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GAMES: THE IMPORTANCE OF BEING EARNEST

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ABSTRACT

Video games are driving technological and societal advancements that serve gamers and non-gamers alike from entertainment to edutainment. Video game software is one of the fastest growing industries in the worldwide economy. 75% of the most frequent gamers believe that playing video games provides mental stimulation or education. Recent cognitive theories confirm that gameplay affects the brain. So, inspired by Oscar Wilde's "boutade" on his comedy *The Importance of being Earnest*: «we should treat all the trivial things of life seriously...» this paper proposes to justify why all games should be deemed very serious.

INTRODUCTION

Together with computers and software, the video industry, its customers and its technology have greatly advanced in the past decades. From a solitary white dot on a black screen (*Tennis for Two*, W. W. Higinbotham, 1958; *Pong*, Atari, 1972), analogical or DOS based, games became multimedia colourful worlds, dramatic and interactive experiences, currently enhanced by cloud computing and mobile access.

Entertainment software is now one of the fastest growing industries in the worldwide economy. Video games are driving technological and societal advancements that serve gamers and non-gamers alike: from leisure time to education, to health, to business or politics. Individuals or groups of family and friends now send their cartoon avatars soaring through multi-dimensional virtual worlds.

Today games create new worlds where players can manipulate and change their environment through realistic animation and unique motion-sensor controllers; they can be played simultaneously on several continents by millions of contestants. Devices for the young are used by senior citizens, bring families together and train corporate professionals. Video games have been transformed from a diversion for the few into a mass medium, helping people live, learn, work and, of course, play.

As the user population increased, market forces have driven developers to make games more accessible to this new, miscellaneous audience. The greater than ever demand for

knockouts has translated into the explosive growth of the industry, which is one of the best performing sectors of any national economy – China (24,5%) being the largest video game market at the moment, with the U.S.A. (23,6%) and Japan (12,45%) as runners up (Statista 2016).

According to the Entertainment Software Association (ESA 2016) some 23.5 billion dollars was spent on video games in the USA alone, more than twice over since 2006 (\$ 7.3 billion). This supersedes PricewaterhouseCoopers' best expectations up to 2019: «Social/casual gaming revenue will exceed traditional gaming revenue in nine markets (...) creating a US\$ 22.52 billion market by 2019». They also estimated that «The single biggest shift in total video games revenue will come as countries such as India and South Africa see social/casual gaming revenue overtake traditional gaming revenue by 2019».

According to Newzoo the global online game market has reached \$ 99.6 billion in 2016 – mobile in itself generating 37% of the income – humbling the financial trend spotter's wildest visions for consumer spending on digital distribution and virtual items.

The EU is also aware of this boom. ERA has open calls for Gaming and Gamification in the H2020 programs.

Studies for the last 10 years confirm that the average gamers are 35 years old, have been playing for 13 years, and half of them are female (ESA 2016). Besides, gamers who are playing more video games than they did three years ago are spending less time on board games (43%), watching TV (37%) or going to the movies (37%). The average week time spend with MOGs (multiplayer online games) or MMOGs (massively multiplayer online game) is of about 6,5 hours per week. And one of the conclusions that supports the intended thesis – that all games are/ or have to be considered "serious" – comes also from the fact that 75% of the most frequent gamers believe that: «playing video games provides mental stimulation or education» (ESA 2016:6).

This paper aims to be a speculation over the main topics raised by the lack of a flawless terminology and ontologies regarding the issue of games and "serious" games. It addresses the problems that had to be faced, and solved, during the preparation of two practical "serious" games' projects – InStory (2006) and PlatoMundi (2009). Furthermore, it aims to stress the upsetting fact that non-serious games are being used for learning purposes taking no notice of the most recent cognitive theories about active learning processes. So,

inspired by Oscar Wilde's "boutade" on his comedy *The Importance of being Earnest*: «we should treat all the trivial things of life seriously...» it proposes to justify why all games should be deemed very serious.

VIDEO GAMES AND EDUCATION

With computer and video games corporations posting record sales – over cinema and TV – entertainment software companies are creating jobs and producing revenue for communities across the nations (Harding-Rolls 2007).

Ten years ago, BBC News, interviewing Mike Griffith, reported that video games are poised to «eclipse» all other forms of entertainment and, relating to the evolution of games themselves, enhanced the importance of narrative content, as «games are no longer pre-set trips through linear mazes, they are becoming a legitimate story-telling medium that rivals feature films». Still from the other side of the Channel, BAFTA (British Academy of Films and Television Arts) devised a new Award for Video games in 2012, with as many categories as cinema and TV.

The economic and research potential of making games, "serious" or otherwise, more appealing is impressive (Statista 2016) and education is one of the fields that is benefiting from humans' constant demand for more intelligent and interesting games.

Research development in academia

From the incipient, pioneer, academic research groups – like <*e-Adventure*> (U.T. Complutense, Madrid, 2003) making a platform to facilitate the integration of educational games and game-like simulations in educational processes; or in Portugal, the European project *e-vita* – proposing new approaches to problem-based and contextualised learning; knowledge-transfer mechanisms integrating Game Based Learning [GBL] turned into huge research networks, like The Center for Computer Games Research (with Espen Aarseth); The Video games Research Networking; or Kids On-line.

In 2014 MMO has become a Science – Attila Szantner and Bernard Revaz, the founders of Massively Multiplayer Online Science, hope to use video games to drive research.

The first Studies by ADL Initiative (U.S. Department of Defence) have proven a skill increase of 100% in trainees using games (Blunt 2007; 2013).

This success has generated an interest in the industry's educational and career opportunities greater than before, and led game design to enter the academia – i.e., as M.I.T. Game Lab.

New and very successful degree programs can be found everywhere: «Increased demand for game development courses at leading universities is offering a new career path for veteran game designers; as teachers» (Campbell 2014). Naturally, governments everywhere started investing hugely in the sector of Digital Economy Development.

Games as a teaching device

Educators are progressively recognising more the impact of entertainment software and utilising games as a teaching device. The use of computer and video games, from favourite leisure activity, became a critical and still-emerging educational resource, the next generation potential learning tool.

The most recent "serious" games are now being used to impart knowledge, develop all kind of skills in people of all ethnicities, genders and ages (Blunt 2013). From the classroom to national organizations, the use of games is becoming a key fixture to teach and train students, employees, and the public in general.

But the power of video games for learning has to be harnessed, and the items built in accordance with the science of learning. From start developers of educational games aimed to target the desired learning outcome, and then designing the game to achieve that target; they also had to consider third-party users of their applications who support, augment, and monitor player progress.

The challenges are significant for DGBL (Digital Game-Based Learning). Designers demanded pedagogical support, Faculties could do with assistance during development and carrying out of DGBL, and students needed supplementary encouragement throughout implementation, just as it happened in its beginnings with online learning. This also meant that institutions had to train help desk staff, provide documentation (FAQs, configurations), new procedures, and course materials.

Computer and video games have become successful global vehicles to teach important values, in the social, historical or political arenas. But a focused robust program of research and experimentation is essential to enhance development of DGBL by stimulating transfer of the art and technologies of video games to education and learning systems.

Games and "serious" games – (un)definitions –taxonomy - ontology

The first Wikipedia entries defined "serious games" as: «a term used to refer to a software or hardware application developed with game technology and game design principles, for a primary purpose other than pure entertainment.

The "Serious" adjective is generally appended to refer to products used by industries like defense, education, scientific exploration, healthcare, emergency management, city planning, engineering, religion and politics».

This characterization and posterior ones entail several flaws – starting with the concept of «game».

Designers themselves do not agree about a pure exact meaning and define it by negatives. It is not a puzzle, because puzzles are static and games interactive; it is not a toy, because toys are interactive, but a game has goals; it is not a story,

because stories are linear and games are not; it is not art, because the arts play to a passive audience and games require an active participation.

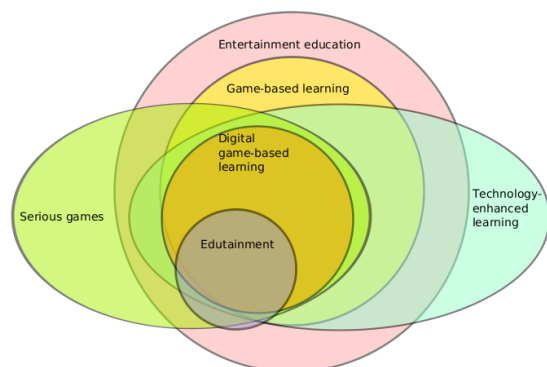


Figure 1: Identification of “serious” games, D. K. Schneider

Something similar occurs within programming, as it covers several areas: graphics, scripting, sound, music and voice; networking; use of controls; AI (Artificial Intelligence).

Also, there are no clear rules – a gold standard – to tell a good game from a bad one. The cataloguing is empirical, according to genres, and results from satisfaction with playability, the immersion or pleasure provided – all three idiosyncratic. Besides, many games blur the taxonomic lines where they are included, blending strategy with action and role playing, for instance. It is critical, therefore, to understand not just how games work, but how the different types of games work, and how game nomenclatures can be aligned with learning nomenclatures.

Stéphane Bura, co-founder of Storybricks and author of the MMORPG *EverQuest* series (1999-2016) summarizes the problem: «There are no universally accepted truths, only opinions about what makes a great game, whether or not video games are an art form or whether there is an effective method to teach video game design. We lack ways to compare games in an objective manner, ways to describe them in a shared language. Without proper description, there can be no true understanding. Success in video games still hinges on applying traditional techniques copying, marketing, luck, or genius. And even if success is achieved, there's no guarantee that we can know why it happened. Arts and sciences have rules and laws, not just techniques. But what are the rules of video game design? Where is our redox law? Our perspective rule? Our theory of relativity?» (Bura 2008).

From the researchers perspective (Boile, Hainey et. al. 2015) the literature review systematizes but does not advance much.

All this is not surprising because, in spite of its huge development in the most recent years, computer and its related sciences are in their infancy. Classifications are yet hybrid of previous practices – programming, graphic art, cinema, and storytelling – now all fused in the new tentative idea of “transmedia”. Ontologies, systematizations are in the making. And it is the discovery of this New-found-land that attracts most practitioners and researchers.

DGBLearning and (mis)use of games

Educational games range from online versions of chess or specially designed board games to highly stylized virtual environments in which users create personas and explore new worlds. By playing “serious” games, students can learn about the food chain, memorize the periodic table, or perfect their multiplication skills. They can solve a complex math problem, test scientific theories, or gain understanding of an historical event or culture.

Being still young, DGBL is not an exception in ambiguity in what regards games rules and taxonomies. For the moment, there are three sorts of games in use: a) Commercial educational video games, known as edutainment, that teach specific basic skills (*Math Blaster*, *Pajama Sam* and *Dr. Brain* recently re-casted from an old scientist into a young genius); b) COTS (Commercial off-the-shelf) entertainment titles used randomly by schools for education (*Age of Empires* or Syd Meyer’s *Civilization* for History; *SimCity* for civil engineering; *CSI* for forensics, not to refer all the possibilities offered by *Second Life*) – this group has to include Microsoft’s latest (2016) attempt to transform *Minecraft* into an educational game, for free, probably to compete with LEGO’s very successful and expensive *MINDSTORMS* and *Education EV3* – which could also be included in the next category; c) Academic games used for training and education (*Gamelearn*), some without the graphic glamour of the above (The *EIS Simulation*).

A review of DGBL literature shows that, in general, educators have adopted three approaches for integrating games into the learning process: have students build games from scratch; have educators and/or developers build educational games from scratch to teach students; and integrate COTS games into the classroom. This latter is the riskiest attitude, either for pedagogical, psychological or intellectual reasons. First of all, because COTS are made for the big market and do not take any particular teaching or learning theories into consideration; secondly, they may worsen the difficulty some students already have in distinguishing games for play, from games for work; and also, among other numerous motives, because the information, historical or other, given by the great majority – either in text or in context – is not acceptable by scientific standards.

For instance, *Colonization* (Syd Meyers) has been criticized, among other things, because it ignores slavery and, to win, the player has to exterminate all native tribes. In *CSI*, the game as in the TV series, the lab processes (and corpses) are glamorized; in *Age of Empires* the bulk of historical information was gathered in children’s books and regarding geographical data – the «hallmark» of the series – the user, in «Random map» mode, plays on a map based «very loosely» on a real world area. *Age of Mythology* is a spin-off of the previous, in a much reduced mythological space, with only three main gods per civilization.

The developers do not accept to be criticized for these content blemishes as they present them as fantasy games. But some of these games have been a-critically used in the classroom for learning purposes.

ALL GAMES AFFECT THE BRAIN

Scattered among the defenders and opponents of the use of video games as learning tools is the idea that games affect the brain – positively and therapeutically for some, developing aggressivity and violence to others. In both cases video games, or all games implying any kind of action/activity, modify the cognitive functions. All – demanding responses and receiving feedback – involve some form of active learning, sometimes reinforced by the repetition of tasks and rewarding in points or badges. Since old Rhetoric times that *repetitio est mater studiorum* – repetition is the mother of study/learning – and *repetitio est mater memoriae* – repetition is the mother of memory.

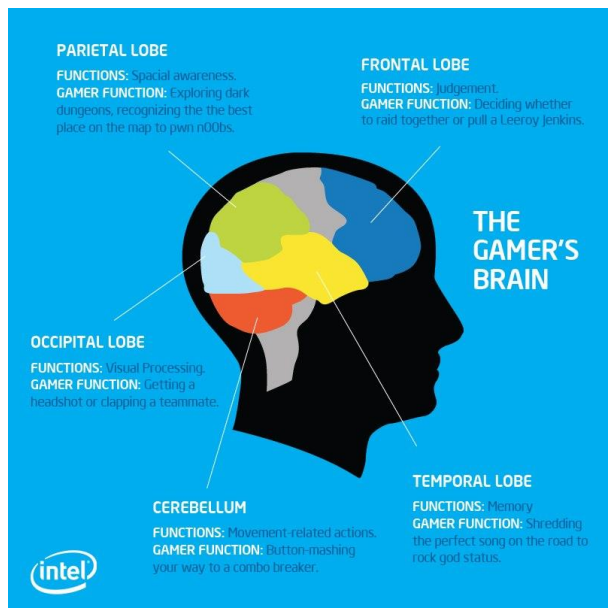


Figure 2: How a Gamer's brain is supposed to work

Studies confirm the development (at different levels) of visual acuity, temporal processing, attention skills, short term or working memory, fluid intelligence and multitasking – some lasting for up to six months.

Where does learning occur in (serious) games

Learning in (serious) games (Blunt 2013) occurs at four levels: Game mechanics (replica of the real world); Goal / mission (fighting a particular type of problem plus the strategies to win); Context (supports the learning objectives in time to solve the several levels of the problem); Challenge (tools and activities to overcome a particular objective). These are the steps that constitute any game, and are embellished and overstressed in the commercial ones.

From the industry of e-learning programs the three top cognitive science-based recommendations for success are: a) engage active recall (use of short term memory) to promote deeper learning; b) foster metacognition – “thinking about one's thinking” – as a kind of self-reflection to help the concepts become more memorable (use of long term memory); c) implement spaced repetition at customized intervals in accordance with learner confidence levels and memory spans (long term memory).

One of the discoveries – attributed only to “serious” games – is that: «playing some types of video games produces significant and long-lasting enhancements in a variety of cognitive functions.

The scope and scale of these beneficial effects has prompted many research groups to test efficacy of video games in real-world contexts such as in rehabilitative settings or in job related training (Green, Bavelier 2015). This study, centred on action video games and cross sectional experiments, is an example of the theories that only “serious” games provoke changes in perceptual, attentional and cognitive skills. And let's slip a very interesting issue: «recent work has suggested an alternative viewpoint wherein action video game experience, rather than producing immediate benefits on new tasks, conveys upon users the ability to more quickly and effectively learn to perform new tasks. In other words, action video game players have ‘learned to learn.’» (Green, Bavelier 2015:105). In spite of this, they agree with the hypothesis of «utilizing off-the-shelf action video games for practical purposes — either in rehabilitation or for job related training.» (Green, Bavelier 2015:108).

Violence and ethical issues

The 2015 Game Award for Best Fighting Game was attributed to *Mortal Kombat X* – where Cassie Cage is supposed to interact (and fight against) her parents (Sonya Blade and Johnny Cage) exploring a new (bloody) graphic aesthetics.



Figure 3: Cassie Cage - *Mortal Kombat X*

In 2016 among the top 20 selling video/computer (mature) games come *Call of Duty: Black Ops* [1st. – mature First Person Shooter/ 1st. BAFTA 2016] a single player heist plot, that can use torture (waterboarding); *Grand Theft Auto V* [6th. /8th. – 3rd. BAFTA 2016]: «with a penchant for carnage and violence» (Hoggins 2013), also accused of being «a nasty example of misogynist clichés» (Campbell 2014).

Allegation that games develop (at least) violent tendencies and criminal behaviour (*Mortal Kombat*, *Doom*, *Grand Theft Auto*, *ManHunt*,) as well as addiction (*EverQuest*) particularly amidst the players of MMORPGs has not subdued.

There is an *Index* of banned video games, institutional rating systems (i.e. the American ESRB, the European PEGI), and Support Groups like OLGA (On-Line Games Anonymous).

On the other hand, some video game developers have tried to fight this kind of moral panic: from a Christian perspective – *Noah's Ark, Left Behind: Eternal Forces* (that battle and kill non-Christians who are fighting for the Anti-Christ), approved by Christ Centered Gamer, i.e., or not: *Roller Coaster, Food Force* (Unesco), environmental (*Climate Challenge*) or even with social issues (*Ayiti: The Cost of Life*) all far from being interesting or marketing successes.

Reputable scientific studies do support both sides – there is no doubt that games have potential to foster ethical thinking and discourse. Ethics is the practice of enacting a judgement (moral in the case) to achieve a better life; it is the process of making choices in accordance with individual freedom of options, with the goal of becoming a better (good) person.

Videogame avatars distribute themselves between good and evil. Usually their actions are too simplistically determined at survival level (to kill/be killed). But games and simulations might be rich in ethical options.

The subtlety or complexity of moral dilemmas can be embedded in content, via storytelling (the narrative bifurcation) coupled with AI – either establishing preferences through abducibles, and implementing choice mechanisms combined with other formalisms for decision making (Moniz Pereira, 2009, 2016); or using prospective logic programming (following either the double or triple effect reasoning) to model moral dilemmas: «as they are able to prospectively look ahead at the consequences of hypothetical moral judgments. With this knowledge of consequences, moral rules are then used to decide the appropriate moral judgments. The whole moral reasoning is achieved via a priori constraints and a posteriori preferences on abductive stable models» (Moniz Pereira 2010).

EDUTAINMENT AND LEARNING THEORIES

The learning outcome from the educational use of video games seems promising, in spite of some methodological flaws (lack of control groups; short exposure time), contradictory results, and assessment issues yet to be dealt with. Some studies have contributed to attest its positive influence with flying colours (Blunt 2006); others – civilian or not – are more skeptical (Hayes 2005).

No one questions that video games affect humans and that humans can learn from video games. But concerns arise when considering the particulars: a) the use of ill-defined terminology; b) Methodological flaws (research on different tasks, age groups, and types of games, i.e.); c) Over-generalization (the effectiveness of one game in one learning area for one group of learners cannot be extended to all games in all learning areas for all learners); d) Doubts if the learning outcomes refer to content or playability; e) Lack of proper design of instructional objectives; f) Assessment and testing issues.

The focus is not on software or hardware matters anymore, but on content. And the problem is to know what content will have to be created to deal with these gaps, and by whom.

Some believe that this is the teacher's responsibility; others suggest that the more students are responsible for their own learning, the more they will learn. Without any doubt there is some content that will not be realistic for students to address on their own; and surely the teachers may function as consultants, but they cannot all be transformed into game designers, in spite of game designers having been transformed into pedagogues. Maybe within this last proposition lies the justification for the (fallacious) idea that users play to feel emotions, and game design is experience crafting for the purpose of emotion engineering.

The approaches to edutainment have mostly been tainted by traditional (analogic) learning theories, namely Behaviourism (Pavlov, Thorndike, Watson, Skinner), Cognitivism (Bode, Miller, Sweller), Constructionism (Piaget, Papert, Kafai) and the Socio-cultural approach (Bruner, Vygotsky) on the way to Blended learning (Heinze, Procter).

In what regards edutainment – closer to games – the main questions have to do with interactivity, original trade-offs (playability) and intrinsic/extrinsic motivations (immersion).

These referred main approaches depict a series of problems that inform and are being (separately) studied by game and interactive-fiction studies (Egenfeldt 2008; 2011), but which seem to contaminate DGBL with a set of dispensable dichotomies: what is edutainment (learning/playing; drill-and-practice/construction); where does the user agency lie (freedom/control; with/without teacher/narrator intervention). In another set of dichotomies (Bura 2008) the term «control» is replaced by «mastery», where freedom «deals with measuring choices and opportunities for choices» and «mastery deals with measuring skills, their acquisitions and their uses».

The most recent educational cognitive theories – namely the ones defended by Hélène Trocmé-Fabre, based on brain functions, types of memory, and attention spans (Trocmé-Fabre 1999; 2004) or the studies of Jeroen G.W. Raaijmakers (Raaijmakers 1988; 2003) – although inspired by and inspiring the new efforts for mapping the brain (i. e. The Human Connectome Project) – have not yet been pedagogically considered.

The natural conclusion is that video games in edutainment have something to offer that sets them apart from the existing educational practices, and so, have to ask for new responses in this domain. Also, and in spite of the huge differences, games are very similar between themselves in the fact that – serious or not – they all interfere with (known) brain functions. So, it is very important to be serious about games.

CONCLUSION

Entertainment software is now one of the fastest growing industries in a worldwide economy. Video games are driving technological and societal advancements that serve gamers and non-gamers alike: from leisure time to education, to health, to business or politics.

The evolution of game studies from research centres to large networks grow on a par with the demand for game developing courses in academia – some taught by successful game developers aware of game mechanics but ill prepared for pedagogical contents.

The concepts behind games, and “serious” games, are not yet clear and have been defined by refutations. This negatively affects DGB Learning – from both the teacher and the student perspectives. Concerning edutainment per se, the empirical research suffers from lack of systematization, theoretical and methodological flaws.

The traditional learning theories fall short and are inadequate for this new medium; and the cognitive studies’ advances regarding education have not yet been fully applied. In technical terms, new challenges are imminent with the exploration of augmented reality, ubiquitous game interaction (Martins, Correia, et al. 2008) and SR-Learning (Martins, Sommerer, 2008) and the expected developments in brain-mapping.

The adjective “serious” annexed to games – and the respective research – has been based on the (mis)conception that only some games affect the brain. However, either due to the fact that game construction and mechanics are similar for edutainment or entertainment, or that the practical use and process of gameplay always affect the brain, all games should be considered “serious”.

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