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The Digital Textbook:
Methodological and Didactic Challenges for Primary School

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Summary: The potentialities of ICT in education bring about changes in the teaching and learning methodologies, in the places where you learn and in the way you learn. This demands a reflection not only on the ways of learning, but also on the support resources, so that learning can take place and, of course, it is indispensable to understand the teachers' answer to the digital challenges. Thus, the purpose of this analysis is to reflect about technological trends in an educational context and their underlying models by analyzing the role played by digital textbooks in Portugal in an innovating context. This way, we intend to contribute to an educational policy as we plan to relate the teachers' training to the increasing development of the digital textbooks and we also intend to contribute to the understanding of a didactic resource which is closely related to the learning processes which resort to advanced technology.

Key-Words: digital textbooks, ICT (Information and Communication Technologies), methodological change.

El potencial de las TIC en la educación requiere cambios en las metodologías de enseñanza y aprendizaje, en los lugares dónde se aprende y cómo se aprende. Esta realidad exige una reflexión no sólo sobre las formas de aprendizaje, sino también sobre los recursos para apoyar a los alumnos, siendo imprescindible para entender la respuesta de los docentes a los retos digitales. Por lo tanto, nuestro análisis tiene como objetivo reflexionar sobre las tendencias de la tecnología en el contexto educativo y los modelos subyacentes, analizando el papel de los manuales digitales en Portugal en un contexto innovador. De hecho, tenemos la intención de contribuir a la política educativa, con el fin de mejorar la coordinación de la formación del profesorado con el creciente desarrollo de manuales digitales, y la comprensión de un recurso didáctico que responda a los procesos de aprendizaje que integran tecnología avanzada.

Palabras-clave: manual digital, tecnologías de la información y comunicación, cambios tecnológicos

Introduction

If the world rules are changing quickly, the way you learn, where you learn and what you learn is also changing. In a context of change, tomorrow's school is redrawn and the future generations are prepared for a society which is more and more global and demanding. In this context, and for this reason, teachers have an increased responsibility in the teaching-learning process and the supply of books in this digital era generation can be an important contribution to the improvement of the quality in education. At a certain stage there emerges a reflection which focuses on the type of resources available as far as digital textbooks are concerned and, consequently, on the quality of the teachers' training in the field of ICT, in the role of promoters of the e-book, and on the way the students' learning process is carried out so that school success as well as the conjuncture of change may be understood. On the whole, we hope to contribute to a modern and up-to-date education which will answer to change and to social interests.

Thus, we shall analyze some challenges that change presents in the educational context and the way school and teachers respond to this conjuncture which is in transformation, having as main characteristic the technological evolution which affects each and everyone of us in a different way, not forgetting that the generation school is the one that most demands a new educational paradigm. However, in a scenario of big changes we can verify that some teaching resources, even though suffering deep transformation, were able to survive: this is the case of the school textbook in paper support. We shall analyze the way students learn and today's formative offers of the textbook.

1- A changing context

Today's technology is creating a world which is immaterial, timeless, flat and global, surrounding us every day, and changing our ways of communicating, our relationships, our interests, the place we ascribe to things and the way we experience them. Thus the magic of the digital is bringing about a technological, political, social, economic and, we hope, educational revolution. Friedman (2006) tells us he was aware of this evolution when he had to buy a mere plane ticket: there were those who still belonged to the 1.0 generation (someone was responsible for the emission of the ticket, the customers made their way towards the company ticket counter to get a number, wait in a queue and negotiate the acquisition of a ticket); others belonged to the 2.0 generation (an electronic ticket machine replaced the clerk responsible for the selling of the ticket and all the customers had to do was to make their way to the machine); others, however, were already living in the 3.0 generation (those are the ones who do not need the clerk or the machine and who emit their tickets themselves and, as such, they may be considered collaborators of the airline company). In the educational context, we are also supposed to find, in the teachers, different stages of competence in ICT, in the schools, different types of resources available and the use of different kinds of school books. The study carried out by Quadros-Flores (2010) shows that, in fact, there are distinct stages in the integration of ICT, but that those stages are not tight because there are teachers who stand at the point of transition and who, therefore, use mixed methodologies. In this sense, the author has defined three stages according to the resources and the methodologies that are used:

- Discovery Stage – Teachers have at their disposal several basic ICT tools, such as the computer, the printer, software and the Internet. However, the author verified that the availability of these tools is not enough to increase the degree of frequency in which the computer is used. Also the teachers within this stage use a traditional methodology adapted to technology since they are mainly concerned with the successful management of the new tools.
- Experimentation Stage – the majority of teachers can be placed in this phase and they have at their disposal the computer, the printer, the CD player/ recorder, the scanner, varied software and the Internet. Nevertheless, the author verified that these teachers work less than three hours per week with the computer and that the above mentioned tools do not stimulate the degree of frequency in which the ICT are used. Nonetheless, teachers assume differentiated attitudes: for some the resource to the new technology represents the use of only one more working tool; they relive the same mise en scène with new accessories, keeping the old methodology and the old profile of both the teacher and the student; and that is why, in this case, the technology became a means of exposition and consolidation and the traditional methodology was adapted to the new technology. For others, the resource to the new technology may well represent a way to change since they already use a renewed methodology, that is to say, they are already able to recreate scenarios, new learning environments, new ways of teaching and learning, new temporal spaces and the student is now the creator of his/her own knowledge. We could say that this stage represents the beginning of the transition from a teaching model to a learning based model. There is a change in both the student and the teachers' profile.
- Transformation Stage – The author verified that the availability of the interactive board, the wireless net, the digital camera, the video recorder is more meaningful for the teachers who use the computer more than three hours per week; in this case, these resources stimulate the number of hours of the ICT use. At this stage, teachers develop innovating or renewed methodologies and they carry out practices which are democratic, transferable, up-to-date, useful and that they can effectively solve teaching/learning problems. This shows an undeniable change in both the students and teachers' profile; teachers stop being information consumers to become information creators/producers and they guide their students towards the information and knowledge paradigm. These are practices which are not centered on "copy and past", but on research and construction of knowledge, on teaching individualization and on the development of autonomy; creativity, critical reflection, collaboration and interaction with others are valued.

Based upon the information obtained in from teachers who carried out good practices, the author asserts that those teachers backed themselves on technology, so that they could obtain better school results. The good practices they used were effective solutions to problems in a given context, drew a renewed scenario of a dynamic school, a school which was more attentive and more open to the world, and made children happier. These are practices which involve the students in meaningful contexts, leading them towards the world of discovery, of the pleasure of sharing, of collaboration, of production, of know-how; these are practices which feed knowledge and which motivate efforts towards final results; practices which draw an outline of a new profile of the teacher: much more attentive to the student, an investigator, a coach, worried about the teaching-learning process and effective in the preparation of his/her students for the

future; practices which give school and the educational paradigm a new face. It is important to underline that, according to Hernandez (2007) and Gilleran (2006) good practices depend on the context, on the teacher's starting-point and on the project goals. However, they allow all students a place in the learning process, they favor the know-how, comprehension and debate. Silva (2001) adds that they make a new definition of time and space possible and that they adapt themselves to the students' needs. Are not these the main aspects that should be taken into account when elaborating a digital textbook?

However, the existence of the stages mentioned above by Quadros-Flores (2010) presupposes distinct school books, so that teachers can feel satisfied and, of course, school books will tend to offer teachers and students the possibility to implement different practices in an easy, quick and safe way. True change will happen when most teachers show a meaningful methodological change by introducing new digital resources and new ways of teaching how to learn; in this case, they will demand a digital textbook which must be elaborated according to a renewed methodology and a more global vision of education; thus, new processes, new ways of acting and doing are necessary and, as a consequence, new skills, so that you can effectively accompany the evolution and know how to be in a global world which is permanently changing. Pink (2006) speaks of a new era, a conceptual era, full of opportunities, but cruel for those who are slow and not flexible. However, it is not enough to equip schools with technology or offer teachers and students the digital textbook; you need to include methodologies which can bring about new ways of learning in a global society and in network; in this situation there is a strategy which is very important: the use and application of the digital textbook by the teacher is fundamental for success in the students' results. Even because, according to Carvalho (2007) technology can also reinforce approaches centered on the teacher; that is why we underline the fact that the correct use of these more advanced technological resources is fundamental to success. Furthermore, it is also important to underline the need to make adjustments and plans elaborated according to the educational goals and to the school mission. It is necessary to give importance to what is relevant, so that school will not lose itself in the global world and in the great variety of relationships of information and of "things" that are attractive but that are futile and that deviate from its purpose. Here lies the importance of the digital textbook which can open school to the world, but must guide learning, making it meaningful, up-to-date, interactive and individualized. The "good" book will be the one that allows school to fulfill its mission with good results and that contributes to the proper education of a generation who will serve the society in the near future.

Technologies also evolve by stages, so they affect the methodologies used by teachers. Carrillo (s/d) mentions the transition from a model centered on the teacher and based on technologies which were transmissible to a model centered on the student, based on interactive technologies, and still to a model centered on collaboration in group based on collaborative methodologies. It is at this third stage that the methodological change is supposed to take place and, as a consequence, a change in the mental pattern.

The course of these stages outlines a course of education; in this context digital textbooks must be prepared to include working methods which are up-to-date, useful and motivating of a meaningful, communicative interactive, global learning, taking social habits into account. In fact, technology created a network society which promotes a dynamic, global, self-expansive culture and that changes the ways of life. The online culture architecture allows fluxes of information and relationships which exceed the time and space of learning as well as the learning contents. Downes (2011) speaks of a network that learns,

that adapts itself and that takes new forms based on reflections and interactions, networks that invite you to learn, to teach students how to learn and to motivate them to manage their own learning; thus, to be online in the networks, also shows what each one, or each school knows or does not know, their expectations and needs. This presupposes the growth of virtual learning communities since, according to Dias (2007), communicating and learning online, besides the social interaction or the individual learning, also involves the collaborative meditation on the creation of distributed knowledge. In this context, we can say that the digital textbook will be able to take a flexible form that will allow the identification of a school, or a class, or of an educational community, momentarily built or in a programmed based way. Its quality may, thus, reflect the capacity of the group and its dynamics. This way, the digital textbook may defy organizations to share, to co-operate, to construct knowledge as a tool that stimulates collective intelligence (Levy). The school textbook, which today's teachers follow closely, rigidly and blindly as representing all the knowledge the students should acquire, will stop being a book that promotes passivity, repetition and memorization, limited in information, to become an interactive, dynamic book that will allow access to large quantities of information in multimedia format and the use of the hypertext that will create a collaborative culture and both a synchronous and an asynchronous communication. This idea underlines the need for trusting the others, determining the teacher's new characteristics: attentive, critical, observant, inquisitive, productive and enterprising as well as his/her students. The e-book will, this way, help to turn solid learning into a more fluid one (Bauman, cited by Area, 2012). According to this author, the electronic book represents the change of a solid culture, representative of an era of certainties and of close, stable knowledge which passes from generation to generation through physical objects, into a 21st century's fluid culture, stimulated by advanced technologies which contribute to the student's training in a more flexible way and which develop skills for the autonomous construction of knowledge and its dissemination, so that students can deal with today's uncertainty and complexity.

Cabero & GIbert (2005) and Cabeo & Román (2006) underline the importance of activities that may lead the student to understand contents, to transfer them to other situations and to examine them more deeply in an autonomous way, which will integrate differentiated scenarios, which will promote the acquisition of specific vocabularies and which will allow the application of contents; activities which may promote the learning how to learn, which may be useful, meaningful and interactive, which may arise curiosity and create the motivation to deepen concepts and which may help students to create their own strategies of an autonomous construction of knowledge. However, they call their readers' attention to the fact that the websites that possess didactic materials are still designed for a passive model of learning. Do modern digital textbooks also lie upon this type of model?

The 2.0 Web tools promote writing, production and multidirectional interaction, revolutionizing the traditional applications by rebuilding environments in social networks "from many, to many" (Selwyn, 2011, 35), but, in spite of that fact, when used in education, we verify that there are not many yet who refer the use of good practices with their students. We can still observe on the Internet that they resort to several practices which are still connected with traditional patterns of reference and many others are still against using them frequently. The reason why this happens dwells perhaps in the fact that most teachers' training in ICT, particularly in that area, is still very elementary, as mentioned by Sanpedro (2012), Quadros-Flores (2010), Costa (2008), Blamire (2009), and consequently, it lies in the problem of adapting

to an efficient methodology which leads to innovations and recreations which are not so operative in what concerns the results people hope for. The reason still lies in the low availability of the resources that promote the use of ICT (Quadros-Flores 2010). Educational policies can also be fundamental as far as change is concerned, so a clear definition of goals, of the curriculum and of the way one evaluates competences help to build the designer of the methodological strategy.

Changes are not generalized and have occurred particularly in some contexts, namely in the classrooms of teachers who are more dynamic and innovating and, according to Simão (2007), in the normative field and in the curriculum plan; he even wonders whether the way teachers teach and evaluate, the way their students learn and show the knowledge they have acquired do not stay the same. This shows that the digital textbook will respond to the teachers' needs. In fact, the most demanding teachers will look for new e-book formats and will expect the market to offer them more and more effective answers. As far as the market's answers are concerned, quoting Visel, Adell (2007) mentions two types of electronic books: based on PDF, which imitates the characteristics of the physical book; based on the reader, which uses a certain language type – HTML or XML – to label different parts of the text structure. However, he adds that both deal with the book as a text and a text is just a part of the book which involves reading while the e-book involves writing as well. The book should be alive, stimulating dialogue and social life. He adds that electronic books should solve problems: the one of preservation relating to the use of electronic formats, the reason why active, deliberate policies are necessary as well as the use of open, standardized formats; the one of note-taking – as far as physical books are concerned you can take notes on them and you can lend them, but to one person at a time, while electronic books should allow several readers to take notes and add commentaries to the text, stimulating, this way, the exchanging of ideas and debate on the present and past text. In our opinion, the digital textbook should also solve several problems: to teachers, it should facilitate a living, dynamic learning model that should answer to the challenges of education in the future; to students, it should solve the problem of the weight of the backpacks they have to carry to school every day and that harm their health and the problem of the lack of motivation which represents an increased effort in the teaching-learning process; to parents, it should be a cheaper solution. Adell (2007) passes on the idea that technology can make the book alive because the book can be more easily updated, and technology may include tools that may facilitate the appearance of e-book designers in what concerns formal, multimedia and interactive aspects and that may facilitate freer surfing through the hypermedia. The e-book is, thus, a living book, online, a book which brings the communication between authors and readers alive, a book with social life, in Vershbow's words, an unfinished product because it is dynamic. He adds that, as far as school digital text books are concerned, teachers should be able to elaborate and hand out didactic activities to their students, parents should have access to their children's school progress, assiduity and homework, and the platform tools should allow the communication among intervenients and the development of learning networks. Nothing better than to visualize the e-book of the future! Matas (2011) suggests "a next-generation digital book". A book in which interactivity plays a determining role. Flexibility of images, graphics and interactive videos are highly valued, taking the student to real scenarios, and the interactive simulation is valuable since it will most certainly attract students to digital books. The possibility of accessing the digital textbook via

mobile-phone will solve a lot of problems, but it will also present a challenge to school, as far as the students' guidance is concerned.

As change takes place, a new school is created, a school which is different from school in the past, a school in which unidirectionality gives rise to multi-directionality; schools connected in network establish connections that may (re)create information patterns that encourage innovation and new ways of thinking. Quadros-Flores (2010) presents three adaptation stages of schools to the most advanced technologies, showing that in a last phase, schools may become more intelligent, more humane, able to translate feelings, knowledge and ideas and to expose themselves to the world; schools may be able to relate and interact; schools which will be reflective, critical and enterprising in a large, real, virtual space; schools which will be able to respond to the knowledge society: school (re)organization; competence acquisition, experimentation; renovation, acquisition.

For Area (2007) today's challenge is the future citizens' educational system and our society's democratic system. In this context, Barbosa (2006) thinks that the school is expected to be the place where democratic practices are experimented and a way of learning the virtues and attitudes which are necessary for the promotion of the new forms of citizenship. Carneiro (2007) designed different scenarios of the school course. In one of those scenarios he mentions the rupture with the factory model and the change to a model which stimulates constructivist pedagogical models in connection with multi and interdisciplinary teamwork. That is why teachers will integrate networks which will provide update and professional development. In this context, the key-note is a citizenship of participation and learning of duties and solidarity which will ensure the fundamental rights. That is the kind of citizenship it is expected in this context.

2- The teaching-learning process: the human brain's behavior

The restrict use of traditional resources inhibits evolution, but the use of new technological resources and of new technologies recreates the educational environment and allows the development of a different school. In a situation of change, people must mainly focus on *how to learn*, because *what we learn* is easily reached. The way we teach, educate and teach how to learn in a global world, in which technology promotes interconnection, self-learning and massive intelligence development and uncertainty conditions the future, school books and the traditional models are no longer an effective answer to the interests of the generation of the XXI century.

To make the teaching-learning process easier and prepare today's young people for an uncertain future, we consider that the way the human brain works is extremely important, despite the fact that we are conscious that the systematic use of these new technologies affects brain development itself.

After reading Wolfe's book (2004) we realized that:

- The brain has the ability of mentally transferring situations, so when an action is frequently repeated it is memorized, becoming automatic and we need less awareness to do the task, as it happens when we are learning how to drive.
- As the brain gets used to new things, it ignores them. Thus, the brain is always looking for stimulations and trying to find out if what is received is different every time, if it is something

new, being this fact an important part of the filtering process. Novelty, the intensity of the stimuli (loud sound, intense light) and movement make people pay attention in an innate way because, as the author adds, the human brain is programmed to focus on unusual situations.

- Memory allows us to learn by means of experiences, it is crucial for survival.
- There are two types of memory: the declarative one, which stores and remembers the information we can speak or write about, is reflected and reflex, can be incidental (remembers places and times) or semantic (includes symbols, rules and precise words, like the multiplication table); the procedural one, which consists of how to know and how to do, makes us focus on the task, making sure that the movements are performed correctly.
- The information we get through visual stimuli is interpreted and grouped in the visual cortex which means that two people can look at the same thing and focus on different things or even see different things.
- Meaning and Emotion are two factors that influence the brain capacity for paying attention to information and keeping it; that is to say, the brain pays attention to a new piece of information, but if this piece of information is considered to be senseless it will not be processed. That is what happens when we are using a book written in an unknown language or a text about something we do not understand: we do not get motivated. Our brain cannot rebuild a circuit which has not been activated before, so it does not receive the information. If the information in the classroom does not relate to something the student has previously stored, it will be excluded as senseless.

This way we consider that digital books must take into account the following requirements:

- Allow the consolidation by means of memorization, understanding, experience and know-how;
- Develop declarative and procedural memory;
- Promote something new to attract brain attention – this means the application of several resources with diversification of movement, light, sound, colour, rhythm and interactivity. Sensorial memory filtrates information;
- Avoid repetitive sequences or resources;
- Encourage new working methodologies, as the use of the e-book will not have the desired effects without methodological changes;
- Include an introductory note of preparation and orientation of the subject because that will raise the probability of better attention and, as a consequence, will lead to more lasting knowledge;
- Be careful with the type of language one uses, the contents one exposes, the possible links, the type of resources and the sequence of contents, because learning has different stages and the benefit one gets in a specific stage depends on one's knowledge of the previous stages;
- Enable knowledge sharing and collaborative spaces in Network:
- Make the teacher's individualization of the digital book possible so that he can adapt himself to the different sociocultural contexts and needs, making the process of learning more meaningful and emotional. This way people will have stronger remembrances of the topic which aroused attention. Solving life/daily problems is another way of raising emotional and motivational concern;

- Be safe, appealing, interactive and open. The syllabus taught out of context causes misunderstanding and demands a lot of memorization effort and effective learning does not take place sine what you learn does not last.
- Allow the creation of contents and their storage and the extension of the book throughout the class and its collaborators.

If a digital textbook offers all these features, it will allow the student a wider field of action, thus allowing him to learn more about each topic, it will challenge the ways of evaluation as it strengthens informal learning and it will challenge pedagogical methodologies as it needs a pattern which helps the student to organize the information he gets and to transform it into effective knowledge that he can critically use in his daily life. Furthermore, it will lead to a more flexible curriculum and completely change the student's teaching-learning process; it will also encourage social constructivism as it values the interaction among individuals as far as tasks and production of concepts are concerned. This way we believe that the digital textbook can make schools more intelligent and sensitive, getting closer to what the human cortex allows: thinking, dreaming, imagining, innovating, feeling, criticizing, learning and producing. This way it is possible to understand Landim's table, which shows that the learning process happens mainly in situations that involve the different sensors of sense (Table 1), and this is the reason why we underline once again the power and potentialities of today's advanced technologies: sound, image and interactivity play an important converging role in the teaching-learning process.

Table 1 – How learning is achieved

Knowledge	
How people learn	How it is preserved
1,0% related to taste	10% of what we read
1,5% related to tact	20% of what we hear
3,5% related to smell	30% of what we see
11,0% related to hearing	50% of what we see and hear
83% related to sight	70% of what we say and discuss
	90% of what we say and immediately do

[Source: Mehlecke & Tarouco, 2003]

As a matter of fact, our eyes contain almost 70% of the body sensory receptors and every second they send to the brain million pieces of information to be processed there, causing people to say that a picture is worth a thousand words (Wolf 2004). Sight helps to keep information and broadens understanding. The same happens with the learning of a musical subject which is better achieved if students are involved in

its making. The author adds that our eyes can get an image like a camera does, but what we actually see is influenced by the information we store in our brain. This shows the importance of the knowledge we possess and also that an ordinary image or video in the textbook require the student's previous contact with that particular subject otherwise they may not produce meaningful effects on the learning process. We underline the importance of the teacher's role as a guide, a mediator and a "*coach educator*" in the teaching-learning process, so that each and everyone can give their best and grow in a know-how environment, and so that information overload does not become cognitive noise or garbage and from it one may accomplish meaningful learning that will produce knowledge.

This way, a digital textbook may make students forget the physical space of the classroom, setting them in new environments, where they can experience and live new relationships and build an experienced knowledge, enlarged by their own or peer group motivations: the kind of knowledge which will be better consolidated and memorized for a longer period of time. According to Epper (2004), an active learning makes students learn better, by directly involving themselves in the application of contents in addition to listening to the teacher. Students need to talk and write about what they are learning and associate it with previous experiences to internalize new concepts. These are the advantages of a digital book when compared to a physical book which is more static and limited. In the past the prevailing model expressed a deep concern with information transmission based on memory and with information processing: repetition and attention were fundamental; however, the lack of understanding and emotion shortened the period of time memorization lasted. Nevertheless, learning takes place at a concrete, symbolic, abstract level and repetition as a routine, although important to acquire an automatic habit such as reading, writing, solving equations, etc. is less effective as far as the understanding of a historical event or the explanation of words are concerned. Elaborative repetition is more suitable in these situations. According to Wolfe (2004) these strategies encourage the student to organize information in such a way that it will increase comprehension and the retaining of information because they increase memory, making the information more meaningful and relevant to the student. He adds that if you are conscious of how information adjusts itself to meaningful unit**s**, you will find a way of working with higher and higher quantities of information, that is to say, teachers should be able to see connections that others do not see, but they shoul not teach them, because students need make their own connections.

Involving students in a project or experience is more productive and effective when compared to a situation in which they only listen to the teacher and use the traditional book made of paper. Piano players play their music by themselves and students are not different. Goleman (2002) notes that researches show that people learn better when they use methods which are adequate to their own styles. Learning theories underline the position that effective knowledge is reached through reason or experience and that behaviorism, cognitivism and constructivism show how people learn.

This way, according to Siemens (2007), the first one – behaviorism – values the observable behaviour which is centered on stimuli responses and learning changes behavior. The second one – cognitivism – recognizes the individual in the collective knowledge and that is the reason why the author emphasizes connectivism as a new paradigm of teaching and learning as both individuals and organizations develop specialized networks and the network is a cognitive agent that overcomes individual limitations. In this sense the challenge is centered on the students' capacity for creating their own learning networks to

evaluate and filter information overload, to connect with others, to indicate lack of knowledge and to offer new and creative combinations of information in order to increase their knowledge, advancing and expanding it. The third one – constructivism – suggests that students should construct their own knowledge supported on problem solving in collaboration with others. It presupposes the transition from a teacher-centered learning to a student-centered one, a type of learning that is also more centered on the relationship with others, thus, being more collaborative.

In this context, both the teacher and the digital textbook should, in addition to transmitting knowledge, guide and facilitate learning, sharing and collaboration. Students should construct their own knowledge, in connection with others and with the world.

The communication process is complex because, besides involving the sender and receiver, the encoder and decoder, the channel and the message, it also involves a context which enhances communication. In what learning is concerned, Escudeiro (2012) refers the construction and the visualization of knowledge. The first one presupposes knowledge acquisition, its deconstruction and application and the second one, the use of visual representations and interactive features which enable the creation, transfer and perception of knowledge through meaningful communication. Sound, image, movement, light, color, voice, interactivity are among the many key factors of communication to which current technology effectively responds. The traditional physical book possesses a lot of limitations. For example, images are static and inflexible while in the digital textbook they are dynamic and their availability can be promoted in balanced way.

3- The digital textbook (e-textbook) in Portugal

Discussing the digital textbook involves much more a prospective approach, trying to establish the lines in which to insert the future of education. An e-textbook implies a view supported in electronic equipment; it is, thus, performed in a specific format for that purpose and it can be easily available for its users, regardless of time and space. It does not merely mean availability in electronic form, for the e-textbook allows hyperlinks and adding videos, films and animations. Therefore, it demands available technological resources and, in order to be included in the daily school tasks, it determines teachers with enough ICT training toward the technological domain and methodological change, which means it is possible to find resistance from lots of teachers who are used to more traditional pedagogical resources and models. It must be, nonetheless, pointed out that the integration of the digital must not eliminate the possibility to use other physical resources; both can cohabit, meeting diverse needs. Rodríguez (2003) mentions limitations within the physical resources and the fact that they develop a type of teacher with a sense of consumerism, dependent upon elaborating materials and decisions of publishing companies. In this sense, he mentions (2007) the existence of a crisis in the teaching practice, since teachers are more concerned about selecting books and knowing how and where they are going to use them than about researching other kinds of materials, and a crisis in the educational policies which are more concerned about recommending the use of certain materials than providing means to a reflection on them or having teacher elaborating them themselves. He adds that, in reality, despite the existence of some technological resources used in isolated moments, the textbook determines the work done at schools. Effectively, it is a

powerful instrument which gathers a set of information, according to the official program, for it serves as a rigorous guidance for many and only a few teachers point out any critic, reflection of demanding parameters on a scientific and editorial level to which they are subjected. They usually have a clear structure, intending to stimulate the students' participation and learning.

According to nr.1 of the article 15 of the Portuguese Decree-law nr. 261/2010 "Textbooks to be used are chosen from the ones that, as a result of the evaluation process, have been object of Certificate assessment mention." The assessment criteria of textbooks which have not yet been submitted to evaluated and certified are based on organization and method: it presents a coherent and functional organization, structured within the student's perspective; it develops a facilitating and enriching methodology of learning; it stimulates autonomy and creativity (DGE, 2012). The choice of textbooks taken by schools is within the competence of the coordinating body and educative guidance, which means that groups of teachers are created to analyze and select the textbooks properly reasoned also according to a set of criteria. The Ministry of Education created a Database of Textbooks, allowing the online collecting of the selections and choices made by the schools in order to manage the print run estimate.

Note that in Portugal policies of incentive to use ICT have been promoted and, in this sense, an updating of the classrooms and schools in general has been occurring; as a result, a response of change from the publishing companies regarding textbooks supply is expectable. In these past few years, the textbooks used by most teachers are of physical media and come with an additional CD-ROM, structured for linear usage without bringing in possibilities for methodological innovations. However, the latest analysis of textbooks, in different school grades within primary school and published by different Portuguese publishing companies, led us to conclude that there are two significant models that dominate the market and which are offered, for free, to schools that have chosen their textbooks: Escola Virtual [Virtual School] (Porto Editora group) and "20 Aula Digital" (Digital Lesson) (e-LeYa group). Note, nevertheless, that the textbooks include a teacher audio CD with the narration of texts supporting the oral comprehension of the textbook or audiobook, in the case of music lessons to provide the enriching of children's musical-sound personal experiences.

- The "Escola Virtual" (Virtual School) is integrated in the BRIP (Banco de Recursos Interativos para Professores [Bank of Interactive Resources for Teachers]) is considered to be an educative project that aims to provide attractive and effective resources, for different subjects and to the school grades, according to the textbook chosen by the publishing companies (Lisboa and Porto Editora, Areal Editores), in leading students to school success. It is, thus, a learning platform directed to students' self-training and which allows the personalization of a textbook in digital format. It is destined for the entire educative community (students, teachers, parents and institutions). In what comes to teachers, it involves four strong aspects: Classes, Resources, e-Textbooks, Topics. Regarding classes, it provides diverse digital and interactive resources which involve audio, image, video and animation, it sets record of the tasks delivered by class or by student and of the reports done, allowing the viewing of time, evaluation, state, tips, attempts, details and, also, to print and export. This way, it makes it easier to control situations related to the delivery of the student's material. It also makes it easier to organize the teacher's work, in what comes to the students' biographic data, class schedule, week plan, record of group work,

tests grading and evaluations. As for resources, there is a list of general resources (Textbook, worksheets, games) which allows researching by subject, publishing company, projection and others, and favorite resources. The e-Textbook gives access to the textbook in digital format, allowing you to access a toolbar that enables the underlining, scratching, adjusting while supporting the teacher's communication. The student's e-Textbook has got additional resources that stimulate the content scanning in a more attractive and dynamic way. In relation to topics, it allows a selection by topics and subjects. It is also possible to research tests by type of question and difficulty level. There is a pre-drawn fact sheets bank for students and the teacher can organize a folder with tests or consolidation worksheets that he has made, according to the student's needs, goals, and type of class, selecting resources placed in the platform or adding other external resources. It allows the teacher to print or send the paper to the students and access dictionaries. For subject consolidation, students have access to pre-set conceptual maps and interactive activities with animation. This platform also allows the development of online communities (activity, profile, friends, photos, Blog, Forum, Chat) enabling the user to view the total and last visitants. The presence of an organizer stimulates work organization all year through; the mailbox facilitates the quick message sending among pairs, promoting the sharing of information. Each user has access to "My Account", a home page which designs the tasks and activities done by each user on the platform. Although it suggests a general planning, it allows a personalized planning and the creation of a lesson plan, which are easily saved in "my planning". We believe that the possibility of programming lessons and the easiness of implementation increase the teacher's performance in context, it increases the student's concentration time and reduces the off-peaks or passive times within the lesson.

- The LeYa group meets the challenges of school projects with the "20 Aula Digital" (20 Digital Lesson) for teachers and students (digital resources supporting the textbook). "20 Digital Lesson" is a platform avowed by several publishing companies, namely, Texto Editores e GaiLivro, ASA, NovaGaia and Sebenta. It is composed of four major dimensions, aiming to boost the lessons and to motivate students: multimedia textbook; digital resources bank; digital worksheets bank; planning. There are other tools that support the teachers' communication, allowing them to set meetings, write notes, research and zoom. In what comes to the multimedia textbook, it allows the teacher to project and explore the textbook pages and, by being articulated with contents in digital format, it allows a more dynamic, interactive and attractive exploring of the issue being studied. The availability of a resource bank associated to its easy use, whether in the way of using in the classroom or in the organization of the lesson plan, by dragging, promotes the use frequency in the classroom and the organization of its sequence, avoiding wasting time and breaking the rate of work. We must point out the possibility for the teacher to add external resources, once the platform directly interconnects to the file and to the Internet, allowing the access to resources prepared by teachers and to a range of other resources found online with diverse categories. The platform thus presents a list of general resources that involves the multimedia textbook, the digital test bank and games, a list of the teacher's resources "my resources", allowing the teacher to add external resources to the CD-ROM and,

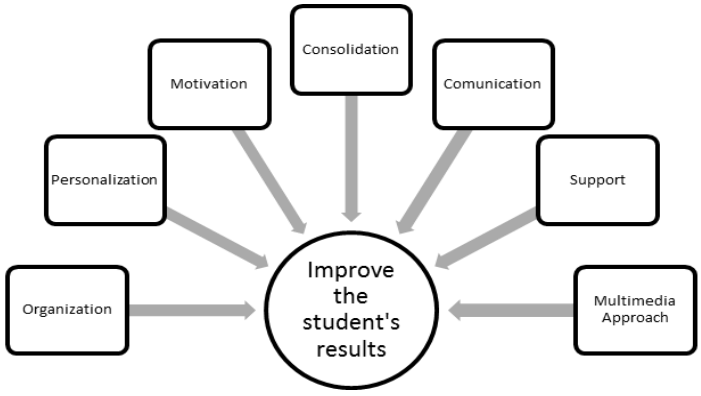
also, resources selected in "favorite resources". The editable test bank, besides the worksheets organized by the textbook topics, integrates "my tests", allowing the teacher to easily elaborate personalized worksheets to the student's context, which enables the print or projection in the classroom. Although there is a general plan of the subjects content, with pre-elaborated planning, the platform allows teachers to create their own personal planning so that they do not feel restricted to its proposals, as it occurs with the physical textbook. The lesson plan involves "all plans", "base plans" and "my plans". Lesson planning with diverse resources and under a sequence created by the teacher according to the rhythm he or she wants to implement, the possibility to save and access *a posteriori* a lesson list set by the teacher and to send them to the students, and the possibility to add text (topic and issue) to the resource, supports communication and orientation of the speech, it can stimulate motivation, depending on the type of resources added, it increases the rate of work, adjusting it to a personalized context, it allows the interaction while learning, the attraction and participation within the lesson, since it extends the concentration time and contemplates the information provided by the school textbook. Furthermore, it makes the teacher's job easier. Adding to this panoply, there are also animations, activities and interactive games, types of cartoon modes, which convey contents and facilitate its consolidation in a recreational way. Also, the easy creation of concept maps allows the clear organization of ideas and their consolidation. Therefore, generally speaking, 20 Digital Lesson suggests that the teachers explore the multimedia contents articulated with the school textbook, that they prepare lessons quickly with resources of the project or with their own resources, evaluate their students in an easy way, accessing the editable worksheets bank, communicate and cooperate taking advantage of the communication and interaction features and sharing resources with the students.

- Another concept and product currently in the Portuguese market is the called "Manual Digital II" (Digital Textbook II) developed by the Lusoinfo Multimédia Company in collaboration with the Instituto de Educação da Universidade do Minho (Education Institute of the University of Minho). It is about a multimedia resource, designed from scratch in a digital format, which is innovating as far as e-textbooks are concerned, to support teaching and learning in Primary School. The software can be installed in any personal computer with Windows, being under way to convert it into other operative systems, even in mobile devices. It is structured by school grades and it comprises the fields: Portuguese Language, Math, Study of Social Environment, English and Information and Communication Technologies. This software organization facilitates its curricular integration in the classroom, as well as the use in extracurricular fields. Since the structure and navigation of the Digital Textbook are intuitive, it is possible for the child to autonomously use it and, thus, evolve at his/her own rhythm, managing the learning and developing personal strategies of situation and problem resolution. The software is not restricted to exposing content, but it rather promotes integrating activities that favor interdisciplinarity and allows the student to have a significant learning (Ausubel, 1968), that is, the child is involved in a "process through which a new information relates to a relevant aspect of the knowledge structure" (Moreira & Masin, 2006, 17), in a close relation to his/her interests, with absorbed

concepts and with the surrounding environment. As a multimedia product, the Digital Textbook includes text, image, video, animation and context simulation, which can respond and correspond to the different types of students' "intelligence", in the line of the "multiple intelligences" concept (Gardner, 1983). The proposed activities (experimental activities, suggestions of small projects, diverse games, worksheets and others) are oriented to help the child to acquire and surpass skills of elementary thinking in the sense of developing the skills of greater cognitive demand.

As an effect, the activities, particularly if accompanied by the teacher, stimulate the development of a critical and reflective attitude in the students, toward the development of critical thinking, more and more necessary in the society of knowledge. The Digital Textbook can, therefore, be put into perspective as being a strategy so that the student "learns with technologies", asserting his/her role as "partner in the educative process" (Jonassen, 2007, 20). Recently, The Digital Textbook has been enriched with the Classroom Website, a platform somewhat close to the "social network" concept which allows the online cooperation and sharing among students, teachers and parents properly identified by the system, which guarantees safety, an important factor in the online working with children. The work spreading is, for children, a great asset since the fact of having an audience, knowing that the educative community has access to their school productions, stimulates them to perfect their assignments. This online interaction is also an important strategy in connecting the school with the family. For the set of interactive multidisciplinary and interdisciplinary activities and for the online cooperation dimension that the Digital Textbook provides, it is, surely, a good resource at the service of the teachers as well as families to get the child involved in educative activities with ICT.

We verify that, until now and in a global way despite the differences, there are significant similarities in the concerns that sustain the edification of digital platforms (Pict. 2).



Pict. 2 – Fundamental pillars that sustain the e-textbook

The organization of the teacher's work, whether on a level of classroom and assignments done, or on a level of classroom plan, taking tests and evaluating, makes the teacher's job easier by having a global view of the class, of the student and the agenda and it contributes to the adjustments to the learning

rhythm and possibly better school results. The support to the teacher and student through multimedia resources that stimulate sight, hearing and interaction, such as animations, recreational activities, videos, interactive games and concept maps, facilitate the transmission and consolidation of learning and contents, develop memory, promote content comprehension, draw attention of the brain, thereby increasing the attention skills and make knowledge more persistent. In this context, they motivate for and in learning. The possibility of communication among peers and the fact that the teacher can send documents designed by him/her, and even organized lessons, eases communication and stimulates the sharing of useful information. Also, the individualization of the textbook pages according to the needs and the easy integration of other external resources to the platform allow the adaptation to the context and to the students, turning it into a more significant and emotional learning, and animate a guiding school of its own transformation. The virtual school even allows a network communication in a safe platform. The chat and the forum stimulate the sharing of knowledge and the collective building of knowledge, but the good results depend on the good use of these resources and the implemented dynamic by the teacher and by the class; hence, the teacher possesses an essential role in using these resources and an added responsibility regarding the digital fracture. It can promote social building and problem solving, collaboration, socialization, know-how, life skills and it promotes the involvement in the task of learning by developing several skills. Quoting Vox, Cobo & Moravec (2011), they mention that the digital skills are learnt when people perform tasks that go beyond the simple use of technology, through informal socializing and through a non-induced way, and that the invisibility of ICT is related to the ability to generalize, connect and disseminate the knowledge that has been created. Note, nonetheless, that these abilities are not acknowledged in a formal evaluation, thereby requiring a reflection on the ways of evaluating a digital culture.

Generically, the current digital manual is directed towards a policy based on students' results, but it reveals a curious change in what comes to the physical textbook which instills a different image of the teacher, the student and the learning context. In this sense, it can be an important link to build a new methodological model in the digital era. Different publishing houses meet the new challenges and make the teachers' tasks easier in the teaching-learning process, improving their own performance. The easy use of these platforms, while not demanding a lot of ICT knowledge, tends to meet the elementary level of training of most ICT teachers and even of the school computer equipment; we must point out the fact that these platforms are likely to be used even in schools with no Internet access because they also exist on CD-ROM support; hence, they reveal their use feasibility and possibly their success, furthermore, they diminish two significant obstacles in the integration of ICT: lack of time and teachers' training.

4- Final reflection

Teaching actors in the era of information and for the society of knowledge, in which technologies of information shore up the teaching-learning process, led us to reflect upon current e-textbooks, an important instrument in redefining the teaching practice in a context of change. It was verified that current technologies are effectively promoters of a new designer within education, carrying in it, meaning and emotion in the teaching-learning process. They demonstrate a more effective response to social demands,

to the interests of this new generation and even to the challenges that the human brain implements. Moreover, the potential they offer come and amplify the ones in the physical textbook, thus meaning progress and a new revolution in the book history and technology. Knowing that the physical textbook stimulates the memorizing and repetition given its physical, time and space limitation, it seems to us that this e-textbook design is the first step in the downfall of the traditional model and towards the creation of a dynamic learning model that is bold in the creation and production, in the collaboration and network learning. Despite striking political ambiguity in the speeches regarding the requiring skills and curricular evaluation, since they significantly reflect a policy based on results that ignores the process, the path of ICT inclusion seems to show a type of learning that seeks meaning and emotion in the educative experience, action over the acquired knowledge, solving life problems and in context, it invites us to reflect upon an education that meets the demands of a global world. Publishers, through physical books, have been guiding the educative agenda. However, by allowing the teacher to recreate the textbook, they open the possibility for the school to be the one to recreate the direction of the change that is capable of taking on the social challenges and building autonomous citizens and with a creative and critical thinking. Besides, e-textbooks enable network interaction, participation and communication and also make it easy to integrate other free tools online, inviting us to be co-educators in the collective building of knowledge, magnifying the genesis of meanings, and creating new concepts in line with the social and cultural democratization. Memorization, comprehension, creativity, innovation, collaboration, production, dissemination, keys to the change of old practices into training youngsters who are able to think systematically given the challenges of an uncertain society, yet demanding in the world of globalization in the digital culture era. The e-textbook will stimulate all of these dimensions, being in consonance with the educative project and the global citizenship, in the sense of comprehensive training of the student and in the development of a critical attitude held in the values of democracy and social justice. Therefore, the challenge of school increases in the flexibility of the curriculum, in the organization of information, interpretation, comprehension and smart use of knowledge in context, in the global evaluation, including the "invisible learning" (Cobo & Moravec, 2011) and in life skill within a society of information and networking. The e-textbook is the reflex and impulsion of the passage from a solid education to a liquid one, redefining the ways of learning and organizing knowledge.

In a scenario undergoing transformation, despite the technology proposed by e-textbooks being easy to understand and use, a monitoring of the teachers' training emerges it should set the rhythm of the change with results that make known the so hoped and longed for quality of education in Portugal; although the technological equipping has improved in the Portuguese schools, an investment in technologies that stimulate the use of ICT emerges.

So, the effective use of the studied platforms will indicate the direction of change and the sense of the practices and, by transforming the teaching-learning process, we hope they will improve the satisfaction of the educative community, the school results in general and the preparation of youngsters in the era of uncertainties.

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