements and the commitment to accomplishing goals. As another example, relatedness need is achieved when pupils feel they have an important role in the classroom and as a class member. Besides, collaboration (when a task is carried out jointly, with the goal of attaining the objectives which were previously negotiated by the group, and the result is shared by all) and competition (when a task is carried out in groups or individually, in order to achieve the goals first established or with the best performance) are promoted by the leaderboard and by the punctuation system, which are elements that encourage pupils' participation, decision-making as well as the desire to score points as the challenges are completed (Raban, Rafaeli & Ritcher, 2015) and the required level increases.

Moreover, we believe that gamification elements can be considered positive reinforcements when pupils want to carry on with an activity in order to improve their performance and to try to outdo themselves. However, if these elements trigger their disinterest, making them want to give up, they may work as negative reinforcements. The same occurs with the reward system, because if it symbolizes the accomplishment of tasks with different levels of difficulty, pupils' interest and motivation increase (Star, 2015), but if they are handed out without representing a challenge or an achievement, they become meaningless and unattractive elements (Hamari & Kovisto, 2013).

We believe that pupils are familiar with gamified activities which allow them to use resources which belong to their universe and for which they are already intuitive, making the results memorable and meaningful (Fernández-Corbacho, 2014). The same happens with pupils' creativity which is also encouraged. At the same time, pupils' curiosity (Superfine, 2002) and feelings, such as joy, pride and frustration arise, which makes this methodological approach closer to real life.

**The Game of Emotions in the Design of Gamified Tasks: our Action Research Project**

Emotion and learning-teaching process are concomitant, insofar as pupils only remember what is meaningful to them and what provokes their curiosity (Fernández- Corbacho, 2014). We think that this can be a strong ally of the gamified activities, as during task accomplishment the interest, the involvement and the implication of the pupils are triggered (Foncubierta & Rodrígues, 2015). This process is Mora's "emotional awakening", which is closely related to game dynamics and it occurs by stimulating pupils' senses and encouraging their active participation in the gamified task.

Gamified activities awaken the pupils' curiosity to what comes next (Mora, 2013), in order to engage them in the activity: "(...) children who want to find out how something can be made to work or who are trying to make something of their own are driven, often, by a sense of curiosity" (Superfine, 2002, p. 32). This emotional connection to gamification shows that the learning process is something felt, experiential and emotionally active (Fernández-Corbacho, 2014; Foncubierta & Rodríguez, 2015). When gamification is applied in the second language learning context, it is sought to provide an attractive and effective experience because, while language learning occurs, other skills are developed and worked out. These skills help pupils solve the proposed challenges which are related with the topic. Consequently, the goals they set to themselves are fulfilled and they self-regulate their learning in order to reach the expected level (Figueroa, 2015). Both autonomy and competence of the Self-Determination Theory needs are both satisfied (Ryan & Deci, 2008). As follows, pupils' attention and desire are attracted, and their participation is stimulated through enigmas' resolution, contextualized narratives and the feeling of competition (Foncubierta & Rodríguez, 2015). Besides that, they feel intrinsically motivated within the learning process, being able to use

their creativity in the accomplishment of the proposed tasks (Superfine, 2002), by
recurring to their previously knowledge, too.

It is up to the teacher to rethink his/ her practices relying on the elements and
game structures to design contextual challenges, so that their classroom players
overcome them. Hence, they will be engaged, dedicated and motivated with the
learning process while, at the same time, they relate the two worlds they are famil-
iar with: game and learning.

During an activity performance, the feeling of achievement can produce positive
emotions. That occurs when they are associated to rewards, which can be med-
als, for example, for being "(…) a typical representation of excellence" (Dominguez
et al., 2012, p.7). Rewards can not only foster pupils' commitment and dedication
in a task accomplishment, but they also make them wanting to win as many med-
als as possible. As a result, competition among the players is encouraged (idem).
However, classroom rewards can also be used in order to encourage some situ-
ations and special behaviours (ibidem), such as groups inter-help moments, for
example.

Gamification in the learning context can be an interesting process, not only for
being motivating, but also for fostering creativity, participation, motivation and
collaboration among pupils, by combining all these aspects with technology and
digital platforms, such as "Kahoot!" and "Plickers" (which promote immediate feed-
back on pupils' performance). Nevertheless, in English Primary Teaching context,
the Gamification Pedagogy encompasses the use of the four skills which are con-
sidered as essential for learning a second language: listening, speaking, writing
and reading. We worked out these skills during the implementation of this project.

In the following paragraphs, we will present the chosen methodology and the data
collection instruments. We will also present and describe a three sessions' unit
plan which were carried out during this project's implementation.

### Action Research Project Design

Our project, which was carried out in a fourth-grade class from a school in the
Oporto area, is a case study with action research contours and we also relied
on the qualitative methodology during the implementation of our study, in order
to develop new knowledges related to learning and teaching (Bento, 2012). This

method has a greater focus on educational research, and our goal is to understand and seek out the meaning through the observation of pupils' behaviour.

The choice of action research methodology is due to the fact that it seems to be closer to the educational context and also because it is considered as the teacher-researcher methodology (Coutinho et al., 2009), because it allows teachers to observe not only class moments, but also what is inherent to the educational context. This one applies the scientific method to explain and look for solutions to problems, whose answers do not exist in a previously established theory (Carmo & Ferreira, 1998). For this reason, we propose to observe pupils' behaviours and reactions by interacting with them in a natural and discreet way (idem), in order to reduce and to manage possible influences and effects which can be felt by the investigated subjects, while the data collected are analyzed (ibidem). Besides, it is possible to understand, to explore and to describe several events and contexts in which several actors and factors are involved (Yin, 2005).

Our project's main goal was to seek the answers to the proposed questions which led us to this investigation: a) which is the contribution of gamified activities to pupils' academic and behavioural performance?; b) in what way ca gamified activities be accomplished based on *Metas Curriculares* in Primary English Teaching? c) which attitudes do pupils reveal during the gamified activities performance?

We would like to add that we chose participant observation and content analysis (self-assessment worksheets and questionnaires) as data collection instruments.

### Presentation, Analysis and Results Discussion

The main topics, which were included in this three sessions' unit plan were "food", (cake/ rice/ meat/ cheese/ egg/ cereal/ spaghetti/ fish/ chips/ bread/ soup), "fruits and vegetables" (apple/ lemon/ pear/ strawberry/ orange/ grapes/ potato), "drinks" (milk/ water/ tea/ lemonade/ water/ tea/ orange juice), "meals" (breakfast/ morning snack/ lunch/ afternoon snack/ dinner) and "parts of the day" (morning/ afternoon/ evening/ night). Some grammar topics were also focused, such as "likes" and "dislikes" and the definite articles "a/an" in an implicit way. Pupils were already familiar with the topic and they recognized the vocabulary, and for this

reason, some review and consolidation activities were set out by using cultural rich contents and proactive strategies based on analogue and digital gamified activities, such as storytelling and *Plickers* digital platform comprehension questionnaire, which we are going to present next. These lessons were also planned according to the *Metas Curriculares* in Primary English Teaching document and on its aims.

The class was divided into four groups of six pupils and each group had a colour name (the *Blues*, the *Yellows*, the *Reds* and the *Greens*) and an identification card. According to the questionnaire results, most pupils (90%) reported preferring to accomplish activities with more than one friend, mentioning that it was funnier and easier, leading us to the conclusion that they appreciated the relationship among their peers (Foncubierta & Rodriguez, 2015) and making them feel they were group members (Ryan & Deci, 2000). Only 10% stated the preference to solve tasks with just one peer, mentioning that it was less confusing and also less crowding.

The activities were carried out according to the game mechanics and dynamics, previously explained by the teacher, and those groups who finished their tasks on time or first (depending on the activity dynamics) stuck a star on the leaderboard (see Picture 1), which was always within the pupils' scope.

According to the questionnaire analysis, the majority of pupils reported they liked to carry out activities which involved winning points and being winners. Some pupils justified that the victory was connected to the reward system and both were related to a successful activity accomplishment (Ryan & Deci, 2000). Therefore, we can presume that the reward awarding system, which was applied throughout the three sessions, was meaningful and it also represented an achievement (Hamari & Kovisto, 2013). Moreover, most pupils reported enjoying gamified activities, because they were fond of competition and they wanted to show to their colleagues what they were able to do. Thus, to compete was their motivation, so the victory of some would be the defeat of others (Star, 2015).

Picture 1. Leaderboard

In the first session, after playing the "Hangman game" and doing a gap-filling song activity ("The yummy food song" from student's book) in order to warm-up, to introduce the topic and to check what pupils knew about it, they did another pupil's book listening exercise, in which they had to stick pictures according to the instructions. The group who finished first won a point and stuck a star on the leaderboard. Then, the teacher corrected the exercise.

In the following exercise, each group rewrote "The yummy food song" (Abreu & Esteves, 2016), according to their likes and dislikes (see Picture 2), by using the previous model. The original song version ended in a silly way by asking if they liked fish ice cream and pupils had to find out a silly way to end theirs. The groups' choices were: "broccoli ice cream", "tomato soup yoghurt" and "chicken cake". Pupils could check their class book's vocabulary if they needed. The groups who finished the activity on time stuck a star on the leaderboard. Then, they all performed their songs. The use of songs as a teaching tool can help young learners to improve their listening skills, pronunciation and their speaking skills.
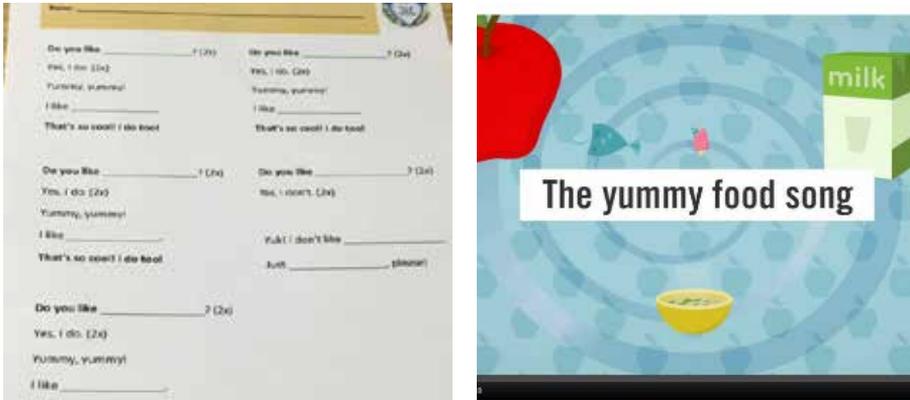
Picture 2. "The yummi food song" template

After revising meals and time by doing a listening exercise about Sarah's routine (which was one of the previous unit plans' character), and in order to check and to consolidate the vocabulary learnt and reviewed, the teacher told the class that the girl had a problem and she asked pupils to guess what it was. After giving them some clues of what it could be, the teacher showed the class a picture of Sarah's empty fridge and pupils were challenged to help the girl (see Picture 3).

The teacher gave each group an envelope with a different meal card inside ("breakfast", "lunch", "snack" and "dinner") and explained the exercise dynamics: pupils were asked to write a shopping list according to the previously meal card given, and they went shopping. Some food realia (cereal boxes and water bottles, for example) and flashcards were used, to provide pupils real lives' experiences, to engage them and to make lessons memorable. The groups who finished on time stuck a star on the leaderboard. Then, each group did the "show and tell" activity to present the decisions they took about what Sarah was going to have for each meal.

We believe this is a problem-solving activity, since pupils had to help the character by choosing the food she needed to have in her fridge for each meal by using their critical and their creative abilities. This kind of activities might support pupils to face future problems and it is up to the teacher to question them, in order to help them to think and to use their creativity in solving potential future challenges (Cruz & Orange, 2016).
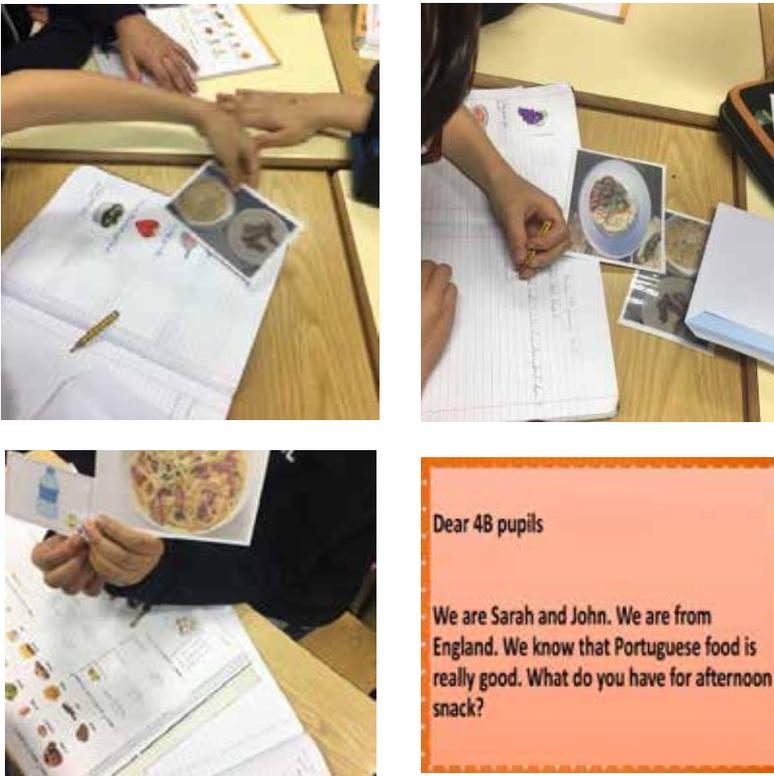
Picture 3. The shopping list activity

In the second session, after homework correction, pupils were shown the cover of the story "Food Project" as a pre-reading activity and they were asked about the continents' names and the story's topic. Pupils were also questioned about what a school project was and about what Sarah and John's project was. It was used a data show projector, so pupils could read and listen to it at the same time as the teacher, in order to become a whole-class activity.

Then, pupils listened to and read the interactive story in which pupils had to answer Sarah and John's emails to four pupils from four different countries: Madagascar, India, Italy and Portugal. The mails were about traditional meals. Sarah and John presented theirs and they asked the other children what theirs was. The answers to these emails were written by the groups by following the given clues at four different moments (see Picture 4). After answering each email, a member of the group was chosen in order to read the group's answer in a "show and tell" activity. In spite of having revised and taught some language structures in the previous lesson and of reading and showing Sarah and John's emails, pupils were free to use the language structures they preferred in order to express what they learnt in their own way. They could use their notebooks and books for research if they wished. They had five minutes to answer and the groups who finished on time won a star that was stuck on the leaderboard.

The first email written was to Aina, a Madagascan girl. The two main characters wrote to her about their traditional English breakfast and sent her pictures. They also wrote about one food they liked and another that they didn't like. Then, they

also asked Aina about her breakfast. Each group received an envelope with three different pictures and wrote on their notebooks the email's answer. When the time was over, the teacher checked the texts of the groups who accomplished the task on time and, then, a group member threw a dice in order to decide which group was going to do the "show and tell" activity to the class. The following emails were written to an Indian boy, who was asked about his lunch and to an Italian girl, who was asked about her dinner. The last email was written to the class. Pupils were asked about what they had for afternoon snack, but there were no clues. Pupils could answer according to their eating habits, their personal experiences and habits or they could use their creativity, in order to present an unusual snack.

Dear 4B pupils

We are Sarah and John. We are from England. We know that Portuguese food is really good. What do you have for afternoon snack?

Picture 4. Story Writing Activities

During the story telling, some deliberate questions were asked, not only for keeping pupils' attention, but also to help them with some unknown vocabulary, such as brussels sprouts or carrots, for example.

This story presented different typical meals from four different countries and some of them could cause strangeness to the class, for example the traditional Madagascan breakfast presented was *Vary Sosoa and Kitoza*, which is a kind of rice and meat soup. In Portugal, it is not common to eat soup or meat for breakfast, so pupils could find it strange or unusual. For this reason, we believe that through story telling these differences can be presented in a less formal way, in order to promote positive attitudes, such as respect and acceptance towards other cultures (Dujmović, 2006).

The story ended with a challenge: pupils had to make their own food project by working in groups. They had to choose a country and they also had to decide who was going to search for a traditional main course, a typical drink, desserts and fruits. The research should be done at home, as homework, with pupils' parents help (if possible) and they could bring pictures, small texts and other kind of information that they would find relevant to the topic. It was expected that the final results would be presented in the following session. This was a "flipped classroom" approach activity, which allowed pupils to take decisions, share responsibility for their learning in order to engage them in the process.

In order to assess pupils' story comprehension and understanding, they answered to a *Pickers* questionnaire. *Plickers* is a digital platform which helps teachers to collect formative assessment data in real time. Each group answered to multiple choice questions related to the story that were projected through the interactive whiteboard by placing the given platform's card according to the answer's letter. Then, the cards' position was detected by the teacher's cell phone and the groups' names and answers were projected on the whiteboard, in order to provide them instant feedback (see Picture 5).

All pupils had the chance to participate and to get engaged within the learning process. This activity also involved discussion among elements of the different groups with the aim of finding out the correct answer according to the given options.

Different reactions and emotions were awakened when groups' names were projected on the whiteboard, revealing who answered correctly to the questions and who didn't. Initially, the teacher chose to show the evolutionary general graph, but due to the request of some pupils, the teacher revealed groups' evolution, leading us to the conclusion that competition among them was enhanced once again. We

could also observe the unfriendly attitudes of some students towards the defeat of other groups.

**Picture 5. *Plickers* comprehension questionnaire**

In the third session, pupils organized the information they searched in order to make a poster. They won a star for doing their homework and another for accomplishing the task. Both were stuck on the leaderboard. Each group had twenty minutes to make their poster (picture 6). Then, they did a "show and tell" activity in order to share their projects with the class, by using the language structures with which they felt more comfortable.



Picture 6. "The Food Project"

Marta Fortunato, Mário Cruz

As following, pupils did a consolidation worksheet (see Picture 7) and a self-assessment worksheet (see Picture 8), in order to help the teacher know pupils' opinions and feelings about the activities that were carried out during the three sessions, where they answered by: a) drawing/ writing their opinions about the sessions; b) expressing feelings about accomplishing the lessons' aims and giving examples of what they have learnt; c) writing/ drawing a picnic food list.

Picture 7. Consolidation worksheet



Picture 8. Self-assessment worksheet

This session ended with the stars counting, in order to know the winners and to reward them (picture 9).

Picture 9. Leaderboard

Pupils' emotions were varied. The winners were happy and eager to know what their reward was, whilst some pupils were sad and upset for considering the punctuation system unfair. Although it is important to point out that, in the questionnaire, only 33% of the pupils stated that if they lost a game, they would play it again in order to win and 0% of pupils reported being sad or upset about losing in a game, while the majority preferred the activities participation to the victory. As we were able to observe, their attitudes and behaviours did not entirely match with their questionnaire answers.

After analysis of the self-assessment worksheet, we could check that the great majority of the pupils preferred to work in groups. They preferred, in general, to accomplish these unit plan activities, focusing on the story telling and on the school project's activities. They also mentioned to like working in groups. We could notice that most of the pupils reached the proposed objectives: a) to identify food; b) to express preferences ("I like chips, rice, meat, apple, spaghetti, cake, cereal, soup, I do not like chocolate"); c) to identify meals. When they were asked about what they didn't like in the sessions, five pupils referred the competition among groups and the punctuation system, considering both unfair; four pupils stated that they

didn't like the "noise" that arose during the accomplishment of the activities; two pupils mentioned the exercises; and the other pupils didn't answer.

Pupils seemed to be motivated and engaged during the tasks completion and their participation was also stimulated. They worked in groups and their decisions and choices were made together, so the relatedness need was achieved (Ryan & Deci, 2000). Consequently, they were able to know and to respect different opinions which were as much important and valid as theirs, as it should happen in real life.

## Conclusions

We believe that the most effective gamification experiences include elements such as curiosity, the permission to fail, the instant feedback, collaboration among players, the presentation of new contents through stories and contextualized challenges and to promote discoveries (Foncubierta & Rodriguez, 2015). We believe that when the teaching process is combined with game elements, it encourages the learning of a new topic and keeps pupils' motivation to continue and to move on to the next level. Some skills, such as the solving-problem skill, persistence and creativity are also recognized, developed and encouraged (idem).

In order to answer to our project's first question, we could ascertain that gamified activities influence pupils' behaviour, increase their both intrinsic and extrinsic motivation as well as their engagement (Star, 2015). Pupils are driven by achievement of stars and by the victory. The competition was marked, arousing pupils' emotions.

Regarding our second question, after analyzing *Metas Curriculares* for Primary English Teaching document and observing the unit plans that we carried out, we can conclude that this legal document presents only the topics that should be addressed and taught in the respective schooling years. So, it is up to the teacher to decide where and how to proceed (Bento et al., 2014). Therefore, we can conclude that Gamification Pedagogy activities can be based on these document contents and created resources, either analogue or digital, since it is possible to draw up strategies, to plan lessons, to structure evaluation elements and to predict pupils' attitudes.

With the purpose of answering to the third question, we have found that gamified activities provoke several emotions, such as euphoria and joy, when the task is accomplished, and the reward is won. However, sadness and disappointment reactions related to competition and to the game elements, as well as leaderboard and stars achievements were also verified.

In general, with the appliance of Gamified Pedagogy in the classroom context, we found that the activities' rhythm and cadence were less formal, making the learning process more spontaneous. This pedagogy also explores other skills, such as: learning to listen and to respect different opinions, respecting and accepting others' victories and achievements and preparing pupils to real life challenges.

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# A Gamification Experience in a Class of a Degree in Engineering

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**ABSTRACT**

The Gamification is a subject that is increasingly discussed in the educational field, but still little implemented, especially in higher education. The Gamification, as a teaching strategy, favors learning and motivation and combats student abandonment.

In the first year of engineering courses, traditionally a large group of students does not attend math classes which leads to high failure rates. This work presents a study that was done in a curricular unit of first year mathematics of an engineering course, where a gamification strategy was used. The goal was to reduce school dropout and increase motivation to achieve better learning and a higher passing rate.

Although this experience does not allow for conclusions, it can be verified that the students were more motivated, the dropout rate was low, and the approval rate was quite satisfactory.

**Keywords:** Gamification; Pedagogic Experiences; Higher Education.

## Introduction

Traditional schooling is perceived as ineffective and boring by many students. Although teachers continuously seek novel instructional approaches, it is largely agreed that today's schools face major problems around student motivation and engagement (Lee & Hammer, 2011). The Gamification, when used as a teaching strategy, favors learning and combats student abandonment. According to Espíndola (2014) the gamification is the use of game mechanics and dynamics to engage people, solve problems and improve learning, motivating actions and behaviors in environments outside the context of games.

The idea of using thought and game mechanics to solve problems is old. Three hundred years ago, the Scottish philosopher David Hume laid the groundwork for

understanding the player's motivations. From the 1960s, several authors wrote books on game psychology (Zichermann and Cunningham, 2011).

Gamification is not about introducing game elements, such as the distribution of rewards and medals for a given product, as it requires an in-depth approach to decide which elements will be incorporated and their conformity with the context of the goal proposed by the project (Marins, 2013).

McGonigal (2011) highlights the following elements of games to be observed in gamification: objective, rules and voluntary participation. Werbach and Hunter (2012) define the PBL Triad (Points, Badges, Leaderboards) as an initial parameter consisting of the following elements: points, medals and rankings. The authors of this work also divided the main elements into categories:

1. dynamics: constraints (imposed limitations), emotions, narrative, progression and social relation;

2. mechanical - elements that stimulate actions and involve the player: challenges, competition, feedback (performance), randomness, cooperation (teamwork), rewards and victory;

3. components: medals (visual representation), rankings (visual representation of evolution), points (numerical representation), levels of progression, team formation, final challenge, collections and unlocking content after accomplishing the mission.

Students who become players, challenging classes, students working autonomously and / or in groups and working online to earn points, receive medals, achieve the highest scores and enter the leaderboard, receive real-time feedback on the performance... These are some of the transformations that occur when one enters into the 'gamification' of teaching.

> Gamification is a tool with advantages and disadvantages in different situations and environments. ... Gamification only uses a few game elements. Learners don't play an entire game from start to finish; they participate in activities that include video or mobile game elements such as earning points, overcoming a challenge or receiving badges for accomplishing tasks. (Kapp, 2015)

A lot of papers reporting experiences with gamification have appeared in the last years. According Dicheva,

> The majority of the papers report encouraging results from the experiments, including significantly higher engagement of students in forums, projects and other learning activities ((Anderson et al., 2014), (Caton & Greenhill, 2013), (Akpolat & Slany, 2014)), increased attendance, participation, and material downloads (Barata et al, 2013), positive effect on the quantity of students' contributions /answers, without a corresponding reduction in their quality (Denny, 2013)); increased percentage of passing students and participation in voluntary activities and challenging assignments (Iosup & Epema, 2014), and minimizing the gap between the lowest and the top graders (Barata et al, 2013). Hakulinen et al. (2014) conclude that achievement badges can be used to affect the behavior of students even when the badges have no impact on the grading. The papers of this group also report that students considered the gamified instances to be more motivating, interesting and easier to learn as compared to other courses ( (Mak, 2013), (Barata et al., 2013), (de Byl & Hooper, 2013), (Mitchell, Danino, & May, 2013), (Leong & Yanjie, 2011)). (Dicheva et al., 2015)

According to Franco (Franco et al. 2015), the games in the educational processes should be promoted with due planning in order to generate student engagement. It is the motivation that instigates a person to perform a given activity, so it is fundamental to know what motivates the students. The school goals to be achieved should be clear, during the use of game strategies that users should have a clear perception of their progress. The interaction between the intrinsic and extrinsic motivations must be balanced, since there is a risk that users, in this particular case, the students, aim only at the rewards and even a reduction of motivation if, for example, the challenges become repetitive.

Gamification tries to harness the motivational power of games and apply it to real-world problems, in our case, students' motivational problems. Mathematics disciplines in the early years of engineering degrees usually face a very high dropout rate so motivation and engagement of the students are important challenges

for the teachers. But what is the gamification of education? According to Lee and Hammer,

> What do we mean by the gamification of education? After all, schools already have several game-like elements. Students get points for completing assignments correctly. These points translate to "badges," more commonly known as grades. Students are rewarded for desired behaviors and punished for undesirable behaviors using this common currency as a reward system. If they perform well, students "level up" at the end of every academic year. Given these features, it would seem that school should already be the ultimate gamified experience. However, something about this environment fails to engage students. In contrast, video games and virtual worlds excel at engagement (McGonigal, 2011). As evidence of this, 28 million people harvest their crops in Farmville on a daily basis (Mashable, 2010), and over five million people play World of Warcraft for more than 40 hours per week (Blizzard, 2010). On the other hand, the default environment of school often results in undesirable outcomes such as disengagement, cheating, learned helplessness, and dropping out. Most students would not describe classroom-based activities in school as playful experiences. Clearly, the existence of game-like elements does not translate directly to engagement. Understanding the role of gamification in education, therefore, means (Lee & Hammer, 2011).

The goal in the use of the Gamification is always the same, motivate students for learning.

The aim of this study was to use gamification were a motivation factor and to combat high school drop-out rates in the first years of higher education in curricular units of mathematics. Thus, we present here an experience where gamification was used in a mathematics class of the first year of an engineering course. Although this work does not allow to draw conclusions, it's yet another contribution on the positive effects of the use of gamification in teaching.

A Gamification Experience in a Class of a Degree in Engineering

## The Gamification

According gamification as well as active learning methodologies and educational coaching come as alternatives to promote learning by means pedagogical and interactive practices with proven effective results. The gaming experience goes beyond the entertainment factor and goes through other points such as the need for competition, instant feedback, the possibility of rapid evolution, and the pursuit of tangible rewards and rewards, which are inherent characteristics of human beings.

In addition, community building for work in games are also actions that encourage the participant to continue playing until their goals are achieved. Investing in gamification it is a way of engaging people, the gamification offers incentives for participants to feel excited to take action or to progress with a task. By promoting experiences that involve students emotionally and cognitively, gamification helps to achieve greater engagement compared to traditional teaching models.

The neurosciences have already confirmed that "when there is an emotion, one learns," then can the introduction of video games bring this about. One of the incessant searches of our brain is by reward. Games are important for education because our brain develops from the method of observation, trial and error. The endocrine system, together with the nervous system, releases dopamine, noradrenaline and serotonin, rewarding us with euphoria and a sense of happiness when we experience and learn in this way.

Another important factor is that games can develop social-emotional skills as well as being a way of engaging people, games provide incentives for participants to feel excited to take action or progress with a task. And with this, some socio-emotional competences can be perceived: interactivity; creativity; own thinking; persistence; sense of urgency; healthy competition; discipline, among others.

Traditional schooling will make less and less sense. For we live in a conflict, between two realities that makes the school a boring environment, outside technology and interactivity - horizontal learning and from the inside the learning process vertically. The learning environment is not very motivating, since most of the teachers went through this school with a content environment and today people do not have that profile anymore. Today:

- 97% of the young audience plays computer and video games;
- 69% of heads of households play video games;
- Most gamers want to play the rest of their lives;
- Collectively, more than 3 million hours of game-related weekly activity are spent.

## Methodology

When introducing gamification, the evaluation was replaced by points that were assigned to the students for completing the evaluation components and for their participation in classes and online.

> Students who have become players, work to earn points, level up, receive medals and other prizes, avoid bombs, get the highest scores and join the leaderboard.
>
> Students earned Experience Points for completing a lesson or for doing extra research about the lesson. And they gained access to special powers by fulfilling all the tasks proposed for a week. These special powers allowed them to eliminate an incorrect alternative from a math test or give them extra lives. If they have enough XP they could buy a help on a test.
>
> The gamification in education implies bringing features and elements of the games to the contexts of teaching and learning, to engage students in their activities and learning processes, also leveraging creativity, critical thinking, teamwork and independence in problem solving.
>
> The students barely registered in the UC had a hundred of starting points and everything they did, or not did, was giving them or taking more points. Each hundred points corresponded to one level and there were twenty levels corresponding to grades from zero to twenty. A student with a thousand of points was at level ten, which means that his grade at that time would be ten values.
>
> The medals or badges were rewards attributed to the students by performing certain tasks, such as going to class, participating in forums, solving challenges, among others. Obtaining a medal rewarded the student with a predetermined amount of points.

The Bombs were penalties attributed to the students for not doing certain tasks such as TPC, Moodle tests, among others. Bombs penalized students by taking a predetermined amount of points from them.

One of the components of the evaluation was the testing of Moodle. The students took these tests biweekly and during the weekend. All Moodle tests had three difficulty levels, Easy, Medium Difficult, and it was the student who chose the level he was doing.

During the semester, the student had to do six tests in Moodle, and had to do at least one test of each level. When he opened the test, the student chose the level he wanted to do, knowing that the average level allowed him to get double the points he could reach with the easy level and that the difficult level allowed him to get double the points he could reach with the average level.

In each test to perform in Moodle the student always had the possibility to make two attempts, but he knew that his classification in this test was the one obtained in the last attempt. The purpose of allowing two attempts was, when the first attempt had gone wrong, lead the student to reflect on what had not gone well on the first try and go to study or look for information to solve correctly this test. So, when he tried the second time, he would be better prepared to do the test. To force this reflection, between the first and second attempts the student had to wait at least sixty minutes between the two attempts. The second attempt was optional, but if the student chose to do it, it had to be of the same level as the first.

Consider, for example, the matrices' test;

- An easy level test involved only operations with complex numbers and operations with real matrices.
- Thus, an easy level test could be, for example,

1.  If i is the imaginary unit, the value of $i^{30} + i^{-60}$ is

    ☐ 0

    ☐ -1

    ☐ 1

    ☐ i

    ☐ None of the others is correct.

2.  If $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & -1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 & 0 \\ 1 & -1 & 2 \\ 2 & 1 & 2 \end{bmatrix}$ e $C = \begin{bmatrix} 2 & -2 & 1 \\ 0 & 1 & 0 \\ 1 & -1 & 0 \end{bmatrix}$, then $A^2 + B^t C$ is

    ☐ $\begin{bmatrix} -1 & 2 & -1 \\ 6 & 0 & 3 \\ 5 & 5 & 2 \end{bmatrix}$

    ☐ $\begin{bmatrix} -1 & 1 & 0 \\ 7 & 2 & 2 \\ 6 & 2 & 4 \end{bmatrix}$

    ☐ $\begin{bmatrix} 3 & -1 & 1 \\ 4 & -1 & 1 \\ 4 & 1 & 4 \end{bmatrix}$

    ☐ $\begin{bmatrix} 3 & 0 & 0 \\ 3 & -3 & 2 \\ 3 & 4 & 1 \end{bmatrix}$

    ☐ None of the others is correct.

- A medium level test involved operations with matrices of complex numbers and matrices proprieties, but only the easiest proprieties and without demonstrations.

1. If $A = \begin{bmatrix} 1 & i & 0 \\ 1+i & -1 & 1 \\ 2i & 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -i & 1+i & 0 \\ 1 & -i & 2i \\ 2 & 1-i & -2i \end{bmatrix}$ e $C = \begin{bmatrix} 2 & -2 & 1 \\ 0 & 1 & 0 \\ 1 & -1 & 0 \end{bmatrix}$,

then $\bar{B} + A^t C$

☐ $\begin{bmatrix} i & 5+2i & 1 \\ 2 & -1+i & 2+i \\ -i & 1-i & -1+2i \end{bmatrix}$

☐ $\begin{bmatrix} 2+3i & -i & 3 \\ 3+i & -3-i & 1+2i \\ 1 & -2i & 2i \end{bmatrix}$

☐ $\begin{bmatrix} 2+3i & -2i & 1 \\ 3+2i & -3-i & -i \\ 3 & 1+i & 2i \end{bmatrix}$

☐ None of the others is correct.

2. The statement:

"If A is a square matrix of order three and with a null row and B is a square matrix of order three and with no null elements, then AB is a square matrix of order three and with a null row."

It's

☐ True

☐ False

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- A difficult level test involved matrices proprieties. Thus, an medium level test could for example be

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1. The statement:

"If A and B are idempotent and permutable matrices, then AB is also an idempotent matrix."

It's

☐ True

☐ False

2. Consider the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & \propto & 0 \\ 0 & 0 & \propto\beta \end{bmatrix}$. Rank(A) = 2, if and only if

☐ $\propto \neq 0 \wedge \beta \neq 0$

☐ $\propto = 0 \vee \beta = 0$

☐ $\propto \neq 0 \wedge \beta = 0$.

☐ None of the others is correct.

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Another evaluation components were the challenges. Each challenge had three multiple-choice questions related to the subjects being taught. Each challenge also had three levels. In the easiest level the questions are only about the subjects taught in the class. In the medium level the questions are about the subjects taught in this class, but related with a subject taught in a other class of the same year and the same course. In the most difficult level the questions were related with real problems. The student started at the easiest level and was going up the level. To level up he had to be able to solve all the issues at that level. If he missed any question he lost a life, but he could try a challenge of the same level again. In each challenge the student had three lives he could use. The number of points depended on the number of lives used and the level at which the student arrived. During the semester the student performed three challenges.

For example, one question of the easiest level is

1.  Consider the matrix $A = \begin{bmatrix} a & 0 & b \\ c & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ , where a, b and c are real parameters.

a)  Indicate the values of the parameters a, b and c for which A is an idempotent matrix.

b)  Indicate the values of the parameters a, b and c for which A is a matrix nilpotent of order 3.

One question of the medium level is, for example
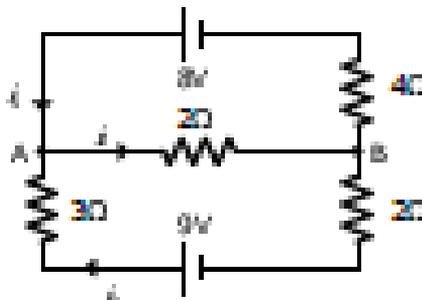
1.  Consider the electrical circuit shown in figure



Figure 1. Electrical Circuit

The potential difference between the battery terminals, measured in volts (V), produces a current that leaves the positive pole of the battery (indicated by the side containing the longest vertical line). The capital letters represent the nodes of the electric circuit. The letter i (not to be confused with imaginary unit which in this context is represented by letter j) represents the current between the nodes and the arrows indicate the direction of flow, but if i is negative then the current flows in the opposite direction to the indicated one. The currents are measured in amperes and the resistors in ohms.

Based on Kirchhoff's laws for electrical circuits, determine the currents in the meshes

One question of the difficult level is, for example
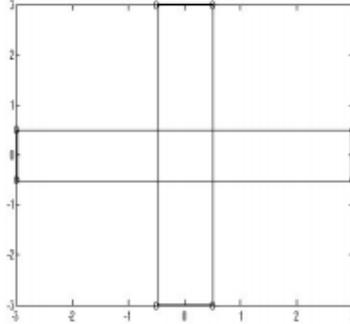
1.  Consider the image



Figure 2 . Cross

and the matrix D that represents it.

$$D = \begin{bmatrix} -0.5 & 0.5 & 3 & 3 & 0.5 & -0.5 & -3 & -3 \\ 3 & 3 & 0.5 & -0.5 & -3 & -3 & -0.5 & 0.5 \end{bmatrix}$$

a)  What is the effect of pre-multiplying D by matrix $A = \begin{bmatrix} 20 & 0.5 \\ 0.5 & 2 \end{bmatrix}$?

b)  Give a matrix B such that BD represents a reduction of the initial figure, i.e., a similar but smaller figure.

With gamification, the tests and exams turned into fighting against enemies and the proposed exercises for classes and group work turned into missions. The grades were the result of the number of points earned through accomplishing the missions and combats with the enemies, which allowed the students to increase the number of points and level up until reaching the maximum. Two types of missions were planned: individual and group. Thus, each player earned points based on their individual performance and also on the performance of the group as a whole, which stimulated the collaborative character of the process. Some tasks involved competitions between groups, which potentiated the competitive side of the games, but in interaction with the cooperative aspect, because the disputes happened between these groups.

The fact that grades were the result of the points obtained implied making available and evaluating a much larger number of tasks than in the previous curriculum. In games, the player has opportunities to evolve his character all the time accomplishing missions or defeating enemies to gain points. To provide that look in the classes, it was necessary to think of a larger number of punctuated tasks, so players could perform various missions to get those points.

A list of activities to be carried out each week was published weekly in Moodle. On that list was also the indication of the medals available this week and what the students would have to do to reach them. It was also published weekly in the Moodle the Leadership Framework in the form of a list, sorted in descending order of number of points, indicating the points of each student and the level in each student was. There was a lot of competition and it was also found that the students made a great effort to be in the first places of the list.

## Results

In this study, the sample was the set of all two hundred and ninety-four students enrolled in the first year and first semester of this engineering course. As for sex, as would be expected in an electrotechnical engineering course, the majority were men, only twenty (7%) of these students were women and two hundred and seventy-four (93%) were men, see figure 3.
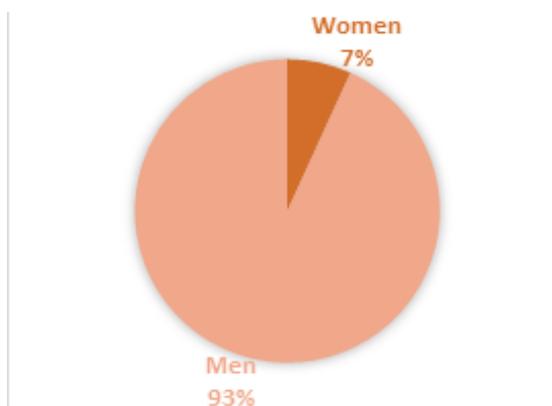
Figure 3. Gender distribution

With the introduction of gamification, classes have become a more challenging experience due to the new method used. As in each class where the student was

present and participated, the student earned a small amount of points until reaching the stipulated maximum, there was a very large increase in the number of classes each student went to. Traditionally, in mathematics subjects from the first years of an engineering degree, the percentage of students per class is small, this year has seen a considerable increase in both theoretical and practical classes, see figure 4 and figure 5.
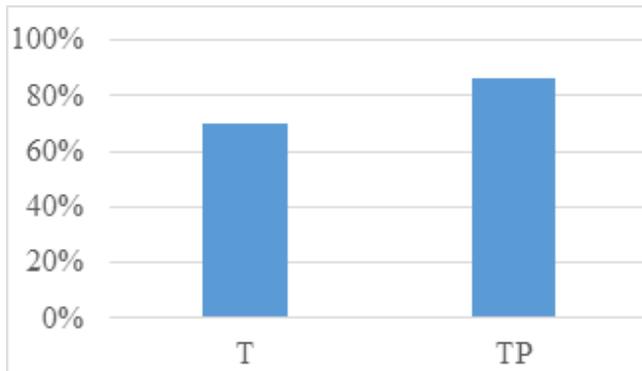


Figure 4. Average attendance with gamification

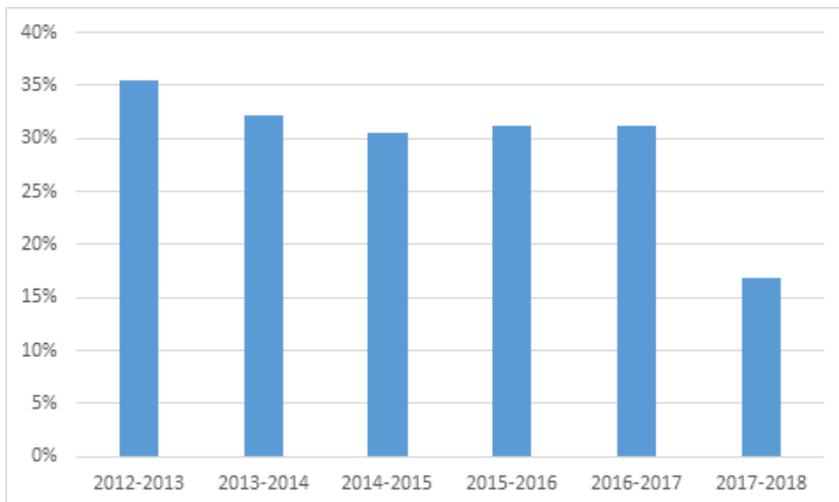As can be seen this year the rate of students who dropped out was much lower than in previous years.



Figure 5. Percentage of students who dropped out in the last years

As they wanted to "win" the game, earning all the medals possible, overcoming all the challenges to reach the last level, they worked harder during the semester and this was reflected in the learning and consequently the Final Approval Rate. The percentage of students leaving the course was very low (6%) compared to usual in previous years (15% to 30%) and the rate of failed students was also lower (33%), see figure 6.
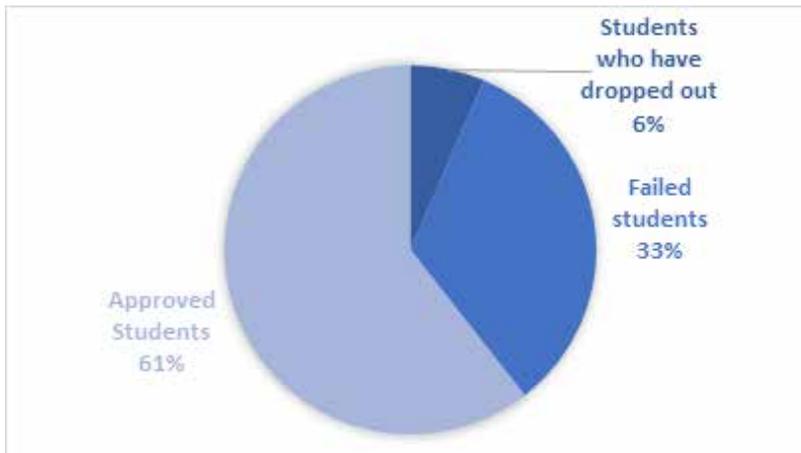


Figure 6. Approval rate

At the end of the semester, the students were asked to fill out an inquiry where they gauged how they had felt in the game. The questionnaire was elaborated with closed and open questions and aimed to collect data to identify a brief profile of the participants and to listen to their opinion about the proposal to use gamification.

The students answered the questionnaire in an anonymous way and via Moodle. It was intended to listen to the students' opinions regarding the advantages and disadvantages they had felt regarding motivation and learning.

Most of the students (97%) responded to the survey and 95% said they had been more motivated and they work harder, and this had been reflected in the average attendance and in the approval rate. Of the students who answered, 38% considered the experiment to be optimal, 42% that was very good and 20% that was good.

Students were asked to identify the positives and negatives related to the topic. In general, the positive points presented were

- motivation and stimulation of learning;
- development of logical reasoning and problem-solving strategies and challenges;
- competitiveness;
- self-improvement and persistence;
- playful and dynamic way of learning;

And the negatives points presented were

- harder than in previous years
- over-competitiveness
- distractions, with loss of focus on content;
- increased gambling addiction;
- mechanization: the student plays for playing and not for learning.

Of the students who answered, 38% considered the experiment to be excellent, 42% that was very good and 20% that was good. Although some students said that this experience was very laborious, none of them rated it as bad or very bad, see figure 7.
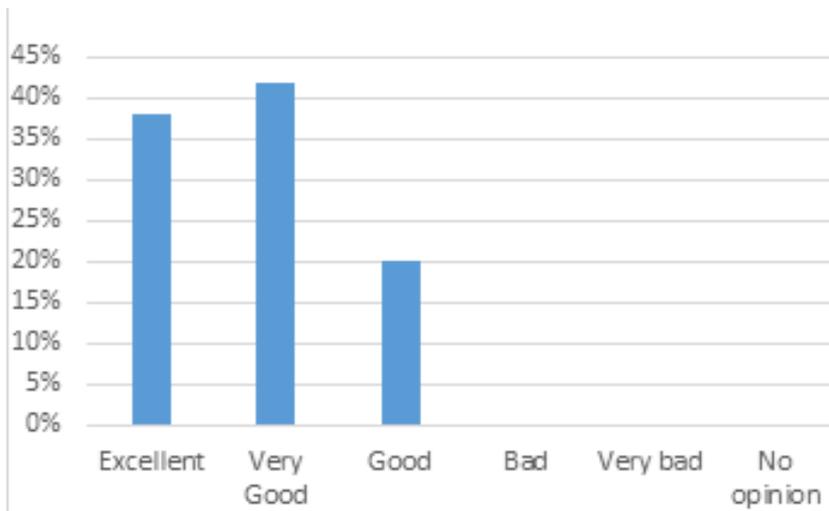


Figure 7. The feeling about gamification experience

## Conclusion

During this semester I realized that the true potential of gamification is not easy to obtain. Game elements are valuable tools, and using them requires discernment, care, and knowledge. As with gambling, misuse of gamification may result in an unattractive and insignificant entertainment experience.

In this case it seems to us that a quantitative approach is not appropriate, since it is not possible to compare the results of the educational success this year with those of the previous years, because the students are different. It is also difficult to compare with the results of other curricular units, because the degree of difficulty is different. However, it can be observed that the impact of learning through gamification has proved to be very successful, with very low dropout rates and high student involvement in classes and in UC activities.

Gaming has a strong psychological effect on people's behavior, so gamification becomes a valid alternative to arouse emotions and contribute to student motivation while performing tasks. Games, which have always been seen as a form of distraction, can merge with contemporary needs in various aspects and environments. In particular, in education, gamification can motivate the study and promote the student's cognitive development. In the learning scenario, this proposal allows a more active and practical participation of the students. However, to obtain its potential benefits it is necessary to plan the educational objectives, discuss the strategies to be used to apply the concepts and mechanics of the games, as well as to analyze already promoted experiences.

In this way, it is possible to reduce the risk of the student to be interested only extrinsically by the approach, aiming only rewards, fun and entertainment.

The positive and negative points pointed out by the students in the final of the semester were very interesting, showing diverse opinions and, nevertheless, very coherent. The positive points listed outweighed the negatives, with motivation being a very prominent aspect. Despite evaluating activities as laborious, students reported feeling more motivated and interested.

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# Parallel Sessions 3
Games for Social Learning

LEARN

# The Use of Badges in The SAPO Campus Platform: Analysis And Reflection

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## ABSTRACT

SAPO Campus is a platform for educational contexts based on the basic principles of Web 2.0 and social networks. The platform offers a badge feature that allows users (teachers or students) to engage in gamification dynamics by creating, supporting and assigning badges. From an analysis of the platform data it was possible to notice that, despite some cases of success in the use of badges, the great majority of users never used this feature, especially teachers.

A questionnaire administered to 61 administrators of communities in SAPO Campus allowed us to understand that this feature was not used because administrators thought this feature was hard to implement with their students. According to the answers, the badge feature in the platform was considered easy to use, but they did not know which was the better content to build badges. Planning and using badges in an engaging way were topics administrators did not know but were interested in learning.

We also intended to analyse the general preferences indicated throughout the questionnaire regarding this feature, in order to understand which changes should be implemented to improve its use. One of the issues that was mentioned as very important is related to the provision of badges' templates/examples that teachers can edit and use immediately, jumpstarting its implementation. It is with practical and successful examples that it will be possible to help teachers to change their own practices.

**Keywords**: Badges; SAPO Campus; Gamification.

**Introduction**

The Internet enabled higher education institutions to adopt technologies in order to improve, in different but complementary dimensions, their educational offer. Learning Management Systems (LMS) emerged as one of the technological possibilities in this field and allowed the classroom to be spatial and temporally expanded, making it easier, for instance, for students to continue their educational activities at home. New challenges arose with Web 2.0 technologies. More than a technological breakthrough, the 2.0 movement extended the possibilities of using the Internet from a participation culture perspective, allowing users to adopt new behaviors of content consumption and creation. The proliferation of publications on websites and blogs, the creation and sharing of images and videos, and the rise of different social networks created new possibilities and challenges for educational institutions. Those new possibilities and challenges triggered the appearance of new trends such as MOOCs (Massive Open Online Courses), where learning activities break down the walls of the classroom, allowing anyone, anywhere in the world, to be able to learn without the need for a formal and permanent enrollment with the promoting educational institution.

SAPO Campus was created in this overarching context and was initially designed to be used in higher education scenarios before a more generic platform was made available for institutions of different levels of education (Santos, 2016).

However, these technological, educational and attitudinal evolutions also raised new questions. In the past decade, one of the most important questions was related to the certification of learning actions that may occur outside the formal and administrative umbrella of educational institutions. The Mozilla Open Badges initiative was created to answer this question, allowing to gather on the same platform badges assigned to each user in different learning contexts (Goligoski, 2012). From a technological standpoint, this feature was promptly supported by different LMS. SAPO Campus also implemented this feature, but not for the sole purpose of certifying skills. In SAPO Campus the main idea was always to explore the motivational and social potential of this feature (Santos, 2016).

Badges are expected to work by themselves as a motivational factor, however this is not usually a simple task. In a longitudinal study, Hanus and Fox (2015) concluded that the use of badges as a reward in compulsory activities inversely

influenced the learner's motivation. On the other hand, Hamari (2017) stresses that clear goals and immediate feedback, like it is possible to find in badges, have positive effects on the implementation of the tasks. Another important point is the role that badges can play after being issued, such as the role of social marker within a community. By being visible, members see their work recognised and may influence their peers to work in order to receive the same badge (Gee, 2003; Hamari, 2017).

However, its effectiveness in terms of motivation is not consensual and many authors warn that, when focusing only on extrinsic motivation, the use of rewards such as badges may have quick effects in short term periods but that dissipate in the long term (Burke, 2014; Chou, 2015; Kapp, 2012; Zichermann & Linder, 2013).

Whichever is our position in this matter, trying to improve learners' motivation through the use of badges or other social recognition marker is an important issue in today's education. It is also important to understand the reasons that prevent teachers from using this tool, which is often available on platforms they regularly use (Moodle, Edmodo and SAPO Campus).

This paper presents the results of a study carried out with the users of SAPO Campus platform where it was intended to understand the reasons for the adoption of gamification strategies and, very specifically, the reasons that lead to use/not use the badge feature in the platform.

## The SAPO Campus Platform

### *Overview*

Since its initial design and launch in 2009, SAPO Campus aimed to facilitate the creation of an online space where students could develop their PLE (Personal Learning Environment) by interacting directly with their formal educational institution but also with other members from other learning communities (Santos, Pedro, Ramos, & Moreira, 2011). In the end of the 2000 decade this was a fresh perspective on how higher education institutions could interact with their students and provide them technology and was also significantly different from the one that was followed at the time.

"Being an institutionally supported Social Media platform – in order to promote content sharing among the academic community – it also gives privileges to its users to build their own personal learning environment without any limitations or constraints" (Santos, 2016, p. 84).

At the same time, this perspective required a more flexible role for higher education institutions by diluting the hierarchy and privileges among all its members, creating conditions for the community to continuously adapt itself to the needs and interests of the overall community, because each member has control over the choices made within the platform. One of the other recognised advantages that the SAPO Campus platform tries to promote is to bring together formal and informal learning communities in the same service (Santos, 2016).

The platform also pretends to facilitate a Lifelong Learning relationship between the institution and its members, since membership does not depend on the official relationship with the institution and can be maintained indefinitely. This hopefully leads to a continuous relationship between educational institutions and its former students, maximizing the possibilities of joint partnerships between the market and the academy. Currently, SAPO Campus has several infocommunicational features such as: sharing features (files, links, images and videos), blog posting, chat service, task scheduling and the issuing of badges. All these features were implemented as SAPO Campus was evolving through the years. A new version of the platform is currently under development aiming to renew and optimize the services already available. It is within this context that the use given by the members to the different features was evaluated, showing that the badges tool stood out in a negative way.

Although this feature was available since 2013, until March of 2017 only 6.6% of the existing communities had issued badges and 1054 (44.8%) out of the 2353 badges were assigned within a single community (Araújo, Santos, Pedro, & Batista, 2017a). This is a very small percentage which led us to consider the need to invest in improvements. That is why we applied a questionnaire to the platform's users that aimed to gather evidences of the main difficulties they experienced with this tool and also to understand potential features that could be added in order to increase its use.

### Badges in SAPO Campus

In the SAPO Campus platform it is possible to make available badges that are, by default, managed by a community administrator. These badges essentially correspond to functions within the community (teacher, student, parent or guardian …) but it is also possible to create new badges for the community that are not connected with particular roles in the institution. These can only be issued by the administrator and are automatically added to the member's profile. In the case of these community badges it is assumed that the function of administrator of a community is performed by someone who has the necessary maturity to manage and issue badges in the best possible way (Santos, 2016).

However, learning communities typically evolve reflecting the learning interests and needs of its members, allowing, for instance, that in a given moment in time someone can be an apprentice in one theme and simultaneously a teacher in other (Gray, 2004). In this line of thought, SAPO Campus facilitates the continuous reorganization of the learning community according to the needs felt by its members in each moment. It is then natural that smaller communities (groups) may be created by teachers or other community leaders and that, over time, the remaining members may also organize themselves into other groups that share common interests or objectives in that community.

Within each group there is at least one member who assumes the administrator role. Only those who have an administrator role have access to the badges' creation tool and are allowed to issue badges to other members of that group. Every time a badge is assigned, the receiving member has the right to refuse it, to accept it in private mode or to accept it in public mode. The way the member chooses to accept the badge indicates if the badge is visible in the user's profile only for other members of the group in which it was assigned (private) or for the entire community (public). This possibility facilitates the self-preservation of members against badges that may be harmful to them, such as in situations of bullying among students (Santos, 2016; Santos, Pedro, Almeida, & Aresta, 2013).

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**Figure 1. Badge creation tool**

To create a badge, it is necessary to define its name and include a description that should indicate the reason or meaning of the symbol that will be issued, thus allowing the viewer to perceive what was done by that member to be eligible to receive it. There is an optional label that overlaps the badge image. At the bottom there is an area with the graphic elements of the badge (icon, design background, color and frame). In total there are 126 icons available and organised by categories. There are also 9 design backgrounds, 18 colors and 6 frames available to choose from (see Figure 1). In this tool there is no way to upload an image. This decision was made by the product and design teams so the graphic identity of badges in SAPO Campus could be preserved. Other tools that offer open badges (eg https://www.openbadgeacademy.com) also tend to maintain the visual identity of the badge, since the value of a badge is always evaluated by the image it presents, "how professional/appropriate it is" (Jovanovic & Devedzic, 2014, p. 61).

In SAPO Campus every member of a community may also endorse/recommend the assignment of badges. It is possible to perform this action directly on the published posts in the platform or with the badges available in any group or

community. This endorsement/recommendation can be made even after a member has received a badge, consequently giving that member a strong recognition message. This fact remains visible in the context of the issued badge, being possible to see the accepted badges, the content the badge is associated with, but also the number of endorsements it has received from other members.

This tool was developed in close collaboration between the development team and the schools that participated in a SAPO Campus platform study. Many of the decisions took into consideration relevant suggestions and problems raised by the users involved in that study (Santos, 2016).

## Method

### *Data collection*

A survey was implemented through an online questionnaire tool intending to understand the reason that lead to a low level of use of badges provided by the SAPO Campus platform. The administrators of Communities and Groups were asked to answer the survey.

## The questionnaire had 4 parts:

- Personal information, where participants were asked to answer questions about their age, sex, professional position, the academic cycle in which they teach and their availability to be contacted in a later moment;
- Badge definition and translation, where respondents were asked about the better Portuguese word for the concept of "Badge";
- Use of badges, where participants were asked about who within a community should have permissions to issue and endorse/recommend badges, and what types of uses they intended to give to badges;
- Experience with the Badges' tool, where participants were asked about their level of use of the badges' tool, examples of badges already created, but also suggestions of features to be included in the tool and reasons that may encourage the use of badges.

To reach a specific group of people, namely administrators of groups and communities in SAPO Campus, the questionnaire was disseminated by email. A total of 982 emails were sent in two moments: during the first half of November 2016 and

later, in January 2017. A total of 63 valid responses were collected, corresponding to 6.4% out of the total administrators with valid emails.

### Results

There was a slight female majority (54.0%) in the sample and the vast majority (87.3%) of participants were between 31 and 60 years old, being the age range from 41 to 50 years old the most frequent (38.1%) (Figure 2).
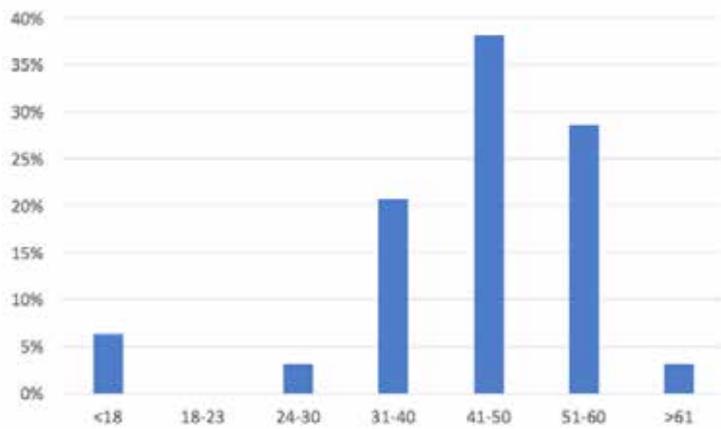


Figure 2. Distribution of sample age (N=63).

The vast majority (88.9%) of the participants performed the roles of teacher or trainer in the platform. The figure 3 presents their distribution by educational level (cycle in Portuguese).
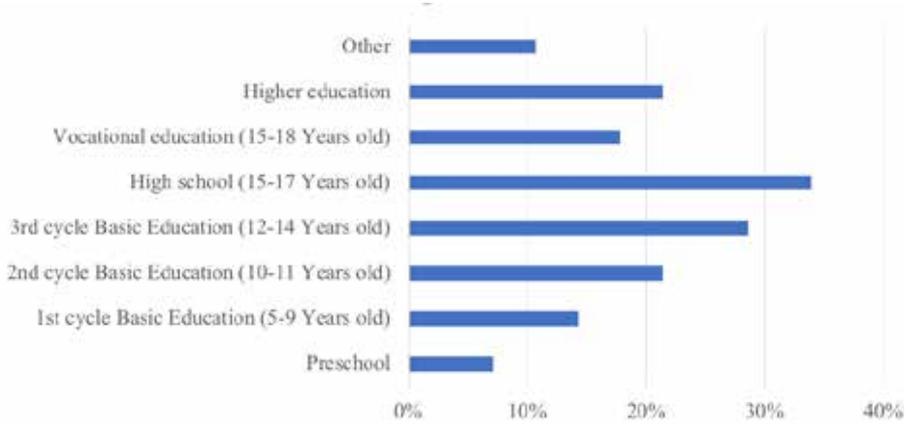
Figure 3. Distribution of teachers per education academic cycle (N=56)

About one-third of the teachers work in more than one academic cycle (n = 16, 28.6%), with secondary education being the cycle with more teachers (n = 19, 33.9%).

Regarding the use made of the badges' tool, 49.2% (n = 31) participants already used and knew the badge tool and 50.8% (n = 32) had not used the tool in the date of response (Figure 4).
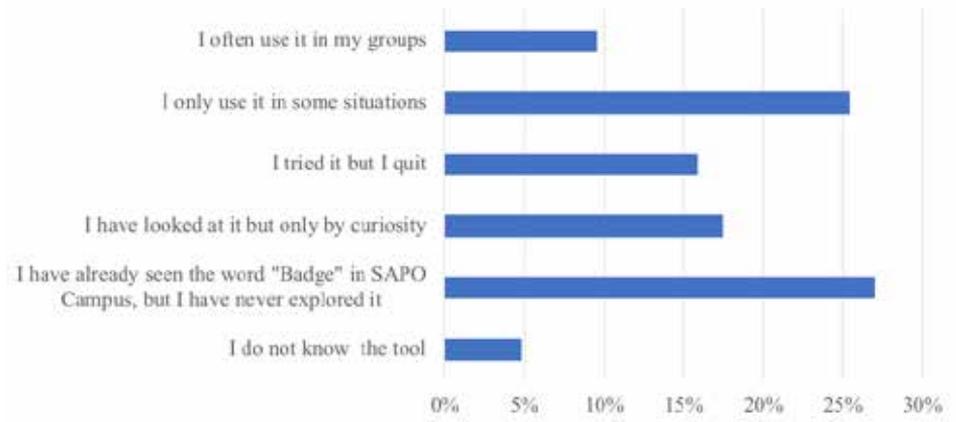


**Figure 4. Grau de utilização da ferramenta de badges (N=63)**

The graph analysis (Figure 4) shows that only 4.8% of the participants did not notice that the SAPO Campus platform had a badges' tool, which indicates that the tool is visible to the vast majority of managers. Another relevant fact is that 27.0% saw that there was a badge button but never felt the will or curiosity to check what

this tool was about. It suggests that they were indifferent to the badge concept, most probably because it is something associated with games and fun, something that is still seldom used in educational contexts. Also, 25.4% answered that they use the tool in specific situations and 9.5% use it frequently, which means that there is a regular use by 34.9% of the respondents.

Regarding other options, 15.9% of respondents answered they have used the badges' tool but have meanwhile given up. The reasons that lead to this withdrawal are mainly related to the necessary time to plan its proper use (44.4%). However, respondents also pointed out causes like the inadequacy of this activity to the group, being considered childish or even the lack of interest of the group on badges. All these reasons end up emphasizing the need to properly plan the badges' use, so that their creation and management are in accordance with the interests and importance of the strategy felt within the group.

Data also shows that it is necessary to analyse specific aspects of the badge tool use. The first question asked was about the best Portuguese word to express the badge concept (Figure 5). It should be noted that the Portuguese translation presents several different possibilities (Araújo, et al., 2018).
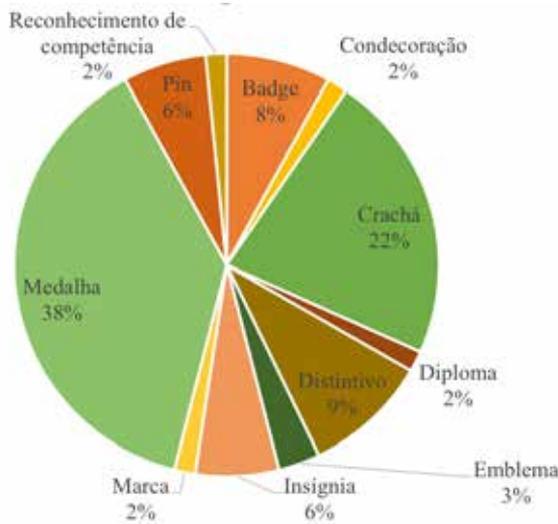


Figure 5. Distribution of answers about the best option to translate the badge word into Portuguese (N=63)

Figure 5 shows that the "Medalha" (Medal) option is the one that is more frequently chosen. However, this term is associated with the idea of competition that does not apply to most situations in which badges are attributed (Halavais, 2012). This is a discussion that should be carried out as a group to reflect on the implications of choosing each of the terms in Portuguese. As another option, there is also the possibility of keeping the feature name in English.

Another question pretended to know which permissions each of the members of a community should have in the badges' tool. Respondents were asked to select one out of four possibilities (Figure 6).
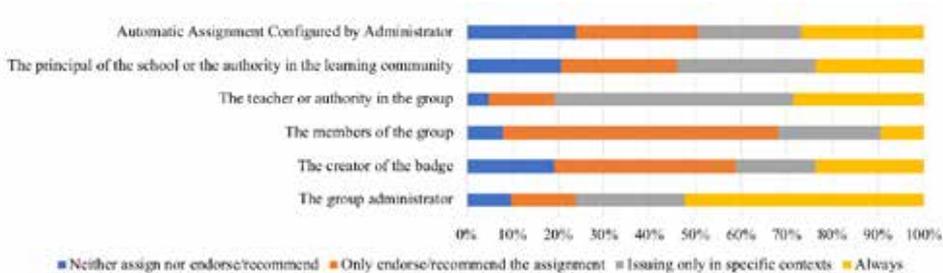


Figure 6. Permissions each type of SAPO Campus' members should have in the Badge tool. (N=63)

The first fact that stands out is a clear division over the automatic attribution of badges: for 27.0% of the respondents this can be done in all situations (always); and 27.0% consider they should only be able to endorse/recommend; 23.8% consider there should be no automatic assignment of badges; and 22.2% consider that automatic assignment can be done in specific contexts. This means that 76.2% agree that this feature should be implemented in the SAPO Campus platform but are still divided on the exact permissions of users.

Another fact that stands out is the difference of permissions between the Administrator of the group and the creator of the badge; and between the authorities of the group and the community. A majority of 52.4% of the respondents consider that the administrator should always have total permission of assignment and recommendation of badges, but that is an opinion that is not shared by the remaining respondents. Values range from 28.6% for group authorities to 23.8% for both creator and community authorities. For 39.7% of the respondents, the member that creates badges should only be able to endorse/recommend them to

other members, and 52.4% consider that the authority in the group should be able to assign them but only in specific contexts. Finally, 30.2% also think the same permission applies to the authority in the community. Another interesting finding is that for 60.3% of the respondents, members should only be allowed to endorse/ recommend badges, something that already happens in the SAPO Campus platform. However, 22.2% consider that they should be able to assign badges in specific contexts and 9.5% that they should always have full permissions.

The possibility of allowing members to import and use a repository of badges on their group, and also to reuse their content by editing it, is something that some other platforms allow (Edmodo and Moodle). However, this is not a feature available in the current version of SAPO Campus (Araújo, Santos, Pedro, & Batista, 2017b) and a question was included in the questionnaire on order to understand if members were available to share badges created by them with other administrators. Data shows that 92.1% of the respondents were available to share their badges so they could be reused and adapted by other administrators.

Finally, an open-ended question asked respondents about the difficulties experienced in using the badges creation and assignment tool (figure 7). This question was asked just for those who actually used it (n=30).
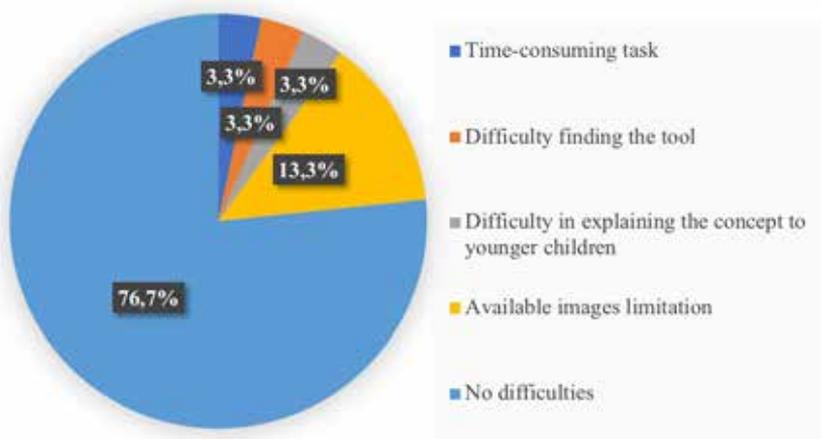


Figure 7. Distributing difficulty type felt with badge tool (N=30)

Figure 7 highlights the difficulties experienced by those who have already used the badges' tool in SAPO Campus. It should be stressed that the majority (76.7%) of respondents did not identified any problems. The most frequently mentioned difficulty is the limitation of the images available in the tool since the provided library has only 126 images and it is not possible to add new ones. The remaining difficulties should not be overlooked, although they were only mentioned by a single person.

These results are important to the analysis and decision making related to the modifications that will be implemented in the new version of Badges' tool in the platform.

### *Discussion*

After the analysis of the responses to the questionnaire we were able to understand that the main problem concerning the use of this particular feature is not related to the badge tool itself but with the concept of badge itself. In fact, half of the respondents did not interact with the tool despite knowing it existed; and from those who use it, only a few uses it frequently. Some respondents claim to have given up using the feature because it required a lot of time to plan properly, although some situations in which the group did not react as expected were also detected.

> "(...) anyone who ventures in building a non-trivial badge system will probably face a huge badge conceptualization problem: what are the achievements in a specific case, what to badge/reward, under what conditions, and, most importantly, how to chain and prioritize the achievements?" (Jovanovic & Devedzic, 2015, p. 120)

Since badges are something new and are not part of the teachers' usual strategies, it is expected that without any previous examples it will be difficult for them to understand how they can make the best use of the tool. This problem, also highlighted by Jovanovic & Devedzic (2015), resulted in the creation of a MOOC entitled "Badges: how to use?" (Araújo et al., 2018, 2017a) and in the creation of a public blog with articles that present examples of badges that can be created and strategies that can be put in place, based on the examples created by the trainees who attended the MOOC (http://campus.sapo.pt/blog/crachassugestoesexemplos).

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It should be also stressed that "[e]stablishing the credibility of digital badges and ensuring that the various stakeholders value them is also important" (Dowling-Hetherington & Glowatz, 2017, p. 8). The value of badges depends largely on previous experiences and credibility within the community in which they are used (Halavais, 2012). There is, therefore, a long way to walk, which is not only related with more knowledge of the tools available to create badges and how they work but especially with a clearer understanding of the concept and its possibilities in different learning scenarios.

However, the tool must meet the needs of the users. By analyzing the answers we noticed that there are some possible changes that can improve its use, such as: decreasing the steps to access the badges creation and management tool; enabling the upload of new images, as other tools do (www.openbadgeacademy. com), but without losing the graphic identity of the platform; enabling new design shapes by adding new frames; allowing the sharing of badges that can be reused in other situations; and implementing the automatic endorsement/recommendation and attribution of badges.

## Future Work

It is important to disseminate examples of good practices so that other teachers can also try to implement them in their own contexts. One of the interesting issues verified during the MOOC "Badges how to use?" was the fact that teachers who shared their examples recognised the positive impact on their students and the many issues that arose because other teachers were also interested in adapting this strategy in their own contexts (Araújo, et al., 2017a). It is therefore important to find a mechanism that allows sharing examples and good practices of the use of badges among SAPO Campus members.

For this some of the members who participated in the MOOC will be invited to join a discussion group about the new features to be implemented. This feedback will be crucial to match the platform's features to the real needs of its users.

Finally, it is also important to proceed with studies related to the democratization of badges' creation and assignment. The limited role that regular users have when they interact with badges in the platform should be questioned and new privileges

should be tested, in which any member of the platform will be able to create a badge or make a proposal for a new badge.

Being studied, these questions could lead to a renewed approach to the way teachers and students identify roles and responsibilities in educational contexts. We believe that this type of change is not possible to evaluate and implement through surveys with users that, probably, cannot imagine the consequences of this very different approach to teaching and learning.

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# Gender Representations in Videogames: Gamers Perceptions about Female Characters

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Societal narratives derive from shared social constructions that validate social discourse about a given subject or object. Social representations confirm the image that society has of something or someone. The new societal configurations have substantially altered the role of women and the way in which women are represented socially. There are still negative social representations and the standardization of women's role depends essentially on cultural and geographical issues. However, there are also new narratives that seek to overcome the stereotypes developed over the years, combated by the waves of feminism and different organizations.

In the context of videogames, female representation is anchored in cultural and social values, but it also refers to its hypersexualization and negative stereotypes (such as fragility and submission). Gender representations in videogames and the social narratives they adopt refer us beyond the business side, with a clear impact in the cultural, social and even educational domains. If for a long-time videogames were only seen as mere entertainment tools and very attached to the male audience, it turns out that many of these associations have been fading over the years and progressively the industry has changed the constant concept that video games are only for men and only produced for the male audience. To what extent do the female public see this change? How does a woman feel represented in video games? The female image is adapted in order to meet the standards required by society? What representations and standards assume the current society as elements that define the female figure? Several studies have tried to understand all these issues around the female universe, trying to promote the idea that women can be placed on the same level as men and that even required the same needs of the opposite sex. In this paper we propose an approach about why the objectification of women that is exposed by the video games industry and thus create an accurate representation of how the female audience is denoted. In this sense, we opted for a methodological approach to content analysis that crosses the qualitative and quantitative aspects. The methodological strategy was operationalized through individual interviews and online questionnaires. The sample consists of male and female gamer audience. It follows that the central objective of this study is to correlate the representation of female characters with the perception that the gaming public has of that representation.

**Keywords:** Videogames; Gender Representations; Female Representations; Social Representations.

# Teaching of Indigenous Model of Critical Thinking to Children Through Gaming for Reality Check Skills

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### ABSTRACT

Children who are the future of human race need to be groomed in such a manner that they become free thinkers and responsible citizens one day. For this, scholars, academicians need to rethink on the teaching of critical thinking of young minds. It is very obvious that the inflow of irrelevant/ unnecessary/ fragmented information does condition the young minds and exactly, this paper intends to deal with the problem of de-conditioning of young minds by indigenous critical thinking based on ancient Indian texts' methods. The paper proposes teaching of indigenous model of critical thinking through gaming which also enhances their media literacy skills. For the students to develop the skill of reality check in their day today life,  a model can easily be demonstrated to young minds as its first and foremost principle is not supposed to be a 'believer' but a 'seeker'. This can be done by introducing game- based- learning on 'exploring actual reality through virtual reality'. In the remote past India had designed such simple, useful, meaningful mental games by which one can be aware of his de-conditioning of mind, behavior and attitudes at the young age and become better information literate. One of these critical thinking games is based on "Vetaal-panchvinshati"(spelled in English Vetala Panchvimshati" where a king has to find a reasoned answer to a situational question at every step and thus keep his wits also on high alert all the time. This paper will explore how it can be introduced to global community. The paper argues this kind of questioning from the above 25 different chapters of traditional Sanskrit text which is unquestionably best suited to the mental maturity of children and has the potential to present through digital gaming. The outcome of the paper lies in the fact that it creates an ambience for acquiring critical thinking which is the most important skill for becoming better media and information literate.

## Introduction

There is no denying the fact that all human beings, irrespective of their class, creed, race, nationality etc. want to understand, realize, grasp and comprehend the meaning of life or reality with limited data that their senses gather. But one needs to get acquainted with the fact that appearance and reality may or may not be similar. That what appears in our experience is also a reality but can't be ascertained. For eons, humanity has been facing this dilemma.  Humans can't escape

from the responsibility of dealing with this complexity as they need to know the real world for their survival and to participate in the society also. Information in various forms has always been the purveyor of the emerging scenario of the world and a conscious approach is required to understand the information in the right perspective. It can be understood through the idea that "complete depiction of the reality is not possible," whatever might be the source of information. As such a conscious approach is required to understand the limitation of the available information.

This continuous struggle to comprehend reality with limitations of physical body and impressionist mind has led to the development of knowledge and culture in the Indian tradition where:

1. No one is a believer, but a seeker.
2. Ignorance is unlimited, and knowledge is limited.
3. With limitations of body & mind, we try to grasp something boundless, but problems arise.
4. Bondage is a problem, but freedom is also a greater problem.
5. Man is not defined, but animal is defined.
6. With hunger, man has one problem but a man with tummy full, has cent per cent problem.
7. All knowledge lies within his or her own self.
8. There cannot be anything new, as everything is in the name of new is the re-production of the data one already has.
9. Thoughts are just sign posts; they are not the ultimate goal or destination.
10. Truth is verbal-truth and existential truth, both.
11. Things which are true may not exist, like Math.
12. Language is either agrarian or market oriented.
13. When we are happy we never ask why we exist or what the purpose of life is.
14. Peace is primary and well-being is ultimate.

*These Fundamentals of Indian Knowledge Tradition raise four basic questions:*

1. What kind of future do we want?
2. What do we want to sustain, for whom and for how long?
3. What does our thinking have to do with our current reality & our ability to achieve?
4. What does our education have t*o do with our thinking?*

### Critical Thinking for Children & Indian Tradition

These four questions define the indigenous response to the problem of critical thinking through games for children. Indian tradition is very cautious about the concept of "Sanaskaara" of every child which means discarding Dosha (short comings) and adding Guna (qualities) at three levels –

1. Kartaa (Doer),

2. Bhoktaa (Enjoyer),

3. Gyaataa (Knower) with the help of second concept known as Purushaartha (to be earned by the human being) which includes

Dharma (following right path based on critical thinking)

Artha (economy)

Kaama (desires)

Moksha (Liberation).

To initiate "Sanskaar" at all the three levels in every child, Indian tradition of knowledge has proposed various ways keeping in view the time, space, situation and nature of a person. There is questioning method; there is story telling method; there is argumentative method; there is physical method and there is counseling method and even many more. But in this particular paper the authors have restricted to only one mental gaming training method of 25 questions where one child is trained to understand a question first then answer as per his wisdom and intuition, followed by reasoning. This set of 25 questions is based on 25 stories from a particular text which deals with multiple levels and kinds of social, familial, individual, emotional, intellectual realities in a story form. In Indian Tradition the well-known

king Vikramaaditya assures a Vaama-maargiTantrik (can be translated as sorcerer in western term) that he will capture a Vetaal (can be translated as Vampire in western term) who resides upside-down on a Banyan tree in Shmashaan( where dead bodies are burnt day and night).

The mighty King Vikrama faces many challenges in capturing and tying up the Vetaala to the Tantrik. Each time Vikram tries to tie up the Vetaala, he starts telling a story that ends with a riddle in a question form. If Vikrama does not answer the question accurately with right reasoning, the Vetaal will obey his command. If the king knows the answer but still remains silent without reasoned answer, then his head shall explode into multiple pieces. Lastly if King Vikrama answers the question accurately with valid reason, the Vettal would return to his resident tree. The King answers to all the 25 questions of 25 stories so the vicious cycle of capturing and getting away of the Vetaal continues for twenty-four times.

In the 25th attempt, the Vetaala shares a story where a father and a son in the aftermath of a war, find the queen and the princess alive and take them to their home and in due course time, the son marries the queen and the father marries the princess and with passage of time, the son and the queen are blessed by a son, and the father and the princess are blessed by a daughter. Now the Vetaala puts up the riddle to king Vikram –"what is the relation between the two newborn children? The question outsmarts the king Vikrama and he is not able to answer genuinely. After this the Vetaala grants permission to king to take him to the Tantrik.

On the way to the place of Tantrik, Vetaala narrates his own story where his parents did have two sons with blessings of a Tantrik with a condition that he will educate both of them. He (Vetaala) was well educated but often ill-treated but on the other hand his brother was also educated but well treated. Later on, Vetaala came to know about the plans of the tantrik that he will sacrifice Vetala to be attain immortality plus dark powers.  At this point Vetaal also tells that Tantrik plan is to sacrifice the king Vikram in front of the goddess so that he can achieve dark powers to rule the world. So, the Vetaala makes suggestion that the king to behead the Tantrik. And King Vikram does the same and gets blessed by the deity Indra and Kali. After this the king asks for forgiveness for Tantrik from Vetaal and Vetaal readily do so and also assures king that he will be always available to king in any need.

The tales of "king Vikram and Vetaal (the vampire)" is an icon of Indian storytelling, a brain teaser. It is a very famous account of human and Vetaal interaction which is chronicled in the "Vetaal Panchvinshati," spelled in English as "Vetala Panchvimshati". The text is also known as *Baital Pachisi(in Hindi)* which consists of twenty five tales chronicling the adventures of King Vikramaditya and the way his wits were pitted against Vetaal(a ghost) . The text was originally written in Sanskrit whose author is not known and most probably written early 9th century AD and is said to be the inspiration for the Arabian Nights and subsequent collections of fantastic mythological tales.

### Story Telling & Indian Knowledge Tradition

Ancient Indian knowledge tradition has potential to teach various subjects in an integrated form but valued story-telling as an important framework of learning. Since the era of oral communication to digital era, scholars have advocated storytelling as the best tool of teaching. Maddin stated (2011) that 'storytelling is intertwined into our everyday life as people use stories for communication and to share information'(pp1-11). Maddin (2011) further argues that it is through stories that humans understand history themselves and the world(pp1-11).

### Thousands of Years Old Critical Thinking Pedagogy

The concept of critical thinking emerged in the Vedic tradition of Indian culture, whose origin dates back approximately 8,000 years. These ancient texts touch upon numerous fields of knowledge, including the social sciences, the pure sciences, human behavior, communication, medicine, and architecture.

The ancient Indian knowledge system was categorized into six philosophies, called *Vaisheshika*, *NyayaShastra*, Sankhya, *Yoga*, *Mimaamsa*, and *Vedanta* which developed between the 10th and 6th centuries BCE. Of the six, the authors choose *Mimaamsa* and *Nyaya* for analysis because they pertain exclusively to critical thinking and provide a basic framework for modern models of critical information and evaluation. Different ancient Indian texts deal with the various problems of message interpretation and critical thinking. Research work on models of critical thinking in ancient Indian (Angiras, Kumar,Sharma 2015) texts highlights their application to teach media literacy in the 21st century( pp 422-437). The models deal with adult critical thinking but they are part of the same tradition that is being

discussed in the present paper related to the critical thinking of children. It establishes the fact that Indian knowledge tradition adopted different forms to groom the generations with training- based- critical- thinking.

### Research Paper Framework

The paper presents a framework of creating an ambience for children to learn critical thinking. Out of these 25 stories (from Sanskrit texts *Vetaal Panchvinshati*) only three stories have been selected as a case study. In view of the limitations of the research paper, complete texts of all the stories cannot be analyzed. But the selection of three stories as a sample presents an overview of the text that establishes the fact that it has the potential to teach critical thinking to the younger generation through gaming. Keeping in view the standard format of a research paper detailed stories have been summarized. The paper mentions a brief summary of the detailed story that depicts the situation in which critical thinking takes place in that particular story. It further elaborates the applications of the critical thinking-based dialogue that takes place in the stories. The modern applications of the critical thinking based on ancient texts have also been discussed.

### Some Important Stories from The Texts

- The Vampire's First Story is "in *which a man deceives a woman".*
- The Vampire's Second Story is *"Of the Relative Villainy of Men and Women".*
- The Vampire's Third Story is *"Of a High-minded Family".*
- The Vampire's Fourth Story is *"Of a Woman Who Told the Truth".*
- The Vampire's Fifth Story is *"Of the Thief Who Laughed and Wept".*
- The Vampire's Sixth Story is *"In Which Three Men Dispute about a Woman".*
- The Vampire's Seventh Story is *"Showing the Exceeding Folly of Many Wise Fools".*
- The Vampire's Eighth Story is *"Of the Use and Misuse of Magic Pills".*
- The Vampire's Ninth Story is *"Showing That a Man's Wife Belongs Not to His Body but to His Head".*
- The Vampire's Tenth Story is *"Of the Marvelous Delicacy of Three Queens".*
- The Vampire's Eleventh Story is *"Which Puzzles Raja Vikram".*

### Background of The Stories

All stories of the text emerged from a particular situation wherein deep critical thinking-based dialogues take place between two entities. The main character, legendary King Vikrmaditya encountered a very complicated situation in which he has to exhibit a great deal of critical thinking to get rid of trouble. The King promises to capture a ghost/ spirit, Vetaal, who hangs from the tree. But to capture Vetaal, the King has to listen to stories from Vetaal. Every story ends with a riddle pertaining to some critical questions wherein the king is supposed to do critical scrutiny of the story told by Vetaal and the former is supposed to answer the question posed by the latter. Answering question is not a cake walk as the following conditions arise:

- If King Vikramaditya answers question correctly with reason; Vetaal escapes and returns to the tree.
- If Vikramaditya cannot answer the questions correctly with reason, he remains in captivity.
-  If Vikramaditya knows the answer with reason and keeps quiet, his head will explode.

### Learning Outcome of Situational Conditions

These conditions and this gaming story deal with emotional and intelligence quotient of any child up to the age of 15 years. To enhance the critical thinking capability of a child the author of the ancient stories deliberately chooses  extremes of human instincts i.e. king who represents power, authority, risk taking capacity, courage, curiosity to know the unknown, continuous hard work, dignity, etc, and on the other, Vetaal, the spirit/ ghost, represents fear, anxiety, confusion, unknown knowledge territories, etc, in a child. The combination of these two psychological frames, the King vs. Vetaal, trains the mind of a child to think in difficult situations of life critically. We must understand that in Indian tradition critical thinking does not mean to think intellectually but also intelligently too. Being intelligent is entirely different Indian knowledge tradition as compared to Western definition. A finely tune balance between reason and emotion will keep a child abreast of worldly realities and prepares him or her to respond responsibly. These stories train a child's mind to remain unaffected by any kind of information.

The second part of this text book which has twenty five stories, deals with different levels and situations of human society and its behavior. Each story deals with different social realities, be it is familial, personal, political, business and so on. The language of these stories is such that it consciously chooses such words which train and condition a child's mind in a way as it should be. These stories when narrated in a class and the teacher asks questions without telling them the answer given by the king to Vetaal under strict conditions, the students starts guessing the probable answer which has multiple options and all options seem to be correct. But these stories have to be tackled by experts only, otherwise they will remain stories. Experts in Social Sciences can evaluate the change in the perspective of a child's thinking after sharing these 25 stories. These stories are basically tools to enhance critical thinking of a person in Indian tradition and also help to fill up generation gap which we all are facing today. These help an individual to relate to the real-world realities and avoid virtual realities.

### Being Intelligent in Vedic Terms

As mentioned above, the ancient texts help children to see the things intelligently. It is pertinent to mention here that in Indian Vedic terms "Being intelligent" is entirely different from the meaning defined in English dictionaries. According to the Indian Vedic tradition, being intelligent means to see the things in their total perspective. In other words, in the knowledge tradition, intelligence includes a de- conditioned mind that is opened to diverse points of view along with a sensitive approach. Notably, Monbiot (2017) opines "Our selective blindness (not to see things in total perspective) is lethal to the living world." Basically, he highlights the fact, "What one sees is not what others see. In this way people inhabits parallel world of perception, bound by their interests and experiences." It is pertinent to mention here that Indian perspective of intelligence is an answer to the problem of selective blindness. In the light of the above description, selected stories and learning outcome, from the point of critical thinking, is being analyzed in the paper as follows:

The first story of the text is a rich framework to make one realize especially children, the need of critical thinking in everyday life for everyone for the right action. This is the classical example of how a critical scrutiny not only saves one from wrong action, but also protects the society as a whole. In the story, a prince came across a princess in a jungle. He falls in love with her at first sight. The princess introduces herself symbolically placing a lotus flower on different parts of her body and left the place. The prince did not see any meaningful message in rubbing the lotus flower on different parts of her body. But a wise advisor and friend of the prince narrated him how by using symbols the princess gave him her complete address. The prince asked his advisor to leave for the given address of the princess. Here they impersonate as commoners and stayed at an old lady's house who was a former employee of the princess. Knowing her proximity with princess, the prince asked her to convey his message to the princess. After hearing the message from the old lady, the princess, with laced sandal-paste hand, slapped the old lady, leaving ten sandal marks on her face. When the old lady showed it to the prince, he felt awkward at a such response from the princess. But the prince's advisor clarified the meaning behind the message and states that the princess intended to meet him, but the matter is to be kept secret from the old lady. To fulfill the purpose, she intelligently, drafted the non-verbal message by putting sandal paste on old lady's face indicating that she would meet him after ten days. When the meeting could not materialize after 10 days, the prince again sent the old lady to princess. This time the princess again slapped the old lady but left three marks on her face. The prince's advisor said, "It means she will disclose the fresh date of meeting after three days". In the sequence the princess disclosed the final meeting time, date and place symbolically. After their meeting took place at the princess villa, the prince informed the princess how he could meet her by dint of wisdom of his advisor and friend. The prince now wished to return to his friend. Applauding the prince's advisor's wisdom, the princess sent some delicious food for him. But surprisingly, on receiving the food, the prince's friend said, "We should not trust this generosity as something true and there should be some reality check. I doubt if she likes my regular advice to you, as my suggestion to you is not to let her govern over you". To test, he threw some food before a pet and the pet died after consuming it. At this the prince got angry, but his advisor asked him to keep calm. And lastly, they paid the princess in the same coin. Prince's advisor scripted a plot

and created a situation where in the prince's father ousted her daughter from his kingdom. When the princess was sent to the jungle by her father, the prince's advisor advised the prince to take her to their own kingdom.

But in the end, the story teller i.e. the ghost, posed a question to King Vikramaditya, "Let me know who is more at fault and so consequently, is a sinner". The King replied, "Unquestionably, the king, father of princess, is at fault as he, without applying critical thinking held her daughter wrong. That way she was deliberately considered wrong by prince's advisor. There is also no doubt about the fact that the princess cheated the prince. But from one angle, she was applying critical approach to secure her future in the Kingdom. The Prince's advisor was serving his master and by hatching the conspiracy against the princess, he gives a befitting reply for the dignity of his master. But the King, without checking the validity of the allegations against his daughter forcefully exiled her."

### *Story Application & Autonomous Thinking of Children*

The beginning of the story of the text arouses a natural interest in children.  It inspires how children need to be critical towards various messages in everyday life. A 'healthy skepticism' is considered more important in every branch of critical thinking, including media literacy. But literature is weak when it comes to make children realize the importance of healthy criticism. The above cited story proves a potential learning material for the purpose. It is a great dilemma that the young do not know what is right or wrong. As Hobbs (2010) argues that to decide what to believe or not has become more challenging wherein all information is available easily(pp 15-24). Again healthy doubt is required for adult and children according to their mental maturity. The paper argues that these kinds of stories from ancient Indian texts have rich potential to develop a natural quest of healthy doubt in children. As pointed by modern scholars (Connections- Medialit 2013) "Preaching rather than teaching –delivering content about media to students without letting them have the opportunity to seek their own evidence from their point of view can be problematic.". Actually, mostly existing training programs provide a checklist to students to evaluate online information. Byrne (2017) says that the problem with this method is that students hardly memorize or internalize this check list. In the light of the argument the above story has potential to engage students (through gaming) to learn independently and doubt healthily   .

### Gaming Aspect of Riddle 2 In the Story

Long ago there lived a beautiful princess. Once three men visited her kingdom and fell in love with her and proposed her for marriage. In such a scenario the father, the then king of the princess, faced a complicated situation. His dilemma was manifold, as, if he said yes to one the other two would commit suicide. But in between, the princess suddenly fell sick and died. One of the men takes away her ashes and decides to sleep on it throughout his life. The second one respectfully immersed her ashes in the holy river as part of ritual. The third, managed to bring her back to life after he got a secret to bring a dead person to life.

Now in such a scenario the question is raised by the Vetaal whom he should give the king to the princess. The King sagely replied "The person who decided to sleep with ashes of the princess throughout life truly loves her and by treating the princess as a wife even after her death, becomes entitled to marry her. The person who immersed her ashes into the river became her son by performing the ritual. Then, the other one who brought her back to life became her father by giving her birth."

### Learning Critical Thinking from The Story.

The particular situation and dialogues of the story help children to learn situational critical thinking. The paper argues that this kind of learning of situational critical thinking develops a right understanding about the rightful claimant of anything. In the critical thinking context a "guide to children", Linda (2005) pointed out "If I decide to do "x" what things might happen. When the main character in the story made an important decision, what happened as a result? What were the consequences". This type of critical thinking helps children to become a true media literate(pp.22). Loit (2017) points out "Media literate means that one is able to control one's autonomy". The paper argues that it is critical thinking that makes one an autonomous thinker in the real sense and it can't be taught through general teaching. This is truer in the case of children. This type (Riddle-2) of story creates an ambience for the young to be autonomous in their thinking.

### Gaming Aspect of Riddle 3 (strange decision) In the Story

The ruler of Krishanganj, Rajendra planned to marry his multi-talented daughter. She was equally good at studies and also in the use of bow, arrow and sword. The

princess put forth a condition, "Father I want my husband to be more skilled and overpower me in the fight." Thinking that the princess is the only girl of her parents and after defeating her they will rule the kingdom, a number of fighters reached Rajendra's kingdom. But all failed to defeat the princess. Amidst the scenario, a young man who had a clear idea of the princess' fighting skills, came forward and claimed to defeat her. He was given a chance to try his luck. At last he defeated the princess in the fight. But at this, the princess raised a question "How do you know my tricks so minutely". The man replied – "I watched her activities secretly and learnt from it". On hearing why the princess refused to marry the man, her father was astonished. But the young man appreciated the decision of the princess.

After summing up the story, Vetaal posed a question to King Vikrmaditya "Why did the princess refuse to marry the man when he came up to her expectations." Vikrmaditya replied, "Since the young man had learnt the skills from the princess, he had become her student. And in the Indian tradition, a student can't marry his/her teacher. Princess was wise enough to understand their relations and wiser was the young man who immediately fathomed the depths of her decision.

### Critical Thinking and Outcome of The Story

The above cited story helps children to understand the missing link of any message. Tracing missing link of the message has been at the heart of teaching media literacy. Baker (2015) highlights the fact that "media literacy involves critical thinking and critical inquiry and most of all, asking question." He further points out that the questions include: who created the message, who is the audience and what is omitted and why. But the paper explicates that it is not easy to teach the children the skill of tracing missing part of any message. It argues how the above cited story develops a natural understanding among the children to understand the fact what was omitted in the message.

In the Indian tradition, right thinking (Nyaaya, Mimaamsa 10th and 6th centuries BCE)) to understand the things in right perspective is the baseline of critical thinking, particularly, in the social relationships which need to be maintained with dignity. Though both individuals in the story are adults and are free to choose what they want and whom they want. A social perspective added twist to this story and both characters understood the dignity, honor involved in teacher-taught relationship. More so, all relationships are social and at the same time one is free to behave

as per his / her understanding, likes or dislikes but maintaining grace in all relationships is the core of this story. When we lack grace in relationships it becomes troublesome and end in disgust. And this is the reality of our present times. Grace is not about morality issue in Indian tradition as believed. It is about understanding and acknowledging the very basic of human relationships of any society. This aspect of society is a must for the children to learn and appreciate things as it makes them aware of those relationships which are neither for profit, loss nor for utility, but for the grace which adds positive meaning to life.

Likewise, other stories are extremely useful if applied by experts of Social Sciences to teach the art of message interpretation as well as the art of knowing. These can help children to learn the art and science of reasoning in real life situations where humanity needs thinking citizens, but not a conditioned mind. Using these stories as a gaming way one needs to be expert in Shaastra (system of knowledge), Yukti (effective reasoning) and Anubhav (real life experience). This model of critical thinking is well theorized in the series of the text was tested for thousands of years to deal with scores of communication related problems of humanity (Upnishada, Naaya, Mimamsa, 10th 6th centuries BCE, Budhism, Jainism 563 BCE 399 CE) which states every knowledge is, in some or the other conditioned us and needs to be validated. However, these texts suit the adults and not children. But the paper argues that the above stories prepare children to learn better the art of questioning and critical thinking from the above mentioned ancient texts when they attain adulthood.

## Conclusion

The paper concludes with the idea that these stories comprise the teaching technique of developing critical thinking among children as it raises curiosity first then works upon their efforts, emotions and intellect through challenges to audio-video senses where one has to rely on reason, logic and understanding in the right perspective which brings fruit to the well-being of a person. This is required in this century of "over dis-mis-half-motivated-information" where questions of survival, development along with aesthetic living have to be reasonably sound. The outcome of the whole exercise is that children's' engagement with the stories help them handle their emotions and intellect. It further develops a natural curiosity to challenge their own understanding about real world. These 25 stories

raise questions regarding different situations of life and society based on critical thinking. These questioning techniques must be introduced in schools for a de-conditioned human being who can think independently on his own terms and conditions. The paper proposes how if introduced in school curriculum, gaming on the texts will become more productive and it could achieve its final goal.

## Acknowledgements

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## Notes:

**1.** Author and date of the Sanskrit text book of Vetal-Panchvinshati cannot be ascertained due to huge gaps in Indian history. Though scholars of repute do try to ascertain authorship to either Bhavbhuti or Somdeva or Kshemaraj with the time frame from 8th to 10th century. Different translations with Sanskrit starts appearing with the colonial rule over India. Various translational of the texts as follows:

Uhle, Heinrich, ed. (1914), Die Vetālapañcaviśatikā des Sivadāsa, Berichte über die Verhandlungen der Königlich-Sächsischen Gesellschaft der Wissenschaften zu Leipzig : Philosophisch-historische Klasse, 66, Leipzig: Teubner

Ritschl, E.; Schetelich, M., eds. (1989), Die fünfundzwanzig Erzählungen des Totendämons, Leipzig ─ Translation of Śivadāsa recension.

Rajan, Chandra (1995), Śivadāsa: The Five-and-Twenty Tales of the Genie, Penguin Books ─ Translated from Uhle's Sanskrit edition.

_Lāl, Lallū (1805), Buetal Pucheesee; being a collection of twenty-five stories ... translated into Hindoostanee from the Brij Bhakka of Soorut Kubeeshwur, Calcutta_

Hollings, Captain W. (1848), The Bytal Pucheesee: translated into English, Calcutta: W. Ridsdale ─ Reprinted several times between 1848 and 1921 (some later editions asBaital Pachisi). 1884 edition on the Internet Archive

Barker, W. Burckhardt (1855), Eastwick, E. B., ed., The Baitál Pachísí; or, Twenty-five Tales of a Demon, Hertford: Stephen Austin ─ A new edition of the Hindí text, with each word expressed in the Hindústaní character immediately under the corresponding word in the Nágarí; and with a perfectly literal English interlinear translation, accompanied by a free translation in English at the foot of each page, and explanatory notes.

Forbes, Duncan (1861), The Baitāl Pachīsī; or The Twenty-five Tales of a Demon, London: Wm. H. Allen & Co. ─ A new and corrected Edition, with a vocabulary of all the words occurring in the text.

Munshi, Ghulam Mohammad (1868), The Baitál-Pachísí; or The Twenty-five Stories of a Demon, Bombay: The Oriental Press ─ Translated from Dr. Forbes's new and correct edition.

Platts, John (1871), The Baitāl Pachīsī; or The Twenty-five Tales of a Sprite, London: Wm. H. Allen & Co. ─ Translated from the Hindi text of Dr. Duncan Forbes.

Burton, Richard F. (1893) [1870], Vikram & the Vampire; or Tales of Hindu Devilry (Memorial ed.), London: Longmans, Green, and Co. ─ Not a translation, but a retelling "more Burtonian than Indian",[9] _based on one or more of the Hindustani editions or translations._

K ish a, Kālī (1834), Bytal Puchisi; or the Twenty-five Tales of Bytal, Calcutta ─ Translated from the Brujbhakha into English.

2. The paper highlights the modern application of ancient texts teaching media literacy to children elaborating the work of 'Consortium for Media Literacy'( A project of social and environmental entrepreneurs) . Teaching and Valuing Healthy Skepticism in Media Literacy Education. Vol.46.2013.http://www.medialit.org/sites/default/files/connections/teaching%20healthy%20skepticism.pdf

# Designing an Urban Adventure Gamescape: Avoiding the Pitfalls in Creating Opportunities for Learning Through Location-Based Games

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### ABSTRACT

This paper reports on the design and evaluation of player experiences related to a Location-Based Game. Location-based games (or LBGs) seek to move gamified play into the "real world" of cities, parks and other locations. These games are played in everyday places, where game information is tied to specific locations (Magerkurth et al. 2005). This connection to real-world physicality makes the game experience multidimensional and fun for players of different ages. Yet, to be able to envision and create an urban gamescape means that a set of criteria is met. The unique challenge of creating and orchestrating location-based game experiences requires a certain sensitivity of its designers to multiple factors that must be considered. These may include but are not limited to factors such as the city infrastructure, flows of urban traffic, maintenance of recreational areas and human-related factors such as cooperation with the city administration.

The game introduced in the paper represents an urban game adventure built upon the platform of geocaching. We approach the game with a focus on its potential learning affordances. We ask how the pitfalls in creating opportunities for learning through location-based games could be avoided, especially when designing pedagogic aims into an urban gaming experience fit for school-aged children.

**Keywords:** Urban Adventure Gamescape; Location-Based Games; Educational Game; Geocaching; Game-Based Learning.

## Introduction: Location-based Play in a Gamified World

Location-Based experiences aim to provide the user with a richer experience that extends across a series of locations. They build on three core technologies: mobile devices, wireless networking and location sensing (Benford, 2005). Our research focuses on the design and study of a pervasive and location-based game, Sigrid-Secrets. The paper introduces the geocaching trail enhanced with visual

artworks and playified with further with a narrative and mini-games of semi-fictional nature. The paper reports on the design and evaluation of player experiences of this urban game adventure.

Our presentation tells the story of Sigrid-Secrets, a geocaching trail designed and created by the authors (as designers, content developers and researchers), which is located in the cityscape of Pori, a coastal town in Western Finland. It combines geographical locations of a city park with a narrative structure. Sigrid-Secrets is designed to be an easily accessible, narratively engaging and educational experience for players of all ages. The geocaching trail requires its players to move along in the central park areas of the city, visiting six photographic art works prior to the actual geocache. In this way, we have both enhanced the gaming platform of geocaching with art, and also gamified an art exhibition featuring six small artworks 'hidden' in the park areas.

The game offers its players the short-term goal of completing the trail by walking from hidden artwork to another until one finds the final cache. The activity requires the players to walk an approximately 1 km trail from one end of the park to the other end. There is no time limit to compete the trail. Instead, it is the narrative of the character of Sigrid that evolves at each of the artworks, depicting Sigrid at different activities such as dancing or drawing. Engaging tasks are given to the players at each artwork as they are asked to solve easy trivia questions or riddles, such as Sigrid's middle name. While solving these tasks does not give the player scores, they are part of the narrative that intertwines Sigrid's story with facts of the city. By finding the artworks one by one, the player advances on the trail to finally arrive at the actual cache, a hidden container that features the physical log in which geocachers are meant to write their entries.

The objective of this paper is first, to present the aims and designed affordances of our urban geocaching trail enhanced with artworks, a game created for both entertainment and learning. Secondly, a description of the execution of this trail and the play tests conducted with different age groups is given. Focus is given to how the geocaching game relates to and is structured based on its geographical location, a small cityscape. Moreover, we will concentrate on discussing content-creation that is built up on historical and present facts of the city, as well as creative components in reference to how the content is communicated to the

players through the game design. We will then go on to suggest some guidelines on what to consider when designing for urban game adventures with potential learning goals in mind based on our knowledge of the pitfalls we detected while conducting the playtests.

## Design Goals for Sigrid-Secrets

"Player engagement and immersion in games is essentially performative and participatory and occurs in a direct result of active involvement, attention and interaction" (Carrigy et al. 2010). Sigrid-Secrets was originally launched as one part of an outdoor, urban art exhibition, *Kätketty Taide* (in english 'Hidden Art'), located in the city parks of Pori, Finland in May 2016. The idea of the exhibition was to hide artworks in non-obvious locations in the park, such as in and under trees, stones and permanent structures in the parks – park benches, electric cabinets etc.

We understand our game as a casual experience. According to Kultima (2009) to design casual game experiences, is to design experiences in a wider experiental context. Design values related to casual games, are, according to the author acceptability of contents, accessibility, simplicity and flexibility. The first one of our design goals would be the simplest and most easily executed both from the design and play perspectives – to use the platform of the internationally known and popular geocaching game and to enhance it with six artworks telling the story of little Sigrid – a contemporary doll accessorized to look like a historical character from the end of the 1800s but depicted in scenarios that are known to children and adults of the 21st century. The audience for this game would be primarily those with an interest and previous experiences in geocaching. The prerequisite for playing this game is to have access to the Geocaching.com app on one's smartphone.

### Designing for Casual Play

What we had in mind for Sigrid-Secrets was to design an acceptable, accessible and in this way *casual*, yet rewarding game adventure for different ages of players, with different dimensions of game play. In our case 'casual' follows in part Kultima's suggestions, that our game is acceptable, accessible, simple and flexible, as described below:

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### Acceptability

We strived for acceptability. For instance, the acceptability of our game withholds possible instrumental dimensions, when the game is considered as a tool for learning, supporting light mental or physical exercise or facilitating social interaction. These potential dimensions of the game adventure have been scrutinized in earlier phases of our research (see e.g. Ihamäki & Heljakka, 2017; Heljakka & Ihamäki, 2018) and we continue to develop our work on the opportunities for learning in this paper.

### Accessibility

Our goal for accessibility meant that Sigrid-Secrets would be easily accessible cognitively: We connected the narrative of little Sigrid with facts of the history of Pori by exploring the collections of the Satakunta Museum, then giving the character a semi-fictional personality (her name is based on a real person who lived in the region in the 1800s) and designing her fictional narrative partly based on this information. In this way the story of the game became relatable to local people, as it has a straightforward connection to the city where the LBG is located in. Other points regarding the accessibility of the game include the concise information given in the adoption phase: The Geocaching.com website dedicated to Sigrid-Secrets informs the players of the 'backstory' of the character.[1]

### Simplicity

Another design goal for our game was to keep it simple considering both its acceptability and accessibility. Simplicity as a design guideline partly overlaps, then, with the other design goals, but it refers in our case also to the simplicity of the user interface of the mobile device, typically a smartphone which through the use of the Geocaching app unlocks the coordinates needed in order to find out the exact locations of the artworks along the geocaching trail.[2]

### Flexibility

An additional design goal for our game was to keep it flexible: The game could be casually approached by searching only for a part of the artworks during one day and return to the game adventure on a later occasion. In Kultima's definition

(2009) flexibility means that the game supports spatial, temporal and social pervasiveness. We as the designers of Sigrid-Secrets also aimed at an experience that would allow other parallel activities such as strolling in the park and admiring the city with its various structures from this perspective. Furthermore, we aimed at a *leisurely* game experience, which follows one the one hand a non-competitive idea of walking in the park and at the same time seeking for the 'treasures' the hidden photographic artworks entail.

The second dimension and design goal (and an work-in-progress feature) of our game would be an additional layer to the geocaching game – an application that would bring the toy photographs 'alive' by activating supplementary features such as AR-animations on the photographs that would allow the players to play mini-games of e.g. riddles and answering trivia questions. The third, and final dimension of our game would ultimately be an AR feature that would present the player with further content in relation to the Sigrid character. The ideation and design work for Sigrid-Secrets was carried out in fall 2015, well before the launch of PokémonGO (2016), Niantic's immensely pervasive and popular AR-enhanced gaming experience. To us, the game designer's surprise, PokémonGO featured many similarities to what we have planned our game to have. Ultimately, the VR and AR features[3] of Sigrid-Secrets remain in work-in-progress stage until this day. Consequently, the 'artified' game experience builds largely on static images and the narrative delivered to players registered on the Geocaching.com website.

Once the 'Hidden Art' exhibition ended in August 2016, the city authorities gave permission to the authors/game designers to maintain the six artworks and the final cache – a hidden container - in their places. This has allowed us to investigate various aspects of the game in our case studies interested for example in the well-being effects of the trail (Ihamäki & Heljakka, 2017), as well as its possible educational implications (Heljakka & Ihamäki, 2018). To this day, some 272 geocachers report to have visited the trail (as per February 2018).

Figures 1, 2 and 3. Exhibition poster for Sigrid-Secrets as a part of the *Kätketty taide* ('Hidden Art') exhibition and *Vihervuosi* 2016 event; Map depicting locations of the artworks in the parks of Pori; An example of how the artworks are displayed on existing structures such as park benches.

## Related Research: Designing LBGs

In 2005, Chen and Michael predicted, that 'games and game technology are poised to transform the way we educate and train students at all levels' (Chen & Michael, 2005, n.p.) One could say that every instance of a played game teaches its players something, but designing for pedagogical outcomes presents game designers with challenges not necessarily associated with the design of casual games. With serious games the primary goal is often that of education.

In order not to design 'chocolate-covered broccoli', as famously stated by Bruckman at the Game Developer's Conference in 1999, designers must recognize factors that predict effectiveness in educational games. According to a review made by Linehan et al. (2011), these factors may be fun, flow, engagement, feedback, goals, problem solving, game balance and pacing, interesting choices and fantasy narrative among many other aspects.

Designing educational games, then, could be seen as a category of serious games, or games with a purpose, which in this case cater for playful learning. Again, Kangas (2010) sees playful learning as a key competence in teaching and learning. Kangas defines the goal of playful learning as follows: It is curriculum-based learning that is enriched with play, games and technological affordances. As

Hirsh-Pasek et al. (2009) describe, both free play and playful learning should command a central role in high-quality education for preschoolers (Hirsh-Pasek et al. 2009, 54).

According to Lihehan et al. (2011) the merging of the disparate goals of education and games design appears problematic. 'Games that teach also need to be games that test', and game designers must work together with educational professionals when aiming to developing serious games as new teaching tools, Chen & Michael remind (2005). When game-based learning is of interest for designers, it is in place to consider how to assess and test in order to determine that the participants can relate to the content of the game, understand the tasks provided and make use of the game appropriately.

Mobile devices enable 21st century students to construct their knowledge anywhere and at any time. Mobile learning (or M-learning) is "an educational interaction delivered through mobile technology and accessed by students from any location" (Traxler, 2009). M-learning is characterized by physical mobility in its flexibility of time, place, pace and space and has used mobile devices with an Internet connection for educational purposes (Kinash et al., 2012). According to Zimmerman and Howard (2013) "mobile devices can situate and connect learners by supporting authentic, context-specific, immediate learning" (Zimmerman and Howard 2013, 2). Consequently, learning is no longer only for the classroom, its integrating mobile technology enables teachers to customize student learning by creating authentic learning activities to engage students, as contemporary phoneurs (Souza e Silva & Hjorth, 2009) anytime and anywhere (Hess & Gunter, 2013). Several researchers refer to the ability of mobile learning ability to enhance collaborative learning (Barker et al., 2005; Cheon et al., 2012).

Location-based learning experiences presents a new area of research that potentially move and mobilize learning outside of the traditional educational context. Designing location-based games for this purpose (for example, designing geocaches with educational implications in mind) needs to take several issues into consideration. Benford (2005) discusses the relevance of location-based games to education. His report concludes that location-based experiences could introduce significant benefits for education in schools, but a number of challenges need to be considered and assessed in the process. These include technical challenges

and organizational challenges - questions regarding technological connectivity and matters related for example to privacy concerns and 'culture clashes' in using mobile devices in the educational context. Thus, a factor that presents an increasingly important one that needs assessment, is the one of *functionality of technology*. The second one addresses the *user of the technology*, and the third one the *content provided by this technology*.

Schadenbauer (2008) lists a number of useful questions that are relevant to ask, when conducting research with young people involved as players of a (digital) game, these are both user-oriented, technology-oriented and content-oriented questions, all relevant when considering M-learning (mobile learning): How are mobile phones used by young people? Which media are consumed by teenagers? How often do young people play games? Which kinds of games are popular? How important is social interaction in games? Do teenagers accept mobile learning games? Do the test subjects like the game and the story? Are the tasks difficult/ easy? Do the aids help to solve the tasks? Does the framework support the game progress? Which technical problems can occur? Which potential improvement is possible? As well-designed apps presumably provide an appealing platform for learners of the 21st century, it is useful for the designers of location-based games to consider the questions above.

Linehan et al. (2011) claim in their article that studies that try to point to reasons why games can be understood as valuable learning tools often do not include reviewing of empirical evidence. In our study the aim is to tackle this challenge by turning to potential users of our urban game adventure, with a focus on preschool and primary school-aged children. The methodologic approach used for our study will be discussed in the following.

## Methodology

Our research investigates how to avoid the pitfalls when designing and using a location-based game like our Sigrid-Secrets geocaching trail in education. The paper at hand focuses on a case study conducted with preschool and primary school-aged children. The question that guided our research was to understand, how preschool and primary-aged school children respond to our urban game adventure during simulated geocaching tours that were guided, narrated and gamified by

ourselves, using our own mobile devices for demonstrating and documenting the tours. In the context of this study, therefore, we asked these questions:

RQ1: What are the potential learning affordances of our urban game-adventure, Sigrid-Secrets?

RQ2: How could the pitfalls in creating opportunities for learning through location-based games be avoided, especially when designing pedagogic aims into an urban gaming experience fit for school-aged children?

We have studied the pervasive game of Geocaching using material from four sources: Our earlier research, on which this study builds, employs 1) user generated data (comments) on the Geocaching.com website. The research reported here uses 2) documentations of play tests, 3) surveys and 4) children's drawings. In addition, our study includes active participation and observation during the play test sessions.

The survey method for assessing the perceptions of our game is adjacent to what (Davis et al., 2005) refer to as *playtests*. In sum, our multimethod approach allows us to target our case study from several perspectives which is needed when the implementations of new types of game design are considered. By organizing three guided tours, we play-tested both the experiential and educational capacity of the trail. This meant that we were interested both in how the game works for the player audience of young children with no previous experience of geocaching. Moreover, what was of interest to us was to test player responses to the second dimension of our game – the animated features including mini-games such as riddles and trivia.

The orchestration of the game adventure included walking the geocaching trail with the children that the game administrators (in our case the authors/researchers) led the players (pre)school children) by reading the story of the main character of the story, Sigrid. Moreover, orchestration involved actively monitoring the children to ensure they stayed out of harm's way and participate actively in the geocaching game (Capra et al. 2005).

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## Case Sigrid's Secrets: Studying Simulated Geocaching Tours with School-Aged Children

According to Mäyrä, any gameplay experience is intimately linked with the immediate personal contexts of digital play, which mean that we need to know the players better, how they play, what motivates their play – and/or about their aversion towards certain game forms (Mäyrä, 2007). Again, usability research may help in identifying problems that block users from experiencing the 'fun' of a game (Davis et al., 2005). In games, this means a careful assessment of their playability.

The study presented in this paper centers around the evaluation of our urban game adventure included observation of children in action. Specifically, in the following, we will analyze the player experiences of our location-based game, Sigrid-Secrets. The research reported uses documentations of play tests, surveys and children's drawings. In addition, our study includes active participation and observation during the play test sessions. Surveys tap players' perceptions of games and usability tests may be employed to discover whether the experience the player has of a game matches the designer intended the player to have. A combination of survey and hands-on gameplay together form a method, the playtest, typically interested in the players' initial experience of a game (Davis, Steury & Pagulayan, 2005). In our research the play tests meant a simulated geocaching game of Sigrid-Secrets guided, moderated and documented by the authors. We also experimented with the additional method of asking the children who participated in the playtests to draw images of what they think they learned by playing our game. The results of our multimethod study will be presented in the following.

### *Guided Tours of the Sigrid-Secrets Geocaching Trail*

The guided tours were organized over two days in October 2017. One the first day the authors hosted tours with the two groups consisting of preschool children and their teachers (with n=12 participants in the English group, n=11 participants in the Finnish/English group, and two teachers in each group). Each guided test tour of the trail ranged between 45 minutes to 1 hour in length to complete. At the end of the tour we asked each participant to each fill in a survey and to draw a picture of what they learned and remembered from of the geocaching trail. Two children in the Swedish speaking group (i.e. the third-graders, n=12), were familiar with geocaching either because of having played the game elsewhere with their family

before, or because having toured the Sigrid-Secrets trail prior to our guided tour. Generally, the participating preschool children had not played geocaching before, nor had it been used by the preschool teachers either in informal or formal learning situations. However, many children reported – when asked – to have played Pokémon GO in the Raatihuone Park (the starting point for the Sigrid-Secrets game experience) – a hotspot for caching 'Pokemonsters' since the summer of 2016.

During the tours we as the researchers narrated the experience by using the story of the character of Sigrid based on the text that is available on the game's website under Geocaching.com, and guided the groups by walking from artwork to artwork.

As our 'artified' game experience represents a work-in-progress project, not all of its designed features are available at the moment. Each of the artworks which represent the character of Sigrid in different activities involves a mini-game such as a riddle as presented through e.g. a short animation, which in the future phases of continuing the development of the game will be a part of its digital enhancement and available through an app. Consequently, these features were simulated to the groups by using mobile devices and explaining that they are going to be a part of this game in the future. In order to activate the children in order to play the mini-games with us as the tour guides, we played each animation from a tablet and asked the groups questions such as: "What is Sigrid's second name?" (the letters may be found both on the artwork and the animation); "What do the colors in the animated film remind you of?" or "Which are the colors of the rainbow?"; "Which instrument does Sigrid play in the animation?"; "What is Sigrid doing in the animation?"; "What are they doing in this historical film?"; and "Where is this scenery from?" or "What bird makes the kind of sound you are able to hear in the background?". Some of these questions could be solved by looking at the static image in the artwork only, whereas some needed to be found in the animations (including sound) to be unlocked through the images by a mobile device and app.

### Observations

According to our analysis, the educational affordances of Sigrid-Secrets may be grouped in the following categories: a) spatial design affordances, b) narrative design affordances, and c) interactive design affordances. Examples of these will be given in the following.

During the tours it became apparent that the children liked the idea of a 'treasure hunt'. Many of them enjoyed the competitive aspect of the 'game within a game' they developed by themselves during our guided walk, i.e. who will find the artworks first. Although this proves that children are innovative in coming up their own rules for existing games, this possibility is an unintended design affordance. In geocaching, the question is not so much about how fast you find the caches, but rather, how many you find during a longer period of time.[4]

Observation for educational affordance of an LBG: Design features for the game that demand physical skills such as ones relating to speed and dexterity.

During the tour with the English preschool children, some participants asked about the number of artworks placed on the trail (altogether 6) and some were interested in how far they would need to walk during the tour. Both of these represent the games *spatial design affordances* having to do with its lay out. Some of the children jumped on the public artworks found in the park area, but which were not a part of the geocaching trail[5]. The elements outside of the game belong to the city structures, which can be interpreted as intentional affordances of the park, but unintentional design affordances of the game.

Observation for educational affordance of an LBG: Design features for the game that use the city structures for teaching about measurable entities (e.g. geometry, architecture, physics etc.)

Children in both groups paid attention to an unintended *spatial design affordance* in the end of the trail, where they met with a fly agaric (poisonous mushroom). They used a relatively long time to inspect this. Based on our earlier research on geocaching (e.g. Ihamäki & Heljakka, 2017), we have come to understand that adults, too, become more interested in what can be found in the environment outside of the game when they are looking for caches in the name of geocaching.

Observation for educational affordance of an LBG: Design features for the game that teach about the city's flora and fauna (e.g. tasks related to biology).

Some of the children told us that they have been students of a local dance school which is part of the information given in the Sigrid-Secrets story. They also enjoyed a historical short film that show people rowing across the river Kokemäenjoki river and where there presently is a bridge. The possibility to interact with the

story of Sigrid-Secrets based on the previous knowledge and experiences of the local people, is an intentional *narrative design affordance*. One of the children in the group considered the Sigrid character (a doll), as "creepy". This character (a doll) also represents an intentionally designed feature of the game, or *narrative design affordance*, but its potential "creepiness" not, which is an unintentional design feature.

The participants in the study were enthusiastic about the short animations that are going to be made available as a part of the game that has to be unlocked with an app, and the functions of which we now simulated by playing them for the groups from a tablet. The participants were excited e.g. by the mini-game that asked them to find out Sigrid's second name by re-arranging letters that floated around Sigrid in the animation. The children also liked the animation with the dancing Sigrid, which they considered 'magical' (English group). This animation also provoked laughter with the second group (Finnish-speaking group). The children were also enthusiastic about the sounds of a seagull featured in one of the animations from where they needed to recognize the bird. This represents an interactive design affordance that from the viewpoint of the game designers, is intentional and educational as it requires cognitive skills from the players.

Our other observations made during the guided test tours of the Sigrid-Secrets geocaching trail have to do with the challenges and difficulties that we as the guides (and researchers) of the tour experienced during the walks. These include factors outside of the game, but that nevertheless affect the overall experience when a technologically enhanced game is played outdoors. These include the functioning of the Wi-Fi connections, working of the mobile devices (running out of batteries and space, slowness of functioning etc.); the weather conditions during the game-playing; the risks of moving with groups of young children in the city center; and the maintenance of the geocaching trail, which may be affected by e.g. construction work carried out in the area where the trail is located.

### Survey

The preschool teacher in the English speaking preschool group informed the researchers that the children had experienced filling in the survey as difficult. Again, the 3rd graders of the Swedish school had, according to their teacher "filled the survey in the best way they could". Because of this, questions on validity arise.

Nevertheless, the surveys, in which we asked the adventureness of the trail, its length, about learning on the trail and a possibility to give free comments, the children described it as "good" and "fun". In the most cases they graded the experience with its features between 3-5 (3=good, 4=better than good, 5= excellent).

*Drawings*

Children's drawings (for example, see Figure 5.) of what they thought they had learned by touring the geocaching trail addressed several aspects of the trail. They varied from images of the trail itself to descriptions on the park surroundings and to the weather conditions. Roughly, the drawings could be divided into two categories – those of maps of the trail (based on the children's own observations, as maps of the trail were never shown to them) and those of the surroundings of the trail, mostly featuring trees and infrastructure in the park. Many of the children who we interviewed and videotaped when they explained what they had drawn mentioned the 'treasures', i.e. artworks on the trail and the actual geocache, located in a secret stash underneath trees.



Figures 4 and 5. A mushroom at the end of the geocaching trail caught the children's attention; A drawing made of the geocaching trail by a 6-year old girl. She explained the red object to be a park bench underneath which the children discovered an artwork.

## Affording Opportunities for Playful Learning through Geocaching

Our assessment of the game adventure begins by comparing the design goals with the results of the play tests. As the results of the first phase of our research

with transgenerational users of the urban geocaching trail illustrate, the user experiences are multidimensional (Ihamäki & Heljakka, 2017). A general overview of the detected affordances shows that it is possible to categorize a set of different design affordances that relate to the game and ones that are part of the environment, in our case park area in an urban center. These are either an intentional or an unintentional part of the geocaching trails game-specific affordances. According to our analysis, the affordances of Sigrid-Secrets may be grouped in the following categories: a) spatial design affordances, b) narrative design affordances, and c) interactive design affordances. The intended, designed affordances of an urban geocaching trail enhanced with artworks are controlled by its designers, whereas unintended design affordances emerge when users explore and interact with the game, depending on the players, the changes in the environment (spatial surroundings) and e.g. the weather conditions. The tests revealed both intended and unintended design features which we here describe as pitfalls. These are pitfalls which can be faced when school children are taken to experience an urban adventure gamescape with educational outcomes in mind. Challenges in designing for urban playscapes with educational intentions in mind include, according to our study a) challenges in interaction in gameplay (real world interaction, interaction with other players, b) challenges in impact of location (situational factors) and c) challenges in responses to game aesthetics and narrative. Based on these, we developed the following design guidelines:

General design guidelines: Suggestions for future designers of urban adventure gamescapes for learning:

- To avoid pitfalls in designing for *interaction in gameplay*: Design the LGB so that its goal, mechanics and approximate length is informed and easily understood by the players before they start to play (together) and that the players know what to expect.
- To avoid pitfalls in designing the *location of the game*: Design the LGB in cooperation with whoever is in charge of the location (e.g. city officials in charge of maintenance of your game's elements in the physical environment) to ensure that the game elements stay intact.
- To avoid pitfalls in designing the *aesthetics and narrative of the game*: Design the LGB to include approachable (in the case of young players,

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child-friendly) characters so that the players are not scared off by anything to be considered 'creepy'.

## Summing Up the Pitfalls in the Park – Avoiding Unwanted Outcomes of Location-Based Game Design

Two research questions guided our process. These were: 1) What are the potential learning affordances of our urban game-adventure, Sigrid-Secrets? And 2) How could the pitfalls in creating opportunities for learning through location-based games be avoided, especially when designing pedagogic aims into an urban gaming experience fit for school-aged children?

Following important questions ask when designing LGBs according to Benford (2005), the most relevant to our study proved to be: How important is social interaction in games? Do the test subjects like the game and the story? Are the tasks difficult/easy? Do the aids help to solve the tasks? Does the framework support the game progress? Which technical problems can occur? and Which potential improvement is possible?

Assessing perceptions of the game by conducting playtests with young children provided us as the designers and researchers of the game valuable feedback. We suggested possible educational ideas on affordances that stemmed from our observations. Again, a summary of the results of our case study point to that the unwanted outcomes of a designed LBG may relate to user-oriented, technology-oriented and content-oriented matters, which should be considered in design work. In our case issues relating to interaction, location and aesthetics/narrative proved to present the most prominent instances of unwanted design, which could be overcome with improved design.

Findings show that geocaching as a platform has potential to be used for educational purposes of the innovative kind, but playing in the urban, outdoor environment also brings possible challenges with it. In general, when designing location-based games there needs to be awareness to avoid the pitfalls that players of different ages can face in the middle of urban environments. In our case study, these concerned the game itself (content and technology-related challenges), the game presentation (its physical presence and challenges of maintenance in the parks), the players (challenges in uncontrollable movement of young children) and

seasonal constraints (weather conditions). The three first ones of the aforementioned can be avoided by thoughtful design, while the last may be avoided when play sessions are organized only at times with ideal weather conditions. To sum up, we have given some suggestions in the form of design guidelines for future designers of urban adventure gamescapes for learning.



Figure 6. Avoiding the pitfalls when playing urban adventure games with young learners

## Conclusion

In this paper we have explored how the cityscape provides both a formal and an informal setting for learning, when a LBG such as our Sigrid-Secrets is used for game-based learning in outdoor play. We found, that the participants of the guided test tours interacted with our Sigrid-Secrets geocaching trail through three affordances, namely the affordances in relation to its spatiality, narrativity and reciprocal interaction between the game and the player. The tentative results point to that children as young as the preschool and primary school children in our study, can by playing the game in teacher-supervised and guided situations, effectively learn about the urban infrastructure and information embedded in the game's narrative – in this case the story of Sigrid-Secrets that links to the city's historical past and present.

By turning to the participants of our case study, we were able to see how the children interacted creatively with the city park environment, how experiencing the game sparked their artistry when drawing images of the trail, how they immersed themselves in the story of Sigrid through their imagined 'treasure hunt' for the

artworks, how they innovated new uses of the parks structures e.g. by climbing and jumping from the park benches and concrete structures and how they used their personal expression in explaining their meaningful memories of the trail and what it, most prominently, taught them.

Finally, by letting the early learners show us how they interacted with our geocaching trail, we were able to see how collaborative learning may take place outside of the classroom when the game of geocaching is played in a social situation. By seeing how the children played, it was able for us to sense their excitement, engagement and discovering of the fun of what playful learning in the park, instead of the usual school surroundings, may mean to them. We propose that acceptability, accessibility, flexibility, simplicity are useful design values to consider when designing location-based games as urban adventures in cityscapes. Further, we add that game interaction, location and aesthetics/narrative should be carefully considered mainly based on their acceptability and accessibility. Finally, we have suggested some guidelines that, according to our understanding, are central to designing similar multidimensional geocaching trails as the urban Sigrid-Secrets game-adventure presented in this paper. Further research questions may include the teacher perspective. For example, What kind of content would educators see relevant to employ in narratives embedded in LBGs like Sigrid-Secrets. And: How would educators like to measure the outcomes of learning if such game-based learning experiences were used in the future?

Neustaedter, Moulder and Wakkary et al. (2012) have noted that what might be challenging in designing 'mixed-reality games' is to ensure the 'scalability' of these games. In other words, it is the possibility to duplicate these games in various locations, or to sustain long-term participation in them. In this research, our larger project interested in location-based game development and related research now also includes the design and execution of another similar location-based game adventure in the city of Rauma – a continuation and further development of the story of Sigrid. Our second urban game adventure based some 50km southwards from Pori in the UNESCO heritage site of Old Rauma on the West Coast of Finland. There, the story of Little Sigrid continues with new adventures and a work-in-progress app in design for players of different ages and gamer profiles even outside of the geocaching community. This second phase of our research will reveal whether or not an urban game-adventure is possible to continue in a second location and

perhaps, allow the interaction between these two geographically separate, but virtually connected gamescapes to enter a playful – entertaining and educational – dialogue, and in this way enrich the overall experience of playing with Sigrid.

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## Notes

1. It is important to note, however, that although the game is physically easy to access (the photographs are permanently exhibited in the surroundings of the city parks), the digital component needed for the game – the Geocaching app – is needed at this time to communicate the idea and content of the game. Our plan is, initially, to launch an app specifically designed for Sigrid-Secrets, which would enable users not familiar with the game of geocaching, to be able to play it as well.

2. As the game is physically based in the public sphere in the context of the city park it is also possible that it's accessed by the non-playing audience, or approached by curious individuals, who start to look out and follow the artworks spread in the park. It is still unlikely that a spontaneous instance of game play like this would ultimately lead to finding the actual geocache, as it is well hidden in a secret spot not visible to passers-by as might be the case for the artworks.

3. The future of location-based experiences brings to the fore many interesting research topics, one of them being what Augmented Reality will bring to these game experiences.

4. However, for geocachers familiar with the Geocaching game logic, there is a special goal: when a geocache is launched, whoever finds that first will receive the "First to Find" title, a merit within the geocaching community.

5. In this way, they utilized the playful urban space to a physical activity adjacent to parkour (see e.g. De Souza e Silva & Hjorth, 2009).

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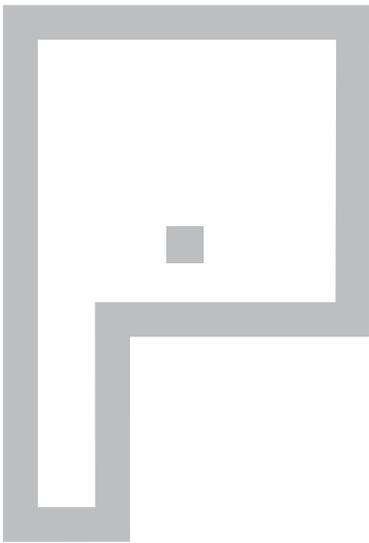
# Parallel Sessions 3

Game Design

LEARN

# A Literature Review for Game Design Frameworks Towards Educational Purposes

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### ABSTRACT

Creating a game is a complex process, full of layers and steps in which different team members should contribute to the final product in order to be appreciated by the public. To control the steps and maintain everything guided towards the same objective throughout the entire development there are several frameworks that help in the organization during the creation flow of games. A game design framework is a group of techniques to be applied at each stage of the project, depending on the needs of the game designer.

The purpose of this paper is to identify and review academic and scientific papers regarding the elaboration, creation or application of game design tools for educational purposes. Its elaboration will work as a research basis for a master's thesis regarding the use of game design frameworks for creating educational games.

Therefore, a review of the literature (10 years or less) will be carried out, using periodical resources and a database of academic papers. The following topics will be explored in order to verify the relevance of the works studied: (1) target audience, (2) game design framework used, (3) scope of work creation, and (4) result obtained. As a result, we performed an analysis and led a discussion about these academic studies and applications of different game design frameworks for pedagogical purposes, thus we could realize the advantages and limitations that these frameworks may present for this intention. Under those circumstances, we established our work based on the research questions and we showed their possible scientific contributions to the area of game design for educational purposes.

**Keywords:** Educational Games; Game design; Game Design Tools.

## Introduction

Electronic games have attracted the attention and time of countless children and teenagers around the world since its emergence in the late 1970s, and their fascination with digital entertainment is greater than ever. However, as digital games

became a frequent activity in people's lives, their possible effects on the audience has begun to be discussed. The main concerns that has been raised are about the possibility that the practice of video games may become an addiction or provide other harmful behaviors, such as aggression or depression (Griffiths, 1998). Although, lots of people saw the astonishment of the younger audience as a possibility to turn electronic games into a new educational tool. By offering fantastic environments, rich visual and audible elements and by enabling interactive storytelling. Electronic games are a comforting and exciting environment with recognizable and interactive features (Poole, 2000). In the early 1990s several games for educational purposes began to emerge (such as "Reader Rabbit" by *The Learning Company* in 1986, or "Dr. Brain" by *Sierra* in 1992) which, in addition to being a success with the public, they revealed the new possibilities that educational games propose.

Nevertheless, despite the growth of the discussion about the use of games for educational purposes, being either about the contrast between the intrinsic motivation of the younger audience and disinterest with the school content (Prensky, 2003), or the greater acceptance of the use of digital tools within the classrooms by the academic community (Kirriemuir, 2002),

Studies that approach the processes of development of educational games are necessary to be explored, in order to understand the results achieved and to establish their state of the art. On the one hand, there are studies that use game structures to create environments which are capable of motivating learning (Malone & Lepper, 1987) since the 1980s, these studies focus on understanding the use of motivational aspects of games as an artifact for supporting the engagement during the learning process, on the other hand, there are others studies aimed to the effects of digital games in learning, which also understand the characteristics that make them attractive to their audience and analyze which of these characteristics differ from commercial to educational games (Schaller, 2006).

## Methodology

It is a systematic review that adopts a detailed analysis of the literature related to educational games and game design techniques. All papers were researched through the Internet, in different academic databases and specialized periodical

resources. Researches were carried out in English and Portuguese between September and December of 2017, and initially it was excluded papers which are older than ten years from its original publication. Papers were selected from the Brazilian Symposium on Games and Entertainment done at Science Direct, Sage Journals, Springer Open, British Journal of Educational Technology, Academic Conferences and Publishing International, Google Academics, Capes Periodicals, Brazilian Digital Library of Thesis and Dissertation, Journals for Free, FaSCi-Tech, Research Gate and Emerald Insight.

The criteria for inclusion was defined as: (1) Pre-filtering, original text, full text should be available in online format and publication date of a maximum of ten years; (2) First filter, thematic related to educational games or games creation techniques; (3) Second filter, target audience should involve game developers or game researchers; (4) Third Filter, specific game development reports were not allowed; And (5) final filter, the article needs to include both themes of educational games and game design. Therefore, papers which were not related to the mentioned areas were discarded. The selected papers were separated into two groups: articles on the use of games for pedagogical purposes and articles on game design techniques for game development. The separation was done with the intention of finding techniques or frameworks of game design aimed at educational games.

Table 1. Filtering Process

| No. | Filter | Filtering details | No of selected articles |
|---|---|---|---|
| 1 | Pre-filtering | Ten years or early and available in online and | 418 |
| 2 | First Filter | Thematic related to educational games or games creation techniques | 257 |
| 3 | Second Filter | Target audience should involve game developers or game researchers | 145 |
| 4 | Third Filter | Specific game development reports were not allowed | 41 |
| 5 | Final Filter | Including both themes of educational games and game design | 17 |

## Results

A total of 418 academic journals related to the study, the development and the analysis of games applied to pre-filtering were collected from the databases mentioned. In a second moment the filters (2) and (3) related to educational games or

techniques of games creation directed to game developers or game researchers was applied, thus were selected 145 papers. In the third step the papers were analyzed more deeply, applying the third filter, in which were chosen only articles that were aimed at the purposes of this paper. Thereby 41 papers were chosen and separated, 29 focused on the use of games in education and 27 papers on tools or debates about game design. The ones in the Table 2 include both themes of educational games and game design.

Sixteen of the selected papers deal with both themes of educational games and discuss game design techniques, which are more relevant with the subject of study in this paper.

From the list, four papers deal with the benefits of teaching digital game development for teachers and students (Papers 4, 5, 6 and 14). They discuss the importance of learning programming and computer science by children, teenagers and teachers in the process of training as a way to adapt the way of learning and teaching the new paradigms of current technology and its availability to the majority of the population.

A prominence topic is the way in which the creators of the game, in this case students and teachers, must think during the development, putting themselves in the role of the player, understanding their needs. The papers propose that the games to be developed must be educational, therefore it becomes essential to determine which content to be taught and to propose the best ways to transmit it to the players. However, the papers do not present techniques for this goal to be achieved, focusing on the perspective of the educational content creator in children, teenagers and teachers.

Table 2. Selected publications that meet this paper specifications. The ones highlighted include both themes of educational games and game design

| No. | Year | Author; Title; | Educational Institution; Location |
|---|---|---|---|
| 1 | 2015 | Vanisri Nagalingam; User Experience of Educational Games: A Review of the Elements | University Technology Malaysia; Malaysia |
| 2 | 2011 | Thiago G. Mendes; Jogos Digitais como Objetos de Aprendizagem: Apontamentos para uma Metodologia de Desenvolvimento | Federal University of Rio Grande do Sul, Brazil |
| 3 | 2017 | Sissy-Josefina Ernst; More than the Sum of its Parts – Towards Identifying Preferred Game Design Element Combinations in Learning Management Systems | University of Kassel; Germany |
| 4 | 2016 | Corbett Artym; Pre-Service Teachers Designing and Constructing 'Good Digital Games' | University of Alberta; USA |
| 5 | 2016 | Yun-Jo An; A case study of educational computer game design by middle school students | University of West Georgia; USA |
| 6 | 2013 | Fengfeng Ke; A case study on collective cognition and operation in team-based computer game design by middle-school children | Florida State University; USA |
| 7 | 2015 | Ismael Gaião Filho; Aplicação e Análise de um Framework de Concepção ao Desenvolvimento de um Jogo Educativo | Federal University of Pernambuco; Brazil |
| 8 | 2015 | Enza Rafaela de Nadai Victal; Avaliação para Aprendizagem baseada em Jogos: Proposta de um Framework | Federal University of Espírito Santo; Brazil |
| 9 | 2015 | Karen Schrier; EPIC: a framework for using video games in ethics education | Marist College; USA |
| 10 | 2009 | Brian M. Winn. The Design, Play, and Experience Framework | Michigan State University; USA |
| 11 | 2015 | Heraclito Amancio Pereira Junior; Modelo para um Framework Computacional para Avaliação Formativa da Aprendizagem em Jogos Digitais | Federal University of Espírito Santo; Brazil |
| 12 | 2009 | Bokyeong Kim; Not just fun, but serious strategies: Using meta-cognitive strategies in game-based learning | University of Virginia; USA |
| 13 | 2010 | Michelle Pereira de Aguiar; Proposta de um instrumento de auxílio ao design de jogos eletrônicos educativos | Federal University of Paraná; Brazil |
| 14 | 2015 | Alexander Repenning; Scalable Game Design: A Strategy to Bring Systemic Computer Science Education to Schools through Game Design and Simulation Creation | University of Colorado Boulder; USA |
| 15 | 2010 | Leonard A. Annetta; The "I's" Have It: A Framework for Serious Educational Game Design | North Carolina State University; USA |
| 16 | 2010 | Vicent Aleven; Toward a framework for the analysis and design of educational games | Pittsburgh; USA |
| 17 | 2017 | Félix de Souza Neto; Jogos Digitais e Aprendizagem: um estudo de caso sobre a influência do design de interface | SENAI/CIMATEC; Brazil |

Some papers have focused their studies on analyzing aspects of game design, being educational or not, in order to understand their efficiency as educational material. The papers (8 and 11) propose frameworks that help to determine if a game is capable of promoting a formative assessment of the players. Both proposals clarify the differences between the traditional and the formative assessment, highlighting the benefits that the second promotes in the students. On the one hand, the paper *Avaliação para Aprendizagem baseada em Jogos: Proposta de um Framework* (8) presents a computational framework in which data would be collected during the process of playing, thus evaluating and suggesting improvements to the educational game, and the paper *Modelo para um Framework Computacional para Avaliação Formativa da Aprendizagem em Jogos Digitais* (11) plans heuristic processes to obtain the qualification of the game as a formative assessment product. Both frameworks seek to improve the game as an educational object in the future. On the other hand, the paper *EPIC: the framework for using video games in ethics education* (9) also establishes an evaluative tool for classifying digital games, but the study is concerned with the ethical aspects of the game. The author also suggests the use of games evaluated by the ethical question in the classroom, as a way to help students understand the subject.

The papers *Aplicação e Análise de um Framework de Concepção ao Desenvolvimento de um Jogo Educativo* (7) and *Proposta de um instrumento de auxílio ao design de jogos eletrônicos educativos* (13) outline tools that help to elaborate and evaluate the design of games based on methodologies not directly linked to the games area. The first paper (7) shows a case study of a board game development applying the knowledge of the German designer Bernd Löbach, specialist in industrial design. The second paper (13) proposes a heuristic tool that helps to verify the educational efficiency of the game already created.

Two papers (3 and 12) seek to understand how games are capable of developing skills in players who remain beyond playing. The paper *Not just fun, but serious strategies: Using metacognitive strategies in game-based learning* (13) explains how MMORPG games can strengthen strategic and organizational thinking in players, even if the purpose is not related to pedagogical elements. The paper *More than the Sum of its Parts* (3) shows the positive effects that the combination of different elements of game design can have on the player development and how these elements can be used in the gamification process in other environments.

The paper *User Experience of Educational Games: A Review of the Elements* (1) and the paper *Jogos Digitais e Aprendizagem: um estudo de caso sobre a influência do design de interface* (17) highlight the importance of UX (User Experience) so that the goals of the educational game are more easily achieved.. The first paper (1) seeks to list the main elements of UX and its implications within the game. The second paper (17) exposes the user interface as an object of study, detailing its functions and impacts on the users of the game.

Only four papers focus directly on game design during the process of developing an educational game (2, 10, 15, and 16), however only two propose a new framework (10 and 16), while the other two deal with the pedagogical and technical concerns that the development of an educational object may have for developers with no knowledge of the educational plan. The paper *Jogos Digitais como Objetos de Aprendizagem: Apontamentos para uma Metodologia de Desenvolvimento* (2) amplifies a discussion about the process of developing an educational game, separating it by stages and highlighting the difficulties and main reasons for failures that it may have in its goal of transmitting content. The paper *The "I's" Have It: A Framework for Serious Educational Game Design* (15) focuses on the pedagogical aspects that must be present during the development of an educational game. The addressed points seek to understand how to correctly spread knowledge to the players without losing the pedagogical goals or conflicting with other elements that constitute a digital game.

The paper *The Design, Play, and Experience Framework* (10), written by Professor Brian M. Winn, proposes the framework DPE (Design, Play, and Experience) as a tool for planning and developing *serious games*, including educational games . The author explains that DPE is an expansion of the MDA framework, published by renowned and popular Marc LeBlanc both by industry and academy. The author expresses that the MDA framework (Mechanics, Dynamics and Aesthetics) contributes to the developers' ability to improve the mechanics present in their projects, understanding the experience of the players, however only the improvement of the mechanics is not enough for the *serious games*, since its main objective is not the fun, but the possibility of learning. So it would be necessary to extend the MDA beyond the mechanics and dynamics within the game, taking into account the storytelling, UX and, mainly, the process of in-game learning. In addition to layering the components that constitute a *serious game*, the relationship between these layers

is explained to be essential for the game to be both efficient in its purpose (to transmit some content) and to engage the player in order to have a positive experience.

The other paper that aims on the process of development of an educational game is *Toward the framework for the analysis and design of educational games* (16), written by Vicent Aleven, elaborates a framework that seeks for evaluating the assertiveness of an educational game and helping his project. The paper establishes that the framework is based on three components: learning objectives, the MDA and the methods of instructional design. The first step is to establish the objectives that the educational object will have, in other words, what knowledge the game should improve in the players. The author emphasizes that setting these goals allows you to draw the direction of the project, and when those goals are inaccurate, the educational essence of the game can become fragile and inconsistent. The second component is the MDA framework, also mentioned in the paper by Brian Winn (10), widely used as a basis to establish the technical aspects that the game will have influenced by the experience that is sought in the player. The third component is instructional design, which is a pedagogical methodology that helps to develop knowledge in different environments. The author points out that there are different metrics to be followed, and the choice of these metrics should align with the design pretensions. The proposed framework was tested as an evaluative tool, being able to set which points the analyzed educational games meet the established metrics, otherwise, how to make them overcome these possible deficiencies. The framework is also evidenced as a useful tool during the game design process, establishing the guidelines to be followed respecting and interconnecting the three components that compose the framework. But the ideation of the game that establishes which of the components should be considered as a priority and, above all, how the relationship between the learning objective, the mechanics of the game and the pedagogical methods will be implemented.

## Discussion

Conducting the research of papers, according to the selection criteria, in order to establish the state of the art of the theme proposed by this paper (game design frameworks for educational games) allowed to understand which problems the academy encountered when the games happened to be potential educational tools. It was possible to observe that the discussion about the use of games in

education is nothing new. The use of digital media as an instrument or simulation of educational environments has proven to be as efficient or even superior to traditional environments and methods (Butler, 1988). The discussion on reinvigorating the environment in order to allow young people to better develop their learning is not discussed as on the benefits they bring (Malone & Lepper, 1987), but it questioned how to transform the school atmosphere without losing their pedagogical values for entertainment.

As the objective was to understand the academic discussion about the processes of creation of educational games, the researched papers were directly focused on the area of development of digital games more than on pedagogy or educational psychology. Although it refers to a development area, the discussion and the concern about the educational qualities that the games might have are very common, even though the digital games industry does not focus on it. It is positive that part of the papers are from developers reporting their experiences in educational projects  or from researchers working on problems and solutions based on experiments using digital games in the classroom. It is correct to affirm that for more than 30 years, there are concerns about applying the theories discussed in an appropriate way in schools and classrooms, and a question was raised about the results obtained when a game is used for educational purposes.

However, it is necessary to highlight two points that should be noticed based on the academic research done. First, the list of papers that analyze the post-production effects and the application of classroom games is much higher than those that promote analysis and improvement during the development of these games. Second, pedagogy and education professionals are excluded from the process of game development. Most are treated as consultants or final public.

About the first point, the total amount of papers initially researched, including the 40 selected for analysis, only 4 discuss about the game development process (2, 10, 15, and 16). We can observe that there is a lot of research material to aid in the understanding of an educational object, analyzing its efficiency and the characteristics that influence the players and ways to validate educational games, although a developer will not easily find the same amount of content that supports the elaboration process of the educational game or that advises how to define technical and pedagogical priorities in the project.

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As for the second point, it is noticeable that, either in the frameworks that seek to validate the game or in those that serve as a tool for its development, the role of the education professional is not defined. They play a role of an external actor, either as an advisor for the educational goal or as an object of discussion in the choice of the game theme, the pedagogue or the teacher is not placed at the heart of the research. Even when the proper importance is given to pedagogical concepts, the role of these professionals is not designated.

It is not possible to measure in this paper how these factors reflect in the success and in the ease of insertion of this media as an educational tool within the educational institutions, however it is noticed a major concern in the validation of the games as educational material or in the understanding of their effects when applied in their best conception by those involved in the development process.

## Conclusion

145 journals were selected from the initial amount of 418, the topics of game design and education in games are quite discussed by researchers and students of the digital game area. Nevertheless, these subjects may have different focuses which make their discussion, endless and rich, on the other hand some topics are not deal with the same enthusiasm. Specifically from the selection of papers that focus on the use of educational games, most part of the research focused mainly on three aspects: social approach, familiarized to the social impact of the game public; learning and digital games, studying the effects of the digital game on the learning of specific aspects; and games within the school, which includes the studies of the use of games as tools especially targeted at school approach (GROS, 2007). There is a lack of studies aiming to improve the process of developing an educational game, to help game developers, pedagogues and content specialists to make the player experience richer, more constructive and more engaging. This discussion is evidenced once that only two papers of the analyzed amount focus their studies to present alternatives and tools for educational game developers.

If we analyze the selection of papers focused on game design, this issue is even more prominent, since some of the papers do not deal with the educational bias, and even the ones that do, build their arguments in the same framework, MDA

(LeBLANC, 2005). ), stating that the alternatives come from the same tool, therefore, with many similar elements. We can increasingly perceive a positive scenario for the use of games within the learning process, with professionals in the field of education dealing with games as tools with great pedagogical potential, as well as the greater concern of the developers and students of digital games in studying their effects when designed to teach. On the other hand we see this same scenario still uninterested and new to know how to improve the processes of developing an educational games. References which offers answers to the difficulties in balancing mechanics with pedagogical methods, to allowing the act to play to thrive, and to the role of the education professional to be assigned when planning the flow of the game have not been found.

There is no denying, however, that the search for the improvement of the insertion of different media, one of them the digital games, in the educational environment is a discussion in progress, and even the topics  narrowly studied have perspectives of evolution when their gaps are evidenced. Given this point of this research, it is possible to adequately raise the questions that lead to a future research on how to develop an educational game that includes pedagogical methodologies in the process of game design, in order to build a game designer assistance tool that proposes a product with educational purposes.

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# Harnessing Interactive Media Ideological Power: *A Disempowerment Model for Video Games*

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## ABSTRACT

In the era of participatory culture, the idea of an empowered user, able sculpt its own media experience has been established as the ideal role to be fulfilled by consumers. Through the analysis of video games that deal with controversial subjects, I will question the defense of pop culture and entertainment media depoliticization, contrasting it with this ideal of an empowered user as an ideological position in and on itself. The qualitative approach is extended in the reunion of focus groups, where the discussion moves to the medium potentialities which are left to be activated because of the necessity of agency as empowerment, and the power structures it reinforces. To understand the underlying modulation and what is to be gained from its subversion, we not only had to identify the missing in-game pieces, but also question the tendencies of the industry, thus considering the transformation of the video game experience as well as the transformation of the medium itself with the activation of its poetic potential.

## Introduction: Games and Gaming Culture as Systems

For several decades, both scholarly and popular discourses about video games were dominated by technophobic narratives. As the usual reaction to technological novelties and their liminal status on the existing frames of thought, these narratives stressed the hypodermic power of new media and their imagery, especially among younger demographics (Anderson & Bushman, 2001). With their acceptance as an object of a legitimate field of study, there was a shift in the attention of scholars, moving the discussion away from strong effects to weak or non-existing ones (Ferguson, 2014) and, at the expense of a closure of the playing instance, their benefits.

Though necessary to their legitimation as an object of study, the impermeabilization of the "magic circle" boundaries quickly became a hot topic for debate within the field (Stenros, 2012), with critics pointing out the structuralist nature of

the separation (Consalvo, 2009). Despite the turmoil, Zimmerman (2012) himself, whose 2004's book on design brought the concept from Huizinga and Caillois' works on play to video games' studies, denied the closed character of the sphere. Games are, besides "mathematical systems", "social" and "representational systems". Therefore, depending on the approach, they can be seen as closed (considering their purely formal ludic structure, which is refutable), open (as cultural systems) or even semi-open (experiential dimension) (Salen & Zimmerman, 2004).

This configuration required a more nuanced approach to their power and, in this context, Jenkins' (2006, p. 210) distinction between the focus on "effects" and on "meanings" gained significance. Calling for an "active interpretative effort", "meanings can be analyzed critically", enabling the simultaneous recognition of video games' benefits and their power reinforcing and legitimizing certain ways of thinking and moral values (Bogost, 2007, p.283). Besides, the creation of meaning on a video game doesn't depend only on the technology in and of itself but on a complex of socio-economic interactions and "feedback loops" (Mäyrä, 2014), that precede, accompany and follow their experience, promoting certain choices, judgments, and the crystallization of certain meanings to the detriment of others.

## Interactivity as Ideology: The Medium, The Message, The Meaning

There's a clear link between rhetoric and ideology, so much so that one could think of the former as a discursive medium for the latter. Rhetoric, as defined by Sutton Smith (2001 pp.8-9) is a "persuasive discourse or implicit narrative wittingly or unwittingly adopted by the members of a particular affiliation", "popular ways of thought, which construct the meanings of the cultures we live in". Ideology, in turn, may be described as a "set of explicit and implicit, even unspoken ethico-political (…) decisions, choices, which predetermine our perception of facts, what we tend to emphasize or to ignore, how we organize facts into a consistent whole (Žižek 2013).

With a permeable sphere of production and consumption, media images are, thus, inherently ideological, as they contain, in their depictions, certain "constructs" about the world and its "social objects". The frames, concepts and classifications for how to perceive a certain reality will be part of the player's "knowledge store", where they'll be interwoven with those obtained through other means, becoming

more accessible and, as such, more poignant the more the player is exposed to similar content (William et.al., 2009 p.819). They are imbued with "ideas and meanings, that are shaped socially, on their production and use" (Sotamaa, 2014).

Despite the mathematical character of virtualization and the ideal of medium transparency, software procedurality itself will have an "expressive power" (Bogost, 2007). Whether consciously or not, games are a medium carrying messages from those who created it, which reflect, say something about and will act upon the culture they're in. As possibly unintended and often unperceived, the rhetorical apparatus fueled through and by pop culture is often claimed as non-existent, and its objects coined as apolitical, unbiased, unserious. Contrarily, this occlusion, that leads to an illusion of absence of power, combined with the authority exerted by commercial games over the consumer may work in favor of the persuasiveness and pervasiveness of their rhetorics (Bogost, 2007, p. 49).

Therefore, identifying a certain rhetoric as being dominant in the context of gaming is also recognizing its ideological framing. At the same time, the discourses which dictate its placement within "broader value systems" (Sutton-Smith, 2001, p. 9) will be in a co-productive relationship with how play manifests itself. This means that the same concepts used to talk about play and games around their "borders" may be used to analyze what happens within, and what happens within may be analyzed in relation to the social dynamics they're embedded in.

Example of this dynamic, the cleansing of videogames technophobic stigmatization came through their pedagogical framing in a rhetoric of progress, focused on their effects over children's physical reflexes and cognitive problem-solving skills. Considering the meanings embodied by this rhetoric, we can identify its transition to the adult world through what is called gamification, which refers to the adoption of the goal-oriented action, rewarding achievements and punishing failure, by the capitalist system, either on consumption or production.

So, in capitalism, as in the interactive setting of a game and in the ideal of interactivity itself, the taming of the consumerist subject walks side by side with a carefully crafted illusion that, despite the mass produced and consumed culture, and the dangers of passive indoctrination by capitalism's power relations and dynamics (Mäyrä, 2014), the individual is not erased, but rather the gravitational point of these economic cycles.

## Video Games As A Post-Modern Medium

This desire for interactivity can be traced back to the beginning of the 20th century, when the first dwellings into the ideal "open work of art" promoted the reader/spectator/listener to the role of its co-producer. At first referred as such metaphorically, as to highlight the importance of the interpretative effort on the creation of meaning, the role would become more literal through electronic technology. More than to a technological ideal, though, these ambitions were tied to a shift in the concept of meaning itself, which started to be understood as "fluid, emergent, decentered, multiple, unstable", not only because of the input from the interpreter but also because of the nature of the signifier itself (Ryan, 2001, p.5).

Subjectivity itself started to be questioned, as the "postmodern subject" is seen as the "site of multiple conflicting and unstable identities" (Ryan, 2001, p.7) rather than the ultimate truth to which each individual could be moored. With authors like Nietzsche, the manufactured character of subjectivity is exposed and the existence of the essential self is denied. Truth is seen as a narrative produced as such through "texted mechanisms" and "discursivization" (Žižek, 2008, p. 172) by this fictional central hub that is subjectivity. Through this fiction, we make sense of the world and its events, making the contingency and potential infinity of its "raw" state tangible. The subject also ascertains itself as an agent, whose actions may affect this finite reality, which means it has the power to know the world and to be a cause of what happens within it. The will to know is a will to power, to put oneself as predicate of meaningful action.

If interactivity comes as a realization of postmodern ambitions, video games, and their rhetorics, are strongly linked to this history of the self. On one side, there's the recognition of its fragmented and constructed character, which virtual worlds help to embrace and explore, on the other hand, there's a need to recover its unity and affirm the power of the subject over itself and the world around it. Both the goal-paced, victory-oriented ludic system and the textuality may be used to reinforce this illusion. At the same time, this understanding of the subject, the world, and Truth itself, highlights the power of all media on their construction.

## The Empowerment Model

### *Video Games As A Medium For Compensatory Self-Empowerment*

Video games not only create a playing subject within its virtual world but will be part of the processes that allow each us to navigate through the real world. Hence, the construction of the importance and central role of the self, reaction to the postmodern attack, is found on the rhetoric of self, which conceives games as "fantasy fulfillment machines" (Sutton-Smith, 2001, p. 11).

With this focus, play became the individual activity of those who play and, by doing it voluntarily and through it, exercise their freedom. This freedom is often applied to this individual's self realization, which means play becomes an escapist fantasy, serving potential egotistical needs and, consequently, answering no longer a need for reflection but instead a need to dominate and prove oneself (Turkle, 2005 p.66).

These needs closely resemble those lauded by the rhetorics of power, even though in their pre modern manifestations, they were tied to the affirmation of "collectively held community values" rather than to the glorification of individual accomplishments. Still, its "hero-making" ability and ties to agonistic expression of play (Sutton-Smith 2001, p.10;74), when conflated with the self-oriented take on success as self realization often through the defeat and at the expense of others, will allow this rhetoric to keep its relevance and central grasp of games' imaginary potential.

The unyielding of the rhetoric of play as power reflects the hegemonies that frame, run, and are reproduced through this experience, revealing its position regarding the status quo that starts to be questioned outside of its sphere. Thus, when employed through an hedonistic medium, play becomes closely interwoven with the freudian concept of compensatory power. Through this lens, games are understood as serving as an escape from the chaos of reality, enabling the balance of emotional and sensorial stimuli, and an illusion of having control over events. So, they end up  being designed as this "panacea for social disempowerment" of a ruling class (Ryan, 2001 p.9),

### Participation: Video Games As Masculinized Power Fantasies

Under the framing of the rhetorics of power, play, its discursivization and manifestations will serve as a way of displaying "the fantasies, anxieties and urges of those who are actually powerful about what do play culture should mean and how its members should behave" (Sutton-Smith, 2001 p.85). So, the inflation of the self as a reaction to its instability and the rapidly changing dynamics of social structures, which became mutable in the post-industrial era, and were understood as a threat to traditional values and institutions, clarify the connection between the two rhetorics and the resulting masculinized medium culture.

There are several reasons for the establishment of video games as a "boy's space". From one side of the medium genealogical tree there's technology, which, as offspring of scientific development and industrial machinery, has been for long a male-dominated field and often "function [in Western societies] as a medium for the reinforcement of the dominant status of masculinity, perpetuating patriarchal gender relationships" (Newman & Vanderhoef, 2014). Another branch is fantasy fiction (from Tolkien novels to tabletop or pen-and-paper games), and the geek culture surrounding it. This culture has been known to simultaneously shun away and idolize women, whose existence outside the constructed ideal is denied. Women supposed lack of interest may itself be justified by how they're treated when they adopt a more active role in the gaming communities, the lack of representation in-game and how these games are targeted.There's also, from a very young age, a social acculturation (by family, peers, media, industry) to gendered games, which reinforce women's traditional roles (Rosa, 2000, p. 166).

At the same time, players are often stereotyped by those outside the gaming culture as "immature, lazy and boyish" (Newman & Vanderhoef, 2014). Calling back Butler's concept of gender as performative, they, therefore, use the tools within their power to ascertain their worth and regain control, creating through them what was deemed as a place their own where to perform and reaffirm this masculinity. Therefore, in-game representations and discourses by the participants push forward an "idealized version of hegemonic masculinity". White, heterossexual, young adult, able-bodied males figure undisputed as the most represented demographic, the one most likely to be depicted favorably and, overwhelmingly, to take on the role of protagonists (William et. al., 2009).

## Representation: Masculinity, Warmongering And Heteronormativity

Besides being underrepresented, female characters' graphical representation and narrative development are often oriented towards pleasing the target audience ideals, rather than ensure a fair representation. They are sexual objects to be looked at, pursued, or even used and collected, and objects of desire to be saved and to get praise from (Salen & Zimmerman, 2004. p. 526). They are unwelcome as beings with their own prerogative and agency. So, outside the virtual world, women's role is to watch men play and within it is to be played with.

Besides female players, other expressions of femininity or deviant from the hypermasculine standard are also subject to the same (mis)treatment. This ideal of masculinity is often synonym with a male-centered heteronormativity. As such, fair queer representation is even lower than that of women (Shaw & Friesem, 2016). Apart from very rarely being given a voice and almost never as a central of playable character, when queer characters do appear they're heavily misrepresented: used as plot devices and framed as a necessary or humorous deviation rather than normalized, legitimate forms of sexual expression, gender identity or expression; used as a titillation of the male gaze; or associated with villainous characters.

As "a militarized masculinity defines much of video games' culture, emphasizing violence and conquest" (Newman & Vanderhoef, 2014), even towards other male players or characters, this centering of the agency around each, so that every targeted player feels as though theirs is a central role in that world's events, leads to an utilitarian mindset, detractor of a deeper emotional experience. In cooperative settings, the player will still keep score, thrive to show the other player's they're better than them, has better items, etc. following the tradition of the arcades, where the best players could register their names on the machine for all to see.

This "militarization" also takes on a literal meaning. Even though technophobic discourses often focus on gratuitous violence and their graphical representations (e.g. *Doom*), often its representation on games, when perpetrated by the player, is in a legitimized form, depicting them, for example as figures of authority, often militarized, as opposed to the criminal "bad guys" and their illegitimate acts of violence.

This is not only supported by their themes and narrativity but part of some fundamental gameplay design conventions, which define and reflect sets of expectations about the experience they're supposed to offer, whether in their formal, ludic or narrative structures. On the side of the structure, there's the ludic empowerment allowed by the interactive character of new tech, on the side of the narrative, the borrowing of tropes of similarly action-packed genres, that awake the heroic morale.

However, despite usually working in favour of their reproduction or reinforcement, each game may position itself differently in relation to this "horizon of expectations". They may as well subvert and question them, thus, enacting changes, however how small, on these expectations and those who hold them.

## The Disempowerment Model

### Focus Group: The Effects And Meanings Of Disempowerment in Video Games

To discuss the current and potential rhetorics, their effects on the player emotional and intellectual experience of the game, as well as their long term impact outside their boundaries, and what difference the concept of disempowerment could introduce in their discussion and media cycles, two focus groups were formed, gathering a total of 10 people: C, 24 year old, assistant professor, male; J, 20, student, female; M, 20, artist, male; P, student, male; PT, 31, writer, male, R, 22, student, male; RM, 22, student, female; RL, 22, student, male; T, 22, store clerk, male; TK, 22, customer service representative, female. Selecting the participants by proxy, with the main requisite being having some familiarity with the games discussed, the non-structured interviews took place in 2015, on August 24th and September 21st (Filipe, 2016). Their opinions will be intercalated with the following analysis.

### The Masochistic Ludic Fantasy: Disempowerment Through Action Atrophy

One of the core gameplay conventions is the maintenance of a steady balance between the skills' development and the difficulty of the presented challenges, the flow (Juul, 2009; Calleja, 2011 pp.57-58). To keep the player engaged in the ludic structure, the game must be challenging all the way through, but not frustrating, that's why an increase in difficulty is often accompanied by the backup of saving points. At the same time, progress and achievements must be properly recognized

and rewarded, especially after the sporadic confrontation with a "stronger, bigger, smarter and harder monster to kill", a boss, which intersects the killing of the weaker enemies (mobs) and acts as a rite of passage to another level, either symbolically or not. This flow keeps the game fun, and the player invested in their evolution in order to beat it, which is what is required of its emotional experience when only taking the player's expectations into account as the sole reason for play to take place. However, some games, as is the clear case of the horror genre, also seem to prove otherwise.

This was also noted by the participants of the focus groups, highlighting the indie game *Amnesia: Dark Descent* and its sanity mechanics. As a lesson of action atrophy, in this game the players (trapped in a sort of house of horrors) cannot defend themselves from the creatures that wander around the hallways. Instead, they must run and hide in the shadows, but the sanity mechanics (narratively integrated as nyctophobia) makes the player-character sanity drop if they stay in the dark for too long. Though this doesn't directly lead to a Game Over, it makes movement harder as one loses control of it when the protagonist faints, the screen blurs and flashes and decoy enemies (hallucinations) pop up, forcing the player-character to hide again, unsure of what's ludically real and not. Though in retrospective, participants recognized the scripted character of the experience, they recounted the intense anxiety and powerlessness they felt while living through it (Rouse III, 2009 p.20).

As this example shows, the disempowerment in horror games is still centred around their "peak" visceral experiences, as is its masochism tied to the challenge of beating the game, whose thrill should never be overwhelmed by an impossibility of being victorious. Some authors even describe it as hard fun, a "masochistic pleasure, derived from negative emotions and the appreciation of that which inspire feelings of abjection, repulsiveness or shock"(Lazzaro *apud* Järvinen, 2008, pp.184-185) Even so, the techniques they employ, their disregard for the steady flow and for the glorification of the player-character, promote the physiological engagement of the player, calling to the game their organic stability, thus, disturbing the security of the cyborgian ensemble.

This becomes clear when observed in other genres. In the adventure/puzzle-game *Shadow of the Colossus*, besides the lack of information about the mission and

how to succeed, the player is faced with an empty world, rather than navigating through it by slaying mobs. The emotions conveyed by the deserted and immense landscape are also translated by the gameplay of the battles against the 16 colossi - goliathesque creatures who wander the "Forbidden Land".

To R, RL, C, and J, the most relevant aspect about this game is precisely the emotional experience it provides, which they traced back to some key features. For one, the battles are not glorified, depicting with audio and graphic detail the pain of the slain enemy and preceding the confrontation with an introduction which underlines their harmlessness. Whereas "usually, you're not supposed to feel bad for the antagonists" (J), this makes defeating them "not particularly pleasant" (R), as it asks the player to question themselves and their actions". This emotional design, they agreed, added a new layer of meaning to the game, as it introduced an element of empathy, which disturbed the player focus on "their own success, no matter the cost"(J). The subversion of the central hero's role extended to his representation, as "his body", translating graphically "the effects of narrative"(J), gets "more and more tainted as you go forth within the game"(R). Every element is designed to convey an increasing feeling of dread with each Colossus slain. In the end, it is revealed that they were built as organic prisons for a demon, whose voice have been instructing the player all along and, by defeating them, it was released, a resolution which shows and intricate relation between the ludic and narrative layers and the emotional landscape both, in articulation, had created.

### The Narrative Dystopia: Disempowerment Through Decentered Agency

So, for a strong interactive context to emerge it's not only about the player being able to act, it's about meaningful action. This means that the player will not only be physically engaged by the machinery of the game's mechanics but that the game experience will take place in a seemingly organic world to which they'll be transported. Without this presence within the world presented, the actions and choices made will be those of an outsider agent externally acting upon a virtual world and its artificial objects. The immersive potential of a video game is, then, tied to its ability to fuel the player "being in the world", a "textual world (…) populated by individuated objects" (Ryan, 2001 pp.14-15). In other words, the textual work is paramount to the creation of an organic virtual world, whose inhabitants are believable enough to become focal points of empathy and are not overwhelmed by

the rules (Turkle, 2005, p.81). As shown with the previous example, the meaning of the game and victory was subverted by creating empathetic enemies through narrativity (visual, not textual).

At an ontological level, the opinion of the participants about the importance of narrative was far from unanimous. But though some (RL, T and C) defended the ability to act as the defining characteristic of the medium, most (except for T) agreed that a consistent narrative, interlaced with the mechanical structure which supports it, is decisive in spurring a deeper connection between the player and the game. To J the dichotomy made no sense, because these are not polar opposites. Rather, "the way we process the narrative" and changes prompted by this processing are part of the interactive context", not detrimental to it. The creation of this empathetic other was also recognized as one of the core aspects for a subversion of the empowerment model and its utilitarianism. So, for example, if a character is lost, it won't be a lost tool, but an equal individual with its own agency, whose existence extended outside the player's sphere.

### *Narrative Structure And Morality Systems*

Narrativity will be both an important part of the strength of the model of empowerment and a key feature for its subversion. Furthermore, there are also narrative conventions that must be subverted in order to truly question the hegemonic model. Another key aspect of the empowerment model criticized by players was the frequent moral dichotomy, lack of depth and futility, both in linear and non-linear stories, even when presented with supposed dilemmas.

Interwoven with the narrative, moral dilemmas are often introduced as plot points that allow a non-linear narrative development, through "a choice between a limited number of charted alternatives" (Ryan, 2001 p.6). Even so, the player will feel as though they're part of the production of the text and, as such, they will abide for whatever the resulting meaning, even though it is still framed by what the designer defined as possible. As such, the illusion of participation will often harness the power of interpretation, as much as there is the danger of the erasure of critical distance by immersion.

Despite the possibilities predefined character, the player can still choose, but choice is not entirely free, but rather what Žižek (2008, p.186) described as a

"choix forcé", wherein the subject has to power to choose but on the condition that they choose the right thing. Often, there's a right and a wrong choice, respectively rewarded and penalized ludically, whereas the absence of choice leads to a Game Over or to the system making an automatic choice for the player. This, R elaborated, leads to a certain ludification of the act of choosing, when all moral alignments, respective choices and outcomes are clear and categorized, the player will most likely choose the path that is more rewarding.

More than more options to choose from, they must offer the player different ways of choosing and of how that choice is embedded in their experience of the game. It may be done by acknowledging "bad choices" and their consequences, as is done in the indie game *Undertale*, where by playing the game anywhere between killing all "enemies" (Genocide Route) or none (Pacifist Route) the player will not only unlock different endings and interactions, but also change the way the game and its elements react to them in posterior runs (e.g. if the players go back to a previous saving point because they regret a decision, they will be faced with dialogues telling them the previous action was not forgotten and that "the game" still knows what they've done).It may also be done by creating contexts where there really isn't a right choice nor an evident dichotomy and respective predictable outcome.

The concept of ideology allows us to think not so much on the contents of the choices or actions the game presents to the player but how they're presented, constructed, how the act of choosing if framed. It's not only the rhetorics of each possibility presented to the player, but also the ideology present in how the choice is structured, at its minimum promoting a disengaged and morally detached participation centered on what it's best for ludic progress.

### Harnessing Ideological Power: Disempowerment as Meaningful Agency

Understood as meaningful action, "with agency there's also a personal and moral responsibility" (Kallay, 2013 p. 23). With this and the previously discussed layers in mind it becomes clear that depicting violence, racial tensions, sexuality or female nudity is not necessarily promoting violent behavior, racism or sexism, tokens of the masculinized empowerment model. It entirely depends on how meaning is constructed and meaningful agency, encompassing both action and its atrophy, responsibility and powerlessness of all interacting elements, is created, thus enabling a humane inclusion of problematic themes.

In *Papers, Please*, for example, players assume the role of a border patrol agent, in charge of approving or denying the entrance of applicants. In order to beat the game, they must only let in those who fit the listed requirements and failing to do so will result in a penalty on the players' score at the end of the shift. This would be quite a straightforward gameplay, if it weren't for the effort the game puts in humanizing those applicants, providing them with a backstory and personality traits, designed to promote empathy and persuade players to make the ludically "wrong" but morally "good" choice. Given the flexible character of the rules and the game being intent on making the players break them, the act of choosing becomes harder and the result of a careful reflexion rather than an automatic selection.

Another apparently simple indie game, *This War of Mine* calls to play most layers and techniques explored so far. The ludic goal of this strategy game is for players to ensure the survival of a group of people caught within a military conflict.

Narratively, it mixes linear (unchangeable events) and subtly nonlinear ramifications dependent on player choices. The outcome of each choice is not clear and there's no direct penalty or reward for each, so the players are "free" to choose if they act, for example, with morals (e.g.helping beggars) or survival (e.g. killing them to get resources for the core group of characters) in mind, but that freedom and the responsibility for whatever comes as consequence won't be empowering.

One of the ways each choice affects how the game develops is by affecting the characters themselves. Each has an invisible mental health meter, but without a dedicated interface, the only way for players to get a grasp of their state is "getting to know them", talking to them and paying attention to their stories and personality nuances (e.g. how sensitive are they and which acts they're more sensitive to), humanizing them and avoiding a prioritization of system's rules. As much as physical dangers (e.g. raids, bombings) or deprivations (e.g. hunger), the emotional stress (e.g the risk of depression) of the survivors is also a real threat, existing as a gameplay mechanic interwoven seamlessly with the game's narrativity and requiring a constant empathetic approach on the part of the player.

With these techniques, *This War of Mine* purposely breaks the flow. Most of the times it is mentioned as a ruthless and frustrating game to play, but here the breaking of games' conventions doesn't result of broken mechanics. Instead, it serves a clearly defined ideological purpose. Its strongest impact comes of a total

subversion of gaming, it forces the player to stop, to "quit" but rather than be consumed by a blind rage towards the game or going back to try again immediately after, it opens the way for a critical analysis of the events that ensued. When trying to identify where it went wrong, the player will face once again the pointlessness of all the losses, which, due to the narrative layer and mechanics designed to create empathy will be felt as broken bonds. This realization is the closing argument of *This War of Mine*, successfully engaging the player not in the graphically realistic representation of warfare, but in a emotional emulation of getting caught amidst a senseless conflict as an uninterested party, a powerless civilian. The futility of the game is the futility of war.

In spite of totally ignoring the horizon of expectations, the game had a very positive reception, both by critics and players, which proves that defying conventions and exploring the medium potential doesn't necessarily shun players away. If the setting is compelling enough and the layers sensitively developed they might engage and transform them and that same horizon both.

## Conclusion: Subversion As Counter-Ideology

As we've seen with the mentioned games, and the participants of the focus group stressed, indie studios were already able to create great examples of video games' potential. Their quantity and subsequent diversity may be one of the reasons for it, but their significant freedom from big producers' demands is also key to understanding how they're breaking the mold.  As R explained:

In AAA games "even when sensitive themes are included, it's still the industry talking, not the voices of those in need (...) [and] they are conditioned by the free market, they have to work within this set of expectations (...) Above all, it is a commodity, modelled by these economic dynamics." In conjunction with those of participatory culture, this means that "the most vocal players will be seen as the most legitimate consumers, with the power to demand that this product fits their will". Meeting this demand, the industry will reinforce these predispositions and they hyperreal character, limiting both the spectrum of possible experiences and their transformative power.

Intending to break this cycle, disempowerment must not be interpreted as a refusal of free will nor a denial of an accountable acting subject. Contrarily, it is

recognizing its place within a humanized setting, among other agents, whom it may impact but also be impacted by, it is recognizing that some actions and choices may have undesirable outcomes that are not reversed through skill or repetition. It is also denying utilitarianism and confronting the player with the underlying meanings of their actions, designing this accountability as something that questions the player and its role, inciting critical self-analysis, and not just as a ludic attribution of a successful action.

Through it, it's possible to both recognize video games' power and criticize it, making use of their role as a tool for political action, to promote critical thinking and put the status quo in check. As such, although the focus of this essay was on in-game mechanics, representations and their rhetorical significance, as highlighted, the proposal of disempowerment as an alternative ideological model strongly overflows the barriers of each game and even those of the spheres of experience which surround their production and consumption. The true power of disempowerment is making games relevant in these broader dynamics, offering a revolutionary, rather than reactionary, contribution to the development of the culture they're inserted in, exploring in full their imaginary potential as a stage to perform possibilities and a platform to enact change. Therefore, the proposed subversive task is meant to, cyclically, enhance video games' power as a medium of experiences and the the medium influence as a cultural object.

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# Biofeedback Game Design

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This project aims to explore the psychological effect of the player during gaming and how reciprocally game designers can manipulate the sensations of the player through biofeedback information (physiological sensors) and implementation of certain game mechanics.

In an initial phase, the objective of the project is to study the physical and psychological response of the participants to different visual and sound stimuli using the simulation of a digital space modeled in 3D, with verisimilar textures of real environments and that can be interacted in VR.

As a case study, we present an immersive simulation game (VR) where the game mechanics change, according to the various signals received from the participant and the results of a large focus group of university Ba and Ma students.

We will use BiosignalsPlux devices, the Unity graphics engine, Oculus VR Kit and Leap Motion tools to validate the study and the future work for an game that could be studied in the field of games and psychology.

**Keywords:** Game; Simulation; Psychology; VR.

# Gamifying the Story or Storifying the Game? - Chou's (2016) Octalysis Framework in English Learning at Primary Schools

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### ABSTRACT

The project "Kwesukasukela" targets on African oral tradition storytelling intermingled with the Ubuntu philosophy and traditional cultures (Varty, 2013) in primary school learning contexts, focusing on how Zulu stories can be integrated into English classroom practices as a means of transformation and of accommodating diversity to foster social cohesion and sustainable development (Battiste, 2005). By encompassing oral traditional storytelling with an experiential communicative approach (Fernández-Corbacho, 2014), both strategies and materials, which take into account the Gamification Octalysis Framework (Chou, 2016), have been created and experimented in a primary school in Oporto.

The aim of this presentation is to reflect upon Chou's (2016) Octalysis framework and how it can effectively be applied in teaching of English as a Foreign Language at primary school contexts. In fact, it served as a motivational framework towards the implementation of several gamification designs and practices within the English classroom walls, leading us to a greater understanding of how competitiveness fostered in gamified tasks can be favourable to Primary English learning.

Moreover, it is the authors' intention to tap into the core essence of classroom practice, focusing on pupils' motivation and involvement within these gamified tasks, which stimulated collaboration, communication, critical thinking and creativity, considered to be the basis for professional success in the 21st century (Duarte & Cruz 2017).

An ethnographic methodological approach was resorted to when observing these practices, which deal with South African cultural and linguistic varieties (Nomlomo & Zilungile, 2016), within a group of 4th year primary pupils learning English as a foreign language, in which project development and the expansion of creative and collaborative critical thinking skills were proposed.

The project's main results show that the gamification approach can aid in the progression of dialogue, can promote cultural awareness and can expedite pupil's cognitive and affective enthralment and engagement, fostering the development of 21st century skills (Cruz & Orange, 2016).

**Keywords**: Octalysis Framework; English Learning for Young Learners; Gamification; Storytelling; 21st Century Skills.

# Introduction

This paper targets on African oral traditional storytelling that incorporates and intermingles the Ubuntu philosophy with traditional cultures (Varty, 2013) in primary school learning contexts, as a means of transformation and of accommodating diversity to foster social cohesion and sustainable development (Battiste, 2005).

Apace with oral tradition stories, the amalgamation of the Ubuntu philosophy within storytelling involves the engaging of our relational selves where "the story of one cannot be told without unfolding the story of many" (Mucina, 2001, p. 1). Ubuntu is the reflection of this philosophy that serves as a vehicle to restore effectivity and productivity in schools as it proposes to teach collective solidarity values through the promotion of respect for norms and values. It endeavours in the commitment to work and fosters a sense of belonging, discipline, community involvement and to instill self-regulation.

It is understood that the anchors of the 21st Century Skills' learning domain are stimulated namely through collaboration and communication, creativity and innovation, critical thinking and problem solving (Cruz & Orange, 2016). These cinchers can serve as effective means when pupils are given building opportunities and allowances have been made for their thoughts and feelings. Moreover, reflection of the process and meaningful connections are catered for. We believe that pupils' successful learning is due to motivational and experiential learning which serves as a springboard towards their further development.

The encompassing of oral traditional storytelling, present in the literature of Mucina (2011) whereby defining Ubuntu's storytelling elements, in conjunction with the reflection of Chou's (2016) Octalysis framework, as well as the resorting to the integration of an experiential communicative approach (Fernández-Corbacho, 2014), are the main focus of this paper. The application of the contextual environment of Gamification integrated learning is also addressed, while taking into account certain gamified strategies and its elements according to Foncubierta & Rodríguez, (2015). These have been envisaged with the primal purpose of achieving educational volition which may result in significant and easily recalled experiences. Subsequently, showing that with teacher's acclamation, conveyances and guidance, they may serve to encourage dialogue, develop cultural awareness and expedite pupil's cognitive and affective engagement.

## 21st Century Skill Praxis

In the age of information, where pupils and learners are more impelled by curiosity, we are to discern the urgent need for them to be able to craft their own questions, to strategize upon inquiry and to harness their curiosity which is incited by their own learning (cf. Minigan, 2017). Added focus should therefore be given to the newfound perception of pupils' ability to think agilely and to use their curiosity in order to drive innovation (idem.)

In an increasingly recognized technological and media-suffused environment, the 21st Century learning skills, such as creativity, critical thinking, communication and collaboration are essential cores for the preparation for our pupils' future (P21, 2015). As the world evolves towards greater connectedness, studies have shown, within the Primary English language classroom, that its main concern is for pupils to communicate transversely through cultures, borders and perspectives and it is upon pupils to whom we entrust the responsibility of building a better global society (Duarte & Cruz, 2017).

We, therefore, need to concede that language education is crucial towards pupils' future success and language arts is regarded as one of the core subjects which pupils have to master, including "English" and other "World languages" (P21, 2015, p. 2). The P21's unified and collective vision for learning upholds that the basic languages skills are essential and indispensable for mastery, knowledge and expertise development, in which it acknowledges that pupils are compelled to think out of the box while focusing on human value goals (Ohler, 2013). It is the encouraging of pupils to become critical and creactical thinkers (idem), as well as doers, which involves them in the combining of creative and reflective thought in the production of original work. Furthermore, pupils are able to achieve au courant dexterities which might include finding solutions to future problems, collaborating with others and reaching a cross cultural consensus (Duarte & Cruz, 2017).

It is within language learning and acquisition that pupils are able to develop and enhance: a) communication skills; b) cultural awareness and perspicuity of cultural views, practices and products of the people and speakers of a target-language; c) establish connections, such as the accessing of the target-language within subject knowledge; and d) reflected comparisons between languages and cultures (cf. P21, 2015).

By acknowledging that language education is critical towards pupils' development we will, within this paper, focus on African oral tradition storytelling. Whereby apperception is given that the art of storytelling is the reciting of many intriguing and mesmerizing folktale, which has been the primal ritual of the African people. This intimate and ubiquitous art form of over 50,000 years old (Sheppard 2009) is coalesced with singing, drumming, percussion instruments, clapping, and dancing (Nomlomo & Zilungile, 2016). Subsequently, this offers a solid justification and reason for telling folktales, not only to the villager's children (idem) but also to project this into the classroom, in which oral tradition storytelling can serve as a lagniappe pedagogical tool.

Moreover, African oral tradition storytelling can also provide for as being a unique way for pupils to develop understanding, respect and appreciation for others, as well as foster positive attitudes towards people from different lands, races and religions (cf. Duarte & Cruz 2017). Subsequently, they are conductors in the enrichment of intercultural understanding and communication, by way of offering a common-ground basis for different cultures and contributing towards the broader perceptions of life experiences. African oral tradition storytelling can also contribute towards holistic approaches regarding language learning whereby a high premium on pupil's involvement is allocated and even more so, rich, authentic uses of a foreign language are offered.

African oral tradition storytelling, in accordance with Gbadegesin (1984), is a method of recording and expressing feelings, attitudes and responses of one's lived experiences and environment, upholding the primordial intention of mediating knowledge and information across generations, conveying information about culture and worldviews, transferring morals and heightening expectations (cf. Oliveira, 2017).

Adjacent to the cultural benefits of oral tradition storytelling, we have also further considered the African concept of "Ubuntu" within classroom practices. Understandingly, "Ubuntu" is the philosophical view that serves as a guide for our actions in order to maintain relational bonds (cf. Mucina, 2011, p. 1). It beholds the notion that "I am because we are", in which the relational interconnectedness of all elements and beings on earth is recognized (idem) and holistically we are considered as being one. Hence, it is this interplay of different knowledge that is one

of the many reasons as to why Indigenous knowledge needs to be taught within the learning environment because its ultimate goal is to affirm a collaborative dimension of knowledge, which can be addressed within the diversity of stories, events, shared experiences and ideas, by building blocks for human development (cf. Mucina, 2011).

By taking this all into account, it was our intention to further consider the ongoing benefits of indigenous storytelling and incorporate these within classroom practices. Pupils were furthermore offered different learning opportunities to use their imagination, to communicate effectively, to enhance their social literacy and build community in a different way (cf. Cruz, 2011). Complementary to this, we were further able to understand that oral tradition storytelling does not only serve as a rich and perennial reservoir through which young learners can acquire literacy skills, but they can also develop their cognitive, linguistic and social skills (Oliveira, 2017). Also, and in accordance with Nomlomo & Sosibo (2016), African oral tradition storytelling is a powerful tool for communicating people's knowledge and wisdom, and an important faculty for engaging critical regeneration and honest self-criticism, while offering a collective vision for and with the community.

Hereafter, this serves as a springboard that helps pupils in becoming active citizens in the world and furthermore reinforces Duarte & Cruz' (2017) findings that in the English Language classroom one of the teachers' primary concern is for pupils to communicate across cultures, borders and perspectives, which can be bolstered with traditional oral storytelling. These authors have also shown that unequivocally storytelling is a teaching approach which can invite pupils to think for themselves and create their own truths. This may include the convergence of multisensorial source information, where pupils can generate ideas, formulate newer interpretations, assess the process and change directions based on their judgments (idem), which can furthermore lead to the development of *creactical* thinking (cf. Ohler, 2013).

Consequently, we are enticed to believe that "Ubuntu" storytelling can be very neatly positioned within the P21's Framework for 21st Century learning skills. The 4Cs encountered within form the bedrock of "Ubuntu" storytelling, where collaboration can essentially be tied in with communication, critical thinking and creativity, hence, the core and essence of classroom practice. Pupils are not only

participating in the act of storytelling, they are also developing other world languages (P21, 2015) and accessing other cultures.

Bearing all this into account, we also place confidence in an experiential communicative approach enhanced by (hyper)sensory strategies (Cruz, 2011) in which teachers are able to immerse and engage pupils with resources and dexterities, which may help pupils to further develop their collaborative, communicative, creative and critical thinking skills, hence *creactical* skills (Ohler, 2013) from both within and beyond the classroom walls. Focus on this approach is underlined in the following chapter.

## From Gamification's Octalysis to Pro-Active Pupil's Development

Experiential learning is, according to the AEL (2008), a change inducing quest which holds at its core learning experiences. These are considered as being a series of relevant and authentic experiences in which pupils are able to connect them to real life. It is a philosophy and methodology, in which educators purposefully engage learners in direct experiences and reflections in order to increase knowledge, to develop skills and to clarify values (idem). It is the process where knowledge is created through the transformation of experience.

In an experiential learning classroom, pupil's needs, interests, communication and interaction are focal points. This approach assists in encouraging pupils when inquiring, exploring and developing their interests. It is also strongly characterized for its ability to develop pupil's creativity, flexibility and leadership skills further (Duarte & Cruz, 2017). The classroom teacher is no longer a teacher-as-expert, instead, is a facilitator, guide and helper (cf. Knutson, 2003).

Fernández-Corbarcho (2014) gives further prominence to this teaching approach by determining that: a) classroom activities need to engage pupils in collaborative strategies thereby making them responsible for their own learning; b) authentic use of language with meaningful and invigorating tasks should be contemplated; c) tasks should be challenging in order to expedite further interest and prepared according to pupil's different learning styles.

Even more so, multisensory activities offer a doorway towards an improvement of the learning process (cf. Shams & Seitz, 2008), where pupils are given the

opportunity of gaining something through experience because they are given the chance to commit something to memory (Arslan, 2010). These created multisensorial learning environments can also pave the way for educators and teachers who are implementing and using ICT tools in the classroom by recognizing Arslan's (2009) suggestion that, by including touch screens in education, where the child can easily slide objects back and forth on the screen, one can give pupils a full hands-on experience and a sense of empowerment and responsibility towards their learning (cf. Cruz, 2011, 2015).

Hereon, we would need to admit that the gamification pedagogy may help to sustain this purpose. According to Kapp (2012), gamification can be defined as using game-based mechanics, aesthetics, and game-thinking with the objective of engaging people, motivating action, promoting learning, and solving problems. Game elements and game mechanics are applied to non-game activities which help to make everyday tasks and activities more feasible (Duarte & Cruz, 2017).

Moreover, Foncubierta & Rodríguez (2015) refers that the use of gamification can be assumed as the technology which the teacher uses in the learning activity's design (either analog or digital), by introducing game elements (logos, time limit, punctuations, dice, etc.) and thinking (challenges, competition, making connections etc.) in order to enrich the learning experience, directly and/or modify pupils' behaviour in the classroom. This can be considered as Gamification's realm, where creation, experience production and the influencing of pupil's behaviour is the offering of a domain of feelings within a given content and, at the same time, the receiving of recognition for their achievement.

According to Chou (2016), gamification is the craft of deriving fun and engaging elements found in typical games and applying them to real-world or productive activities. This process is called Human-Focused Design (HFD) and its focus is the optimizing of feelings, motivations and engagement that HFD is at the basic foundation when designing for overall systems or when applying them in education (Oliveira, 2017), i.e., the transfer of game elements, beyond its traditional field, into the creation of a game with non-entertainment objectives, which integrates elements into existing non-entertainment platforms, such as the language classroom.

In education, focus cannot lie solely on developing a superficial level of a game, hence, the shell of the game experience (cf. Chou, 2016) is often embodied in the form of game mechanics commonly denominated as: *Points, Badges and Leaderboards* (PBLs). The PBL mechanics needs to be applied with the intention of engaging the pupil in order for activities to become meaningful and fun, whereas the PBL elements are there to push and pull pupil's behavioral Core Drives (idem).

According to Chou (2016), every successful game or task appeals to motivational Core Drives which motivates us towards a variety of decisions and activities. Chou (2016) theorized what differentiates one type of motivation to another, therefore laying ground for the gamification design framework known as *Octalysis* (see Figure 1). Reflection was made that everything, action or choice, is based on one or more of the 8 Core Drives within the Octalysis (Oliveira, 2017). Chou (2016)'s starting premise from within the Octalysis' Framework was to maximize the motivation for desired behavioural outcomes through the use of 8 Core Drives (*Meaning, Accomplishment, Empowerment, Ownership, Scarcity, Unpredictability, Avoidance*).
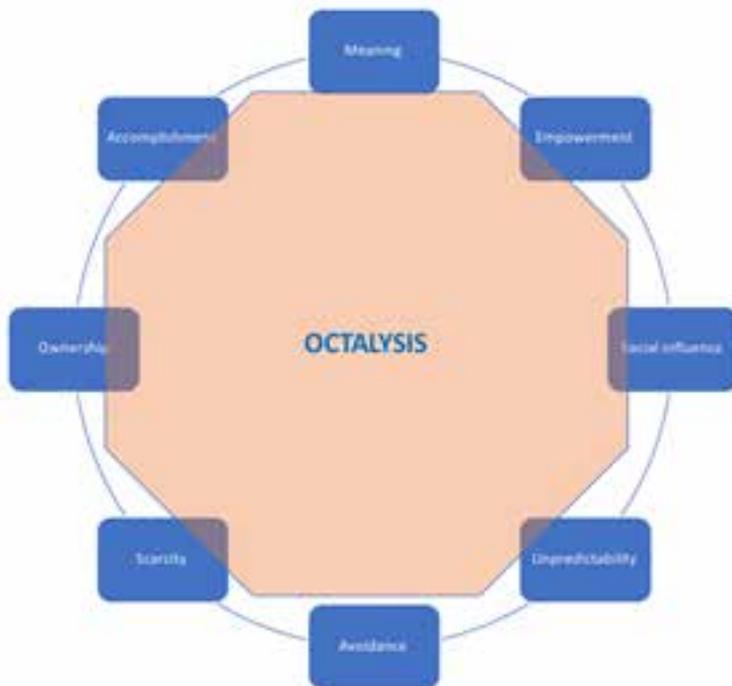


Figure 1. The Octalysis Framework (Chou, 2016)

The Octalysis Framework is a tool to help decipher all the motivational Core Drives and can be used in the classroom to understand how to engineer and design for motivation within a particular classroom setting, and to transform activities into meaningful, fulfilling and enriching experiences. If there are no Core Drives behind a *Desired Action*, even within classroom practices, there is no motivation and therefore no behavioural changes occur (cf. Chou, 2016).

Upon closer examination of these 8 Core Drives, the first Core Drive is known as *Core Drive 1: Epic Meaning & Calling*. It is the drive where people are motivated because they believe that they are engaged in something bigger than themselves and that they are doing something greater than themselves. It is also very powerful in the *Discovery and Onboarding Phases* of the pupil's journey (idem). These phases include novelty which can be introduced through storytelling. Therefore, by instilling Epic Meaning & Calling into, and at the start a lesson/unit with a narrative, pupils are given a valid contextualization and reason as to why they should actively participate and become engaged in the lesson.

The second Core Drive is known as *Core Drive 2: Development & Accomplishment* and is the internal drive for making progress, developing skills, achieving mastery and ultimately overcoming challenges (Chou, 2016). A challenging and meaningful task serves as a justification for a badge, trophy or award and it is within this Core Drive that most of the PBLs can be found (cf. idem). Pupils are driven by a sense of growth and a need for accomplishment of targeted goals. It is an enthusiasm generator and leads to a commitment towards learning new skills.

The third Core Drive is known as *Core Drive 3: Empowerment of Creativity & Feedback*, is expressed when pupils are engaged in a creative process where they repeatedly work towards hands on problem solving (Cruz & Orange, 2016). Teachers should be urged to create a classroom set up where pupils are given a goal, different didactic strategies are used, and a variety of multisensorial tools are offered.

The fourth Core Drive is known as *Core Drive 4: Ownership & Possession* and is when pupils are motivated because they feel that they own or control something, such as a process or a project. When ownership is felt, they innately want to increase, improve and even obtain more (cf. Chou, 2016). This Core Drive also provides emotional comfort and has an ability to instill a sense of well-being and belonging to a society and cultural environment (cf. Oliveira, 2017).

The fifth Core Drive is known as *Core Drive 5: Social Influence & Relatedness* and it incorporates all the social elements which motivate people, namely mentorship, social acceptance, social feedback, companionship and even competition and envy (cf. Chou, 2016; Oliveira, 2017). In education, it can serve as one of the strongest and long-lasting motivations for pupils to become connected and engaged. By implementing an interesting dynamic between *Core Drive 1: Epic Meaning & Calling and Core Drive 5: Social Influence & Relatedness*, one can help to develop group and team relationships as well as collaborative and leadership practices.

The sixth Core Drive is known as *Core Drive 6: Scarcity & Impatience*, which is the longing for something, simply because it is extremely rare, exclusive or immediately unattainable and because it is so difficult to obtain its perceived value increases immensely (Chou, 2016). This can be plugged into Csíkszentmihályi's Flow Theory (2008) which indicates that Flow is an optimal psychological state that people experience when engaged in an activity that is both appropriately challenging to one's skill level, often resulting in immersion and concentrated focus on a task. Therefore, the difficulty of the challenge must increase along with the skill set of the user (Chou, 2016), i.e., too much challenge leads to anxiety and too little challenge leads to boredom (cf. Oliveira, 2017).

The seventh Core Drive is *Core Drive 7: Unpredictability & Curiosity* and represents the main force behind our infatuation with experiences that are uncertain and involve chance (Chou, 2016). Unpredictability entails constant engagement as one does not know what will happen next, our brain starts to pay attention to the unexpected (cf. Oliveira, 2017). By introducing African Oral and Ubuntu Storytelling, for example, one can help to create excitement, anticipation, add suspense and curiosity.

The eighth Core Drive is known as *Core Drive 8: Loss & Avoidance* and it is the motivation to avoid something negative from happening (Chou, 2016). In the *virtual world*, it is the staying alive in order to advance to the next round, having died or contracted injury, players are faced with a setback and are forced to restart or lose something significant, such as coins, rewards, or playing lives. Within the classroom walls, it is through proactively involved experiences that pupils can avoid negative outcomes (Oliveira, 2017).

Subsequently, by having focused on the 8 Core Drives found in the Octalysis Framework, we have firmly understood that by applying gamification in education, the opportunities for experiential, self-paced and life-long learning expand exponentially (Duarte & Cruz 2017). Pupils and learners can feel engaged in enjoyable activities and tasks, and are therefore rewarded with knowledge and skills. In this process, any pedagogical tool which serves as a curiosity catalyst in a learner will increase potentially skills and concepts acquisition.

In the following chapter, we will present our project which is focused on Chou's Octalysis framework.

## The 'Kwesukasukela' Project: Its Design and Results Analysis

The following project was cultivated with the above mentioned aims within an action-research project. The practices illustrate classroom production and performance by focusing on a) an adaptation of a traditional Zulu folktale called "Where Stories Come From" which can help provide a context for meaningful learning; b) Web 2.0 applications for collaborative learning, namely by the use of a flipped classroom strategy, a digital platform questionnaire and a classroom quest; c) creative and (hyper)sensory tasks which helped to develop critical reflection.

The chosen methodological approach was qualitative, as implied classroom observation of behaviours and reactions. The proposed research questions were: a) can Ubuntu storytelling foster the development of 21st century skills; b) can the intermingling of gamified tasks with oral traditional storytelling aid in pupils' development?

These practices took place with a group of English primary learning pupils, consisting of 24 pupils from the Oporto, Portugal area. These pupils were attending the 4th grade where the English language is integrated into their obligatory curriculum. They had 3 blocks of 45-minute lessons per week. This unit was planned for 6 sessions.

The main focus and topics were "family", "animals", "homes" and "parts of the town". An adapted traditional Zulu folktale known as "Where Stories Come From" was used as the main resource. Gamified tasks based on a flipped classroom strategy and the digital platform, "Plickers", formed the basis for a comprehension

questionnaire. The integration of *mind maps* activated the problem-solving tasks. Collaborative and creative skills were induced by town planning activities. Pupils were hereafter taken on a collaborative classroom quest.

The study included a pre-questionnaire with the functional aim of understanding the project's learner types and assessing their preferable learning styles. Other data collection tools included the following list: a) field notes; b) projects/worksheets; d) audios/videos.

Results of the pre-questionnaire gave us the following representations: a) 15% of the pupils preferred working alone, whereas 85% preferred working with their peers; b) 90% have already played board games, whereas 10% have played "Kahoot!"; c) an equally balanced 50% enjoyed storytelling, while 50% preferred reading on their own;  d) 15% of the pupils favoured solving worksheets individually, whereas 85% preferred solving tasks with their body/computer.

In order to give primary focus on and offer a cultural awareness experience, in the first session, pupils were introduced to a flipped classroom strategy. They were divided into groups of three and given a website link including typical villages and housing in South Africa. By using their handheld devices, pupils needed to find three images of their assigned village. The findings of this collaborated project development task, culminated in a slideshow presentation of their chosen traditional homes and communal villages, which then served for discussion. Therefore, pupils were able to make comparisons and find similarities between South African and Portuguese homes.

According to Chou (2016), these practices and strategies can fall under the motivational Core Drive known as, *Core Drive 3: Empowerment of Creativity & Feedback.* The flipped classroom strategy helped to create onbounding creativity experiences (Chou, 2016) by offering pupils more autonomy and more control over their own creative processes (Oliveira, 2017).

In the second session, as a pre-story activity, preparation for storytelling was established by pupils being presented with different types of *realia*. These objects were samples of lexical items to be encountered in the story and helped pupils to familiarise themselves with the story's characters. The *realia* was accompanied by gestures and mime to stimulate the body senses and help to facilitate

communication, understanding, participation, as well as to make the vocabulary more memorable. Having acquired newly learned vocabulary and actively participated in kinaesthetic activities, the teacher interactively presented the adapted traditional Zulu folktale to pupils.

"Where Stories Come From" is an adaptation of a traditional Zulu folktale that originally infers a clear life lesson throughout the entire story, implying that nothing is achieved in life without hard work and effort. Mother Manzandaba, the main character of the story, finds her own stories to tell her children through the fruits of her effort.

An interactive whiteboard and the "Calameo" publishing platform were used for the story's presentation (http://pt.calameo.com/read/004825880067596b07575). In this way, pupils could listen to/read the story as a whole-class activity. In order to help ensure total physical response, they were asked to mime and gesture when they heard and identified the pre-taught vocabulary. The teacher asked convenient 'cliff-hanger' questions and deliberate concept check type questions, which is used to aid in prediction skills and to help contribute towards pupil's engagement (cf. Duarte & Cruz, 2017). According to Chou's (2016) octalysis, these practices are the motivators found within Core Drive 5: Social Influence & Relatedness, Core Drive 6: Scarcity & Impatience and *Core Drive 7: Unpredictability & Curiosity*.

In order to further assess pupil's understanding and comprehension a digital platform was used. A "Plickers" questionnaire was applied. This is a simple tool to help teachers collect real-time formative assessment data without the need of technological devices (Duarte & Cruz, 2017). This digital resource can catalyze curiosity from an inert learner, as it increases their potential skill and concept acquisition, thereby, making it an effective classroom tool (Figure 2).

By intertwining technology with oral traditional storytelling, we can encounter *Core Drive 2: Development & Accomplishment* and the Core Drive, *Core Drive 7: Unpredictability & Curiosity* (Oliveira, 2017).

The third session was the retelling of the story and the reactivation of vocabulary. Story retelling drills are a teacher's reassurance that pupils have properly understood the story and it also gives them the opportunity to review, revive and rehearse the story and storyline. Pupils were then introduced to a "story map" which

is a technique based on memory, creativity, comprehension and understanding (see Figure 3). When a pupil uses a mind map (the story map, for example), they are using their brain in the way it was designed to be used, and this aids in all learning and cognitive skills (Oliveira, 2017). Hence, pupils are actively solving problems while performing a critical reflective task.
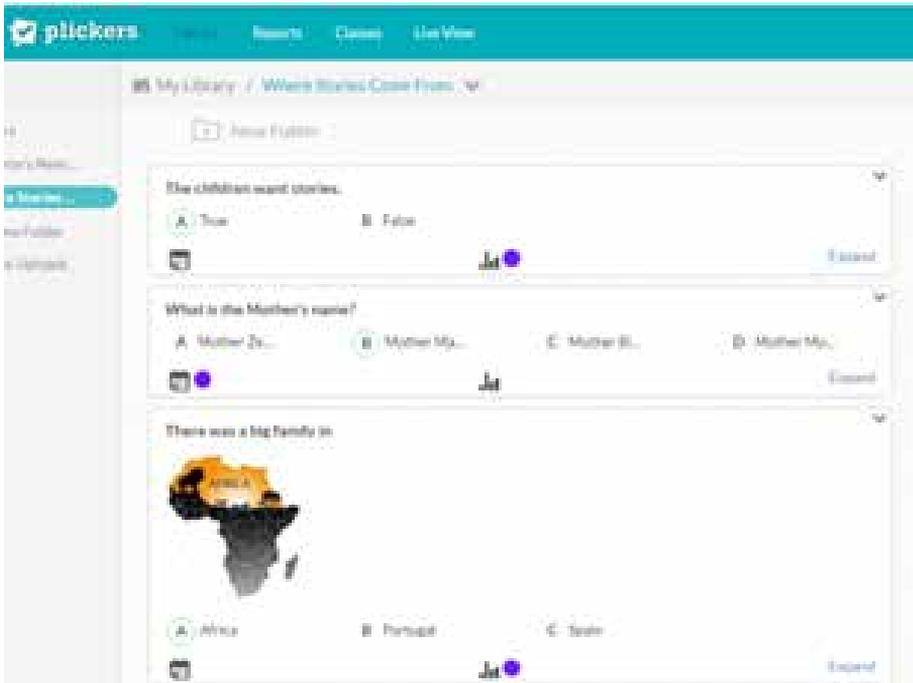


Figure 2. Plickers' Comprehension Exercises

Understanding that the important 21st century skills can be stimulated by using authentic material, which can urge pupils into inquiring and solving problem-situations, we also believe that within the Ubuntu storytelling scope, the use of story maps and problem-solving tasks can also be neatly tucked into the Octalysis' framework (Oliveira, 2017). We can encounter: Core Drive 1: Epic Meaning & Calling, *Core Drive 2: Development & Accomplishment* and Core Drive 3: Empowerment of Creativity & Feedback.

Figure 3. Story Map

In the fourth session, pupils were challenged to act as town planners. They would have to draw a town map and give it a name. The proposed activity was completed collaboratively, in small groups. In this way, provision for social-learning environments, allowed pupils to see and accept other points of view (Figure 4).



Figure 4. Example of a town plan created by pupils

Collaborative learning offers encouragement, creates diversity awareness, embraces shared knowledge, builds self-esteem and develops an overall positive attitude, which may serve as elements to actively involve pupils in the learning process. In accordance with Chou's (2016) Octalysis Framework and taking the town planning activity into consideration, we are able to ascertain at least six Core Drives: Core Drive 5: Social Influence & Relatedness, Core Drive 3: Empowerment of Creativity, *Core Drive 7: Unpredictability & Curiosity*, *Core Drive 2: Development & Accomplishment* and finally Core Drive 1: Epic Meaning & Calling (Oliveira, 2017).

The final session was set up for a Classroom Quest in order for pupils to consolidate knowledge and revise previously learnt items. This quest was prepared on the notion that games create engagement. Here game mechanics and game design helped to engage and motivate the pupils (Figure 5).



Figure 5. Classroom Quest and Collaborative tasks

Throughout the quest pupils worked in teams to complete different tasks. As they progressed they earned points which were awarded upon the task's completion, by winning competitions and other challenges. A leaderboard showed which pupils were ahead and it also served as a motivator (Figure 6).

Figure 6. Leaderboard

It is within this Classroom Quest that we are able to ascertain all of the eight motivational Core Drives in Chou's (2016) Octalysis Framework. We have Core Drive 5: Social Influence & Relatedness, *Core Drive 2: Development & Accomplishment*, Core Drive 3: Empowerment of Creativity, Core Drive 4: Ownership & Possession, *Core Drive 7: Unpredictability & Curiosity*, Core Drive 6: Scarcity & Impatience, Core Drive 8: Loss & Avoidance and ultimately Core Drive 1: Epic Meaning & Calling.

We finalized our sessions with a self-assessment questionnaire (Picture 7), in which pupils answered by: a) using the thumbs up/thumbs down strategy; b) giving examples of what they had learned; c) writing a short composition about the solution to the story's problem.

Figure 7. Self-Assessment Questionnaire

With this self-assessment questionnaire, we were able to verify our pupils' preferences in relation to the sessions (see Figure 8). The majority of our pupils favored the Classroom Quest. In fact, 41% had a greater predisposition towards these types of activities. The research and use of technological devices represented 20% of our pupil's preferences. Storytelling was followed closely behind with a margin of 18%. Following on to this, we have Creative Town Planning at a 15% predisposition and finally activities which involved Singing and Chanting occupied 6% of our pupils' preferences.
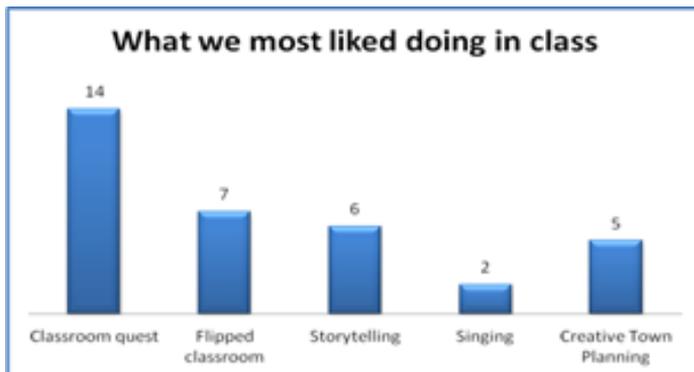


Figure 8. Self-assessment likes and dislikes

By contemplating on our pupils' initial questionnaire analysis, we were able to ascertain that our pupils had already encountered traditional games, yet there seemed to be very little exposure to technological devices or technology as a means and resource in the classroom. There is also an emergence in relation to analogic gamification that appears be as stimulating and motivating because it involves kinesthetically related problem solving and creativity tasks (Oliveira, 2017). We are able to affirm that this type of multisensory learning can cater for different pupil's learning needs, by providing them with multiple ways of learning and offering them a chance of succeeding, and therefore  it gives them the opportunity of gaining something through experience (cf. Duarte & Cruz, 2017; Cruz & Orange, 2016).

## Conclusions

It is within our understanding that educating in the 21st Century is the considering of an interconnected society, where communication continues to play a predominant role. With the intermingling of Ubuntu storytelling and gamified classroom tasks, we have been able to observe the following findings:  a) folklore and Ubuntu storytelling can be a functional and viable teaching approach; b) interactive and gamified storytelling allows for a better comprehension of the story and its elements; c) reflection throughout the whole process (pre-reading/reading/post-reading) plays an important role in the learning process; d) pupils prefer activities which involve collaboration; e) body activity, senses, the use of computers/tablets/ mobile phones are well accepted; f) gamified activities may work as a springboard for the development of pupils' critical thinking skills; and, last but not least, g) creativity can be stimulated by giving pupils options and samples.

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