Beyond Textbooks: Educational Digitals Texts and Gamification of Learning Materials

Más allá de los libros de texto: Textos digitales educacionales y Gamificación de los materiales de aprendizaje

Máis alá dos libros de texto: Textos dixitais educacionais e ludificación dos materiais de aprendizaxe

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Abstract: *The first part of chapter provides a characterization of the textbook as an educational technology model representative of a school of the twentieth century (reception learning, information transmission, a concept illustrated knowledge resource mediator between the official curriculum and curriculum practical and as a product of a cultural industry). In the second part, we present two alternative models of digital materials. On the one hand, models of structured educational materials that adopt interactive ebook format, and models of learning gamification. We conclude on the need to seek the integration of both approaches (structured and gamification materials) in the production of new digital resourses.*

Key words: *texbook, gamification of learning, educational ebook, digital educational resource*

Resumen: *En la primera parte se ofrece una caracterización del libro de texto como una tecnología educativa representativa de un modelo de escolaridad del siglo XX (aprendizaje por recepción, transmisión de información expositiva, una concepción ilustrada del conocimiento, recurso mediador entre el curriculum oficial y el curriculum práctico y como producto de una industria cultural). En la segunda parte, se presentan dos modelos alternativos de materiales digitales. Por una parte, los modelos de materiales educativos estructurados que adoptan el formato de ebook interactivo, y por otra parte los modelos basados en la gamificación del aprendizaje de naturaleza lúdica y con entornos abiertos. Se concluye en la necesidad de buscar la integración de ambos enfoques (materiales estructurados y gamificados) en la producción de los nuevos recursos digitales*

Palabras clave: *libro de texto, gamificación del aprendizaje, ebook educativo, material educativo digital*

Resumo: *Na primeira parte ofrécese unha caracterización do libro de texto como unha tecnoloxía educativa representativa dun modelo de escolaridade do século XX (aprendizaxe por recepción, transmisión de información expositiva, unha concepción ilustrada do coñecemento, recurso mediador entre o curriculum oficial e o curriculum práctico e como produto dunha industria cultural). Na segunda parte preséntanse dous modelos alternativos de materiais dixitais. Por unha parte, os modelos de materiais educativos estruturados que adoptan o formato de ebook interactivo, e por outra parte os modelos baseados na ludificación da aprendizaxe e con contornas abertas. Conclúese na necesidade de buscar a integración de ambos os enfoques (materiais estruturados e ludificados) na produción dos novos recursos dixitais*

Palabras chave: *libro de texto, ludificación da aprendizaxe, ebook educativo, material educativo dixital*

The textbook as the educational technology of the 20th century school

The textbook is the most genuine technological invention of the school institution. The textbook is labeled as the appropriate educational technology for a model of education based on the expositive instruction of the knowledge, in the individual learning, in a curriculum segmented by subjects and organized in function of ages and levels. The school and the textbook, along this last century, have constituted a so intense symbiosis that nowadays turns out to be very difficult to break. The natural habitat of school text is a classroom with an teacher that explains and some students that learn from books. In another

model of education –as constructivism learning model- the textbook makes no sense and functionality. Of similar way, occurs with the traditional school. So that this function and be useful needs teaching materials, in format individual book for each student, that establish and offer along all the academic course the contents and the activities that should be complimented in the environment of the classroom.

Along the 20th century these rules of play were clearly defined. They were functional since they permitted to achieve, in greater or smaller measure, the educational goals established in the official curriculum and above all they were assumed, without to be questioned, for all the educational agents: teachers, students, families, governmental administrations, politicians and all people in general.

This status of privilege and monopoly of the textbook in the academic life of the schools would be able to be explained for the conjunction of different factors or phenomena that go beyond the technical characteristics of these printed works and that are pedagogical and sociocultural nature phenomena product. These factors of functionality and success of the textbook as educational technology is presented in the Figure 1.

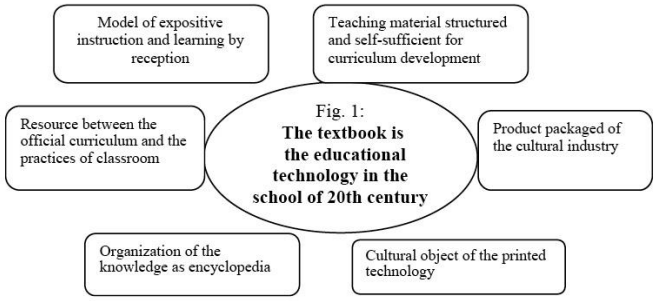

Fig. 1: **The textbook is the educational technology in the school of 20th century**

The textbook is an appropriate technology for expositive learning by reception

The concept of appropriate technology comes already from several decades behind (Klassen and Solid 1981) and refers to that certain technologies are adapted or they function efficiently in you determined contexts or situations. In our case, the textbook is the appropriate technology to the model of traditional education where the vision or dominant pedagogical theory is that of teaching through informative methods and of learning by reception. The textbook is the adequate technology for it since it offers a selection of the available knowledge for a determined matter or subject, the same one is organized and presented of sequential form and adapted, in greater or smaller measure, so much in its vocabulary and in its degree of difficulty to its potential users. The textbook is the central axis or cornerstone of the instruction in school education.

This pedagogical theory or conception of teaching-learning impregnated the genesis of the school institution in the middle of the 19th century and has been consolidated in the 20th century. Nevertheless, for more than one century, the experts and the so much coming research of the psychology as teaching established other theories and educational foci (the New School Movement: Decroly, Dewey, Piaget, Freinet, …) that collided or they contradicted the theory of the school practices based on the broadcast of information well oral way –through expositions of the educational one to the assembly of the class, well material way like the textbook. In this sense, as we will see further on, the raid of the digital technologies and the environments online

open new opportunities so that the pedagogical theories of the New School and of the psychology constructivist be generalized and be a habitual practice in the schools.

The textbook is a structured and self-sufficient teaching material for curriculum development

The school curriculum, in most of the countries, has been conceived and elaborated as an instrument of prescription and control, on the part of the educational authorities, of the educational practices of the classrooms. The authors of curriculum critical sociology have showed that the governmental powers have utilized to the curriculum as the mechanism that to regulate and structure what is taught and learned in the schools. The grammar of the official curricula has a presentation format of the specifics objectives and contents to guide or prescribe the practice of the teachers.

In this logic, the textbook became the resource or more useful material to transfer to the classrooms the curriculum guidelines. Gimeno (1988) called to this phenomenon as the function translator between the official curriculum and the curriculum in action. The textbook puts into operation in concrete terms of daily practice of work in the classroom what are principles and supposed educational established in the official documents and formulated in generic terms. The school text is the only teaching materials that is conceived and elaborate to structure and to give form to a project of educational work for a complete school course. It's a didactic proposal closed and self-sufficient so that the role of the professor consists of applying it to his group of students.

The textbook is a product packaged of the cultural industry

The birth of the school as social institution regulated by the modern state is a contemporary with the apparition and development of the industrialization. The position to teach, consequently, passed to be a craft activity and deregulated to be a task offered by the state with the purpose to form in mass to the greater quantity of youthful and childlike population of a determined country. Because of it, the standardization of the formative offering, the homogeneity criteria establishment in the selection and promotion of the students, as well as to guarantee that all the students to receive the same contents, …, favored that there was an only material that guaranteed that all the educational, all the students and all the classrooms of the country to continue the same process and they taught the same know-how.

This material that permitted standardized these phenomena were the school text. Her logic of production, distribution and consumption was assumed by industries or private enterprises specialized in this type of cultural products created former I profess for the school activity. To date this market of the textbooks and other teaching materials has functioned without large starts, but the times are changing and this cultural industry, just like other similar linked with the leisure, the music, the literature, the movies or the press are in crisis by the explosion and omnipresence of the digital technologies. These they have broken the rules of traditional play

with relation to who produce information, how is diffused and how is agreed to the consumption of the same one.

Set against the industrial model where the producers were private enterprises and where the extortionate to be able to consume any cultural product (a book, a newspaper, a movie, a disk) had to buy it, the digital technology is favoring that any subject can be converted easily in producer of information and to diffuse it in the network, as well as the possibility to reproduce the same work digitally carries to that this be easily distributed and accessible causing That, in many occasions, its consumption require not to pay for the same one. This carries us to the growing concept of licenses copyleft and of free resources and of open access, what has some enormous repercussions on the nature and potentialities of the new teaching materials distributed digitally. This sense, the textbook as object or cultural merchandise, to stops making sense to open a new type of educational materials online generated by the own educational based on the exchange, in the random access and in its recycling or recreation without commercial restrictions.

The textbook is cultural object of the printed technology

The textbook is, above all, a printed book, a technological object of role. The school institution, since its creation in the middle of the 19th century, had always to the printed book as canon cultural, like referring fundamental for its educational function. The modern school is built around the book as cultural object. The education was always, and continues being, synonym of teaching literacy in the reading and writing since the same one is the indispensable competence to continue in the formative system and to acquire the condition of cultured person.

Exactly this goal, the eradication of the illiteracy, is the one that legitimized the social utility of the school since the teaching literacy is a necessary condition for the social progress and the democratization of the culture. The school text, consequently, became that book specific and idiosyncratic that synthesized, organized and showed the knowledge that should be taught and learned in the classrooms. The school institution is a construction of the modern company because, among others reasons, adopted and was appropriated of the technology of the role on the one that the rationality was built and the thought of the western modernity. School and printed technology became a binomial inseparable to date.

The schools on the one hand, next to the libraries by another, were the public spaces of worship to the book as cultural object. The role of the school was to form the readers, the function of the library was to guard the books and to facilitate the democratic access to the same. During many decades was considered that the school curriculum should take charge of transmitting the cultural knowledge that was in the books, without another type cultural formats as the music in disks, the audiovisual, the cinematography and the photography among others. Nowadays, it is evident, that the school cannot continue giving the back to the new digital technologies since these, among others reasons, they have absorbed to all the other media to doing them practically to disappear. The culture, nowadays, is digital.

The model of knowledge organization in textbook is like a encyclopedia

In parallel to the expansion in Europe of the printed technology and to the ideas that you insert in the pages of the books, to ends of the 18th century, began to be gestated a new vision of the knowledge based more in the reason that in the faith, supported more in the evidences and empirical certainties that in the truths revealed. The French movement known as Illustration established the architecture of the rational thought of West just as has arrived to ours present.

One of the objectives of the movement illustrated was to compile, to give form and to organize of systematic way what was the human knowledge. This process consisted of writing the "Encyclopedia" (1751-1772) that is to say, an assembly of books that they intended to classify and to organize the human kownledge to do it accessible to the public. The key axis of this organization of kownledge was the matters or scientific fields. This organizing model was the one that inspired and gave form to the school curriculum a century later.

This, consequently, it was divided into parts (the matters and subjects) being established the contents that should be taught. In this logic, the textbook appeared like a "small encyclopedia" adapted to the formative needs of the students in function of its level of know-how and age. The textbook is a son or consequence of a conception illustrated and encyclopedia form in the organization of the curriculum where there is primate more the knowledge to discipline that the competences or environments of learning of the subjects. This conception to discipline of the curriculum –in force to our days- requires, like we have just indicated, for its put in practice in the classrooms of "micro encyclopedia" for each matter and educational level.

The textbook is a resource between the official curriculum and the practices of classroom

Finally a last phenomenon that explains the hegemony of the school text in the practices of classroom is linked with its function curriculum mediator that name previously and the role of the faculty in the same one. We refer to that the textbooks enclose a determined theory or vision of the educational professionalism (Martinez Bonafé 2010) that separates the producers of the consumers of these materials. The existence and status quo of the textbooks they consolidate a model of deskilling professional of the educational based on the social division of the work among experts or technical curriculum and master. These, through the textbooks, they become mere applicators or agents in their elaborate educational work proposals classroom in far away and alien instances of their school. Them they called curriculum materials "professors-proof" (as is the case of the school text) they are those that are elaborate by experts or businesses to offer him the professors products or material that to present a proposal or educational project "packaged" with their objectives, contents, activities and evaluation detailed. In this way, the textbooks replace the faculty in the process of takes of decisions of adaptation and implementation of the curriculum to its group of concrete students. The work of the educational one remains reduced to negotiate the use that carry out the students of the textbooks in the classroom and the home. On the other hand the lack of the formation and adequate competences, along with the characteristic constraints of the school job, causes that many educational have difficulties to plan, to develop and to evaluate educational projects that go beyond the mere broadcast of information. Trying to create alternative own materials to the textbooks require of

another model of educational professionalism that implies greater competences to face situations of greater pedagogical complexity.

Beyond textbook: Digital texts and gamification of learning materials

The massive raid of the ICT (information technologies and Communication) in all the environments and spheres of our company is producing a radical mutation of the forms to produce, to consume, to distribute and to agree to the information and the knowledge. The economic, cultural, and social impact of the omnipresence of the digital technology is very notorious and begins to be so generalized that is transforming what were the rules of up to now existing play in numerous institutions of the knowledge.

To date the schools and the classrooms have been, up to a point, waterproof to the utilization and pedagogical integration of the TIC. It is certain, that a lot of money has been invested and has gifted to the educational centers with classrooms or rooms of data processing and these, in their great majority, already they are connected to Internet of wide band. In many classrooms also there are laptop computers, tubes of multimedia projection and interactive digital shales. Nevertheless, many studies continue showing that the textbooks and other traditional didactic resources continue being the predominant and most habitual media in the practices of classroom. For example, in a recent study carried out in Spain (Area 2012) where him he was asked at more than 5,000 educational participants in the Project "School 2,0" (project that continues the politics of the model one 1:1, a computer by student) was found that the textbook continued being the daily technology used of form wholesale number of professors, in spite of the existence of numerous digital technology in its classrooms.

These full situations of contradictions we should interpret them as own phenomena of a time of traffic among the "old school" and the "new school", among the school of the 20th century and that of the 21st century, among the school of the technology of the role, and the school of the digital technology. The direction or school horizon should advance toward the radical redefinition of the forms and educational goals of the education. In this sense works exist that have explored different possible settings of evolution of the school institution, and in all they, the TIC appear, with greater or smaller importance, as one of the axes or attributes of the future school OCDE (2001). In this sense, reports as the recently published by Fletcher, G.; Schaffhauser, D. and Levin, D. (2012) they fight determined by a school system –in this case for US- without textbooks in role and full of digital teaching materials.

What characteristics or characteristics should have these new alternative teaching materials to the traditional textbooks? Evidently the first characteristic is that they should be digital, not of role. It implies that the same should assume characteristics as the interactiveness human-machine, the hipertextually or connectivity among some parts and other of the content, multimedia in the sense of the utilization of different languages and expressive forms like the text, the image, the audiovisual thing, the sound, …, and that they be distributed online.

On the matter, there are two large tendencies or foci of development of this type of digital educational materials:

a. By a part they would be those materials of informational nature that, being digital, they continue being characterized for offering a proposal structured of presentation of the knowledge to the students. Evidently they are interactive, hypertextually,

multimedia and online, but they belong to the tradition of the teaching material destined to the presentation or elaborate exposition of the knowledge. This focus has its roots or origin in the CAL (Computer Assisted Learning) and evidently today they adopt new forms as the electronic tablets.

b. The other focus or tendency is the one that proceeds of more next approaches to the constructivism and to the experiential learning. It has their origins in the proposals of S. Papert and they are supported in the logic, interface and playful experiences of the videogames transfers to the educational environment. At present they respond to what is called "gamification of the learning".

In the following pages we will describe one and another focus that represent lines of work and experimentation of alternative digital educational materials to the traditional textbooks in role.

Structured educative texts: from paper textbooks to digital contents

Textbooks have been remained unaltered for decades, but not their contents. Although their composition has evolved into more and more innovative and attractive materials for the students, the way they interact with them has not changed because of the limited possibilities of paper. Nevertheless, the advances of hardware and software during the last decades were the basis for newer and more effective methods for transmitting knowledge, moving the paper contents to the screen of even smaller portable devices. Concepts like interactive or e-books have appeared for the first time associated with textbooks and are changing the way students interact with their teachers in the classroom and how they study at home. However, this model is not only altered how the students learn, but has also changed who creates the contents and how are them distributed, giving more control to the schools of their educative textbooks if their technology gaps are filled.

From paper to the display: the e-book as a textbook

Textbooks are one of the most profitable businesses today, so the appearance of technology companies like Apple, was only a question of time. The new rules within the editing industry have created a controversy between advocates and detractors of these novel technologies. When Apple's iBooks Author appeared in January 2012, teachers and educational institutions had for the first time a tool in their hands towards the creation of high quality interactive and multimedia educative contents for the iPad. Output of an iBooks Author is similar to an EPUB 3, but it uses its own proprietary tags, what it makes it incompatible with other platforms different from the iPad. iBooks Author is free, but it only runs within OS X 10.7.2 or later, and there is not a Windows version. The launch of iBooks Author was very criticized because of the restrictions of its EULA, which was clarified in February 2012 when Apple specified that only the .iba output file was subject to distribution restrictions if it is provided for a fee, but not the contents. Despite these restrictions, iBooks Author has been well accepted by educational institutions, teachers, editors and independent authors who pretended to create iPad oriented contents. However, this tool was specifically created for easy authoring of interactive digital textbooks, and this is what it makes it the best tool in the market for this purpose at the moment. Students can interact with an iBook in several manners, depending on the way on how the contents are designed: they are able to visualize videos and listening audio, interacting with figures and images, answering a quiz,

visualizing 3D objects, etc. The possibility to embed HTML5 code adds the possibility of creating more personalized and interactive contents like puzzles, embedding YouTube clips, maps or even live polls widgets and so on. Students have also easier access to their textbooks, with rich interactive resources and multimedia contents, without having to carry a set of books to their school every day. Teachers can use a set of tools for authoring their own specific contents, and changing any part of the text does no result in a painful task. By contrast, Apple's technology is out of the limits of many families and schools, it is restricted to a closed environment and it is still not clear what is the influence in the acquisition of competences of the students. The tremendous success of Apple's iOS was closed followed by Google when their first version of Android –version 1.5, Cupcake– was released. Android is an open source project, so many manufacturers started to compete against the iPad with their own hardware running customized versions of this OS. In September 2010 Samsung announced their first Galaxy Tab, which was immediately compared to the iPad during the IFA conference in Berlin. In only two years, other important companies like Sony, ASUS, Acer, Toshiba or even Amazon, developed their own tablets using their own customized versions of Android. In addition, other smaller companies –mainly Chinese– wanted a piece of the pie, but with less success. Owing to the huge variety of devices of different vendors, Android OS has not been able to get into the classrooms as iPad did. This system simply has become too heterogeneous when trying to design digital educative textbooks and related applications: The different sizes of the screens and resolutions from different manufacturers become a nightmare to developers when designing educative contents. As a result, textbooks and educative apps remain dominated by iOS owing to the high fragmentation of Android. On the other hand, the apparition of the HTML5 standard was the reason why some companies have adopted it to make tools to create easily distributable contents, compatible with any platform. Most of these tools are relatively high priced, but contents created are not subject to any distribution restriction like Apple's iBooks Author. Examples of these tools are stand-alone applications like Adobe Captivate 6 and Articulate, which are specifically oriented to the creation of educative contents. The trespassing of the rules imposed by editors carried by independent authors has gone one step further, since they can freely distribute their digital educative textbooks on the Internet, where hundreds of free educational textbooks –some of them are interactive and others not– can be downloaded for free. One example of this type of distribution is the non-profit CK-12 Foundation, which provides more than 15,000 resources, many of them under one of the Creative Commons licenses available.

Not just digital textbooks on tablets

Following a strict definition, digital textbooks can be presented on tablets like paper textbooks with the addition of multimedia resources and advanced widgets, but many teachers have gone further, and use these technologies adopting different points of view and methods to interact with their students. This focus implies changing how the knowledge is presented and how the teacher interacts with his or her students. In many cases, textbooks adopt the form of educative apps with several targets. Some of them are thought to get the students more concentrated on the concepts being taught and are able to balance the class from the teacher to the students, aiming them to participate and bringing back an instantaneous feedback to the teacher. Others are oriented to present the contents more attractively and dynamically, getting the students more engaged, giving them the possibility of online accessing after their classes or even adding or modifying contents. These educative apps usually consist in the framework for building, authoring and

sharing educative contents to students and other educators. Social networks become an important aspect to take into account, and many of these apps have their own social networking platform and/or are able to share contents with others. This implies that the success of an educative app depends on the size of the community using it. Other apps just present the contents in a nonlinear way, like an encyclopaedia, but including activities, extended resources and tools, making the contents easily searchable, attractive and interactive. These are not pretended for building contents, but to present them. Lastly, a third group of educative apps mix gaming with the corresponding curriculum, most of them oriented to younger students, becoming more an instrument for the development of their capacities than a way to expose complex concepts.

The number of educative gaming apps has increased exponentially since Apple presented the first iPad in 2010. Now there are thousands of educative apps and educative games available for different platforms, so it is getting easier to build a set of apps for any educative requirements on a portable device. This sharp increase in the number of educative apps initiated by Apple has popularized the iPad between students and professors. Some educative institutions have recently started one-to-one programs, so their students have now the opportunity of using their iPads at home, but in fact, this implies an increasing technology gap, as many educative institutions cannot afford these initiatives. However, technology is evolving faster: cloud computing is now a reality, so educative digital textbooks and educative apps will embed the future innovations of the following years. The future evolution of digital educative materials has established its basis the actual ICT technologies, and HTML5 has demonstrated its potential for the creation of high quality educative materials and contents. As HTML5 matures, its combination with the possible short-term appearance of a competitive authoring tool, able to output digital textbooks in compliance with the EPUB 3 standard, a prizing drop of mobile devices and further improvements in their power and OS's, will help to the democratization and the easy access to educative digital textbooks of students all over the world, independently of the platform being used.

Breaking the rules: Gamification of learning and educational materials

In this section we explore the design features to gamify educational materials. To do this, first of all, we explore the mechanics of video games, wondering why games produces "engagement" in his players?; And can we learn the engagement features of videogames to apply it in the teaching-learning process?. Finally, we present a set of properties that can be taken into account as design guidelines for educational gamified materials. This set of properties secure the engagement of educational materials.

What can we learn from video games?

Scientific research into video games has been rather scarce, only coming into its own in the 80s, when video games first started to proliferate. This research has focused mainly on the negative effects of video games, namely aggressiveness, addiction and withdrawal, and was based on previous research into the effects of TV (Irwin & Gros 1995; Welch 1995; Flood, Heath & Lapp 1997; Cesarone 1998; Wellish 2000). The result has been a social discourse that has uniformly discredited video games and, by extension, games, platforms and players, producing a negative effect on its perceived educational potential. There still continues to be a mistaken cultural

perception regarding the educational potential of video games and also a persistent and deep-rooted dominance of lecture classes in our educational systems.

But in fact, research has demonstrated the practical non-existence of negative effects, along with the presence of some positive ones, including those of an instructional nature (McFarlane, Sparrowhawk & Heald 2002). So, we can affirm that videogames can be really powerful learning tools to help people to learn to solve problems and allow them to adopt new reasoning forms and transform the learning process in interesting, easy and fun.

According to Prensky (2005), there are two main reasons for the use of video games as tools for the support of the study: (1) the new students have changed radically, and (2) this students need to be motivated through new forms to learn. Our new learners grow up with the current digital technology, and computer games are part of it. They are digital natives, because they were born and grew up in a technological word. On the other hand, most of us were not born into the digital era. However, we need to use digital technology in our day-by-day activities. We are digital immigrants because we need to adapt our lifestyles to the new digital technologies, and well designed educational digital games can be an excellent support instrument. A current research area called DGBL (Digital Game-Based Learning) addressed this problem.

Of note is Jane McGonigal's assertion that "video games can make us better persons and help change the world" (McGonigal 2010). She states that there is a lack of research regarding the skill set that is acquired in immersive environments and why players, who often feel frustrated and are marginally integrated in real life, feel successful in these types of settings where they spend a great deal of time cooperating with others to achieve common goals. One example of this is provided by the online game World of Warcraft (WOW), which has a Wiki with over 80,000 pages and 11.5 million players who devote 22.7 hours a week to engage in epic quests and work as a team (Corneliussen & Walker 2008). Although not designed for educational purposes but ludic, the use of commercial games like World of Warcraft open up a world of possibilities in education today (Chang 2008; Corneliussen & Rettberg 2008; Hui-Yin & Shiang-Kwei 2010; Golub 2010; Ducheneau 2010; Pirius & Creel 2010; Bainbridge 2010), such as: students collaborating and discussing ideas, possible solutions, connecting with other students around the world, on topics of study, immersing students in a learning experience that allows them to grapple with a problem, gaining higher-order thinking skills from pursuing the solution, among others.

While not targeted at education, nor seeking to cover any type of educational content, Green and Hannon (2007) cite multiple skills associated with being a "guild master" (one of the roles in WOW), such as: attracting, evaluating, and recruiting new members; creating apprenticeship programs; teaching children to work together for a common goal; communication skills; understanding multiple perspectives, respecting and even embracing diversity of views, understanding a variety of social norms, and negotiating among conflicting opinions; orchestrating group strategy and organized thinking; managing disputes, etc.

We see that the objectives intended through the use of these game types in the education where mainly the improvement of instrumental, interpersonal, informational and digital competences, which includes cognitive skills, methodological skills, technical and language skills, teamwork skills, self-critical capacity, ethical commitment, skills about searching information, selecting it, analyzing it and extracting it and social communication and interaction (collaborative work, chats, forums). In this sense, through the activities around the videogame it is possible to

contribute to the use of information technology and communication and to develop 21st Century skills (Gonzalez et al. 2012).

Thus, commercial videogames can help in the developing of different skills of students. These potential formative benefits have been studied under the project "Educational Games in the Classroom" (Felicia 2009).

On the other hand, in the most cases of "educational games" -games designed for specific learning purposes-, the learning principles tend to be more focused at practice and exercise than at understanding. This means that the student can memorize the answer to a question that shows many times, but without understanding the underlying rules. Moreover, the knowledge is obtained through the included contents in the game, and the cognitive skills are developed as results of the player actions. On the other hand, most games have a very basic gameplay, often derived from classic games or a simple adventure.

But, ¿what are the differences between a videogame from an educational video game?, ¿which characteristics that make video games so "addictives" ? ¿how can incorporate these characteristics into the activities and resources?. In the next, section we propose some main game characteristics and methods for the creation of educational activities.

How can we mix gaming in education?

In "What Videogames have to teach us about learning and literacy", James Paul Gee (2003) maintains that good video games are "machines for learning" since they incorporate some of the most important learning principles postulated by today's cognitive science. Specifically, he states that:

a. Good video games provide the users' information on demand and as needed, not out of context as is often the case in the classroom. It is much more difficult for people to remember or understand information that is given out of context or well before it is needed.
b. Good games are capable of presenting users with tasks that are challenging, but at the same time doable. This is essential to maintaining motivation throughout the learning process.
c. Good games convert their users into creators, and not mere receptors. Their actions influence or build the game's universe.
d. Good games feature initial levels that are specifically designed to provide users with the basic knowledge required to allow them to build generalizations that will enable them to face more complex problems.
e. Good games create a "cycle of mastery", in which players acquire routines through which they increase their level so as to accomplish a specific task. When said task is mastered, the cycle is started again with more difficult tasks.

As a result, many of these characteristics can be used for learning the material and skills relevant to school and professional work.

Moreover, in the design of an educational video game can be considered a set of properties that securing the "learn to play and play to learn", that is named "educational playability". In general terms, "playability" (González Sánchez 2010) can be defined as: "a set of properties that describe the player experience using a specific game system whose main objective is to provide

enjoyment and entertainment when the player plays alone or in company". In extension, the educational playability is not limited to playful objectives but must take into account educational objectives, such as learning while having fun, improving the abilities of students to solve complex problems, reinforcing players' skills and improving player experience (Ibrahim et al. 2012) (Table 1).

Table 1. Playability Design Patterns to Facilitate the Design of Educational Video Games (Ibrahim et al., 2012)

Educational Playability Proprieties	**Description**
Satisfaction	The gratification or pleasure derived from playing a complete video game or from some aspect of it
Learnability	The player's capacity to understand and master the game system and mechanics (objectives, rules, how to interact with the video game, etc).
Effectiveness	The resources needed to offer players a new experience -fun and learning- while they achieve the game's various objectives and reach the final goal.
Immersion	The capacity of the contents to be believable, such that the player becomes directly involved in the virtual game world.
Motivation	The set of game characteristics that prompt a player to realize specific actions and continue undertaking them until they are completed.
Emotion	This refers to the player's involuntary impulse in response to the stimulus of the video game that induces feelings or a chain reaction of automatic behaviors.
Socialization	The set of game attributes, elements and resources that promote the social dimension of the game experience in a group scenario.
Supportive	The ability of the game to keep the player motivated, to teach players/students effectively and encourage them to continue learning and achieve the learning objectives.
Educative	The educational characteristics of the game and the ability of the player to be aware of, understand, master and achieve the learning goals

Relating to the "addictive" or "engagement" component of games, we can found the "gamification" concept (Zichermann & Cunningham 2011). Essentially, gamification tries to applying the mechanics of the games in other settings, such as the educational environment. This concept is not directly related to game design, but seeks to engage the user through small doses of challenges and rewards in order to get that the user perform certain actions in different environments.

Gamification works to satisfy some of the most fundamental human desires: recognition and reward, status, achievement, competition & collaboration, self-expression, and altruism. People are hungry for these things both in their everyday world and online. Gamification taps directly into this.

The game mechanics can be of different types, such as: a) behavioral (focused on human behavior and the human psyche), b) feedback (related with the feedback loop in the game mechanic) and c) progression (used to structure and stretches the accumulation of meaningful skills). In Table 2, we present a proposal of different suggested game mechanics to gamify environments, in our case, educational gamified materials.

Table 2. Proposal of recommended game mechanics to be used in educational materials

Game mechanic	Description
Collection	It exploits the human characteristic of "collector", all are or have been collectors of something: books, records, pictures, movies, etc.
Points	It is the most used mechanical, in real life we handle sports scores, grades in school, etc.. We reward or punish through the points given or removed, respectively. Points are a running numerical value for a single action given or a combination of actions.
Comparisons and classifications (leaderboards)	It exploits the social component, the effort is compared with other users and / or other types of classifications (global, local, etc..). Leaderboards give users the feeling of "fame" and "status." They also give users the chance to compete and compare with other members or players.
Levels	The levels are related to the user experience or level of expertise (expert users, beginners, etc..). Karate belts, job titles, and frequent flyer programs are just some of the examples. They are to shorthand indicator of status in a community and show that you should be afforded respect for your accomplishments.
Status	Status is the ranking or level of a player, related to the scores obtained by users, users are motivated to achieve a high status.
Feedback	People are used to receiving feedback on their actions, it is important to reward positively and provide information to the user about his condition, the environment, and their achievements. For example, showing the progression in which the success is granularity displayed and measured through the process of completing tasks. Or giving rewards to motivate users: points, badges, trophies, virtual items, unlockable content, digital goods, etc.
Achievements	Achievements are a virtual or physical representation of having accomplished something, usually considered "locked" until the user have met the series of tasks that are required to "unlock" the achievement, for example virtual coins, medals or badges.
Epic meaning	Players will be highly motivated if they believe they are working to achieve something great, something awe-inspiring, something bigger than themselves. Examples of this mechanic applied to education could be, the fight to save the planet while they are learning about the environmental care.

There are other game mechanics that can be used for gamification materials and educational activities, such as: *time* (the players have some limited time to perform a task), *exploration* (players have to explore and discover things that will surprise them), *challenges between/among users* (players can challenge each other and compete for the achievement of objectives, objects, medals, etc..).

It is also important to have other people with whom to compete, collaborate and compare accomplishments. As a general rule, humans want to interact and compete with others. In the social game, the objectives can be competitive or collaborative. When you get users to compete and collaborate as part of something bigger, it increases the stakes, adds another level of accountability and is a dynamic motivator. So, in team games must be considered separately the mechanics that influencing the team (win projects, group scores, etc.) as well as the mechanic is that influencing the individual (motivation, positive reinforcement, etc..). In a best-practice implementation, a user's individual achievement should be rolled up under the group or team's success and highlighted in inter and intra group leaderboards and news feeds.

The best way to approach this is with a standard ranking system. Once you have identified the actions for environment, system or activity, you will want to rank them in order of value. Start

with the least valuable action and give it a factor of '1.' Working from there, assign relative values to everything else.

So, you can use *different kinds of point* for different purposes and activities, for example: *basic points* (usually earned by participation and spendable on virtual or physical goods), *experience points* (earned by participation, constantly increasing and the point total is never deducted, not spendable), *premium points* (only for some special action, spendable on "premium" virtual or physical goods). Once they reach a set number of points, they progress on to the next designated *level*. Alternatively, another option is a hybrid approach, mixing points and tasks to allow the users to progress. *Badges* should tie directly into the goals and to what users care about and are proud of. They also encourage exploration of your site, even mastery. Badges can also be used to encourage users to take a specific action. Some badges can be "aspirational," requiring certain prerequisites such as achieving a certain level or owning another badge or virtual good.

Another option is to use the time to reward students based on the made activities, such as:

- *Every time* - Every time that participating in the forum, the student earn 10 points.
- *After X times* - After 10 participations, the student get a trophy.
- *Score higher than X* - Score 90 or more on the quiz, and receive 100 points.
- *Time limited* - The clock is ticking! Now or never…

Moreover, the gamification of educational resources can be enriched through the use of mobile devices and tablets (smartphones), using geolocation and social networking. These wide possibilities are still uncharted; there is a long way to explore....why we do not start now?

Conclusion

The printed textbooks and the traditional instruction are in crisis. Some countries already have announced the establishment of educational politics destined to substitute the textbooks by digital educational materials. For example, the South Korea Department of Education has planned that the tables and other electronic devices will replace the textbooks of role in the year 2014. In U.S.A.. various federal states as Florida or California already have begun this process. The State Educational Technology Directors Association (SETDA) demand that this process finish in the course 2017-2018 (Fletcher; Schaffhauser, and Levin 2012).

Already there are many voices that admit the need and urgency that the school be appropriated of the digital technology and transform of radical way its pedagogical practice. It is time to break the rules in education in schools. Students should learn together, should research and develop projects, must be independent and must use much digital technology. We must go beyond textbooks and traditional teaching that transmits information

In this chapter, we have intended to synthesize two of the most noticeable foci of the digital alternatives to the textbooks: on the one hand, educational digital books that respond to a vision structured of the knowledge, and by another to the gamification of educational material that offer flexible and open experiences of learning supported in the contributions of the videogames. Our position is not to defend in exclusive a focus or another, but to present the need that in the school of the 21st century both types of materials live together. The presence and use of these different technologies (structured digital contents and gamification material) will provide the students so much varied learning to formal teaching processes bias as of playful and more informal experiences.

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