

Word-y: Structure and Content Design of Educational Videogame to Learn English as a L2

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ABSTRACT

The use of videogames in the educational area has taken a bigger role among kids, adolescents and adults, being considered a relevant element, leaving behind its playful look at leisure. Particularly in Chile, thanks to the integration of ICT, several tools like didactic presentation programs or mobile apps facilitate the teaching and learning process of a second language like English.

The aim of this research is to describe the design of an educative videogame and to describe the validation process of the Word-y contents which are associated to learning vocabulary in English. The design has been developed using the incremental prototype model' using the free version of Construct2 software. As projections, the future work implies improve the first prototype applying a content survey to 30 English teachers and educational informatics experts.

RESUMEN

La utilización de videojuegos en el área educativa ha tomado cada vez mayor fuerza entre niños, adolescentes y adultos, siendo un elemento significativo y dejando de lado aquel aspecto considerado únicamente como lúdico. Particularmente en Chile, gracias a la integración de las TIC, varias herramientas como programas de presentaciones didácticas o aplicaciones móviles facilitan el proceso de enseñanza y aprendizaje de un segundo idioma como el Inglés. El objetivo de esta investigación es describir el diseño de un videojuego educativo y describir el proceso de validación de los contenidos del videojuego Word-y, los cuales están asociados al aprendizaje del vocabulario en inglés. El diseño ha sido desarrollado utilizando el modelo prototipo incremental utilizando la versión gratuita del software Construct2. Como proyecciones, el trabajo futuro implica mejorar el primer prototipo a través de la aplicación de una encuesta de contenido a 30 profesores de inglés y expertos en informática educativa.

Categories and Subject Descriptors

D.3.3 [Programming Languages]: Language Constructs and Features – Design, languages, verification.

General Terms

Measurement, Documentation, Performance, Design, Reliability, Standardization, Languages, Verification.

Keywords

Edutainment, Expert Judgment, English as Second Language Learning, Videogames.

1. EXTENDED ABSTRACT

The poor level of English vocabulary of graduated students in Chile is considered one of the biggest issues within public education, which directly affects their speaking, reading, listening and writing skills and even exceeds the basic level of international English evaluation tests such as KET, PET and TOEFL. Thus, continuous curricular adjustments have been made in teaching English since 1996 to provide students with tools that enable them to face the demands in today's world being a good example of this are compulsory English lessons from 5th to 12th grade.

The educational Chilean English teaching program for both primary and secondary education includes the development of the 4 communicational skills for a second language: oral and written expression, listening and reading comprehension. Teachers are required to have and use information technology and communication (ICT) skills, as enabling tools of learning.

English Opens Doors, a Chilean government program created in 2004, gives diagnostic tests, professional training to English Teachers, scholarships, fellowships, and emphasizes the use of modern technologies including e-learning and interactive software. However, the lack of resource and the lack of training of teachers in these new tools trigger poor results in student's achievements, particularly in vocabulary acquisition.

Motivation, high levels of anxiety and no interest due to misunderstanding on the effective use of a second language, generates a poor vocabulary and morph syntactic contents. Nowadays, students do not comprehend the importance of managing or understanding a second language, and how it can provide them better educational and / or employment opportunities in a near future. English is one of the most spoken languages in the world, along with Mandarin Chinese, and many efforts have been made to improve the content and methodology of teaching second language. In response to this issue, today it can find a considerable number of didactic tools, associated with the use of Information Technology and Communication (ICT); tools that claim to give the teacher key elements to improve their performance and as a consequence to the students through software, educational social networks, repositories, games among others, using simple elements, particularly to the new generation of digital natives.

The growing importance of technology was highlighted by UNESCO and is emphatic stating that "the experience of introduction of technologies in educational systems in Latin America and the Caribbean over the past twenty years has shown little effect on the quality of education. Part of it is because the logic of incorporation has been to import, incorporating devices into schools, cables and computer programs, without clarity about the educational goals that are pursued, what are the most

appropriate strategies to achieve and only then, be aware of what are the technologies that will support their achievement” (2013, p.6). ICTs also impact positively on the growth of Latin America, through the convergence of devices, applications, networks and Internet-based platforms. In this context the interaction between mobile technologies services cloud computing, big data analysis, globalization and diversification of the use of social networks and remote sensing ubiquity progresses. This is represented in national policies as: Uruguay Digital Agenda 2011-2015, Peruvian Digital Agenda 2.0 2011-2015 2011-2015 Agenda Digital.mx Mexico, the National Development Plan 2009- 2014 in Costa Rica, and Telecommunications and the Digital Action Plan 2010-2014 in Chile.

Today it is indisputable that ICT has come to play a major role in their interaction with the student, since they were born in the context of the information society and have become familiar with items as cell phones, video cameras, or clickers, interactive whiteboards, which have been used to understand the new codes of communication and use new information technologies themselves assiduously for entertainment and training activities. They offer a number of possibilities in the field of education including for example: creating more flexible learning environments, eliminating time-space barriers between teacher and students, increase of communication modalities such as chat or email, empowerment of scenarios and interactive environments, among others (Cabero, 2007). In this context the study of the processes of integration and use of ICT in the school system has been one of the recurring areas in educational research worldwide (Ping & Hang, 2003; Tondeur, Van Keer, Van Braak and Valcke, 2008; McMahon, 2009; Sang, Valcke, Van Braak, Tondeur and Zhu, 2011). Badilla, Sepúlveda and Careaga (2014) report their findings confirming that the use of technology like mobile devices enables student's practice of English in higher education, transforming and improving the learning environment inside of the classroom and students feel comfortable and secure because they have a teacher and technology's support. Some studies have revealed potential benefits of video games in education as the possibility of providing immediate response, delivering information when it is requested by the student, productive learning, motivation in the different cycles in which the experience develops self-regulated learning or teamwork (Gee, 2003; Rosas, Nussbaum & Cumsille, 2003).

In this context, Game-based learning (Thanekbar, 2015), Edutainment or Gamification (Revuelta & Esnaola, 2012), are new concepts inserted to complement the teaching process, working the program contents in a fun, motivating and innovating style, reducing the anxiety levels of students, and turning the learning process into a game, as a more friendly process.

2. LEARNING ENGLISH AS A SECOND LANGUAGE

Acquisition processes of native languages are strongly contrasted with second language learning, as much as the contexts in which both are conducted and the motivation factors that go with this processes. Dunkel (1948) mentions that since learning our mother language and learning a second language are both learning, it is assumed that one illuminates the other, so this idea shows that the acquisition of language illuminates learning another language.

Krashen and Tracy (1983) argue that the acquisition of a second language is achieved through the exposure to it, if the message sent is understandable to the listener, even if it contains unknown elements. Input or stimulus, is the most important element in any language teaching program, as they believe that the best context

for learning is encouraging the transmission of a message, ergo communicating element, as there might be no communication if the message is incomprehensible or meaningless. Moreover, they analyzed the process of acquiring a second language, which takes place unconsciously and by immersion, contrasting it with the concept of learning, which is conscious and reasoned. They recommend that both elements should be present, but in different percentages: 80% of acquisition and 20% learning approximately. Krashen's Input Hypothesis (1985) supports that there is only one way in which human being acquire language- comprehending messages, or receiving a comprehensible input.

The English teaching program presented by the Ministry of Education in Chile (MINEDUC, 2012) states that according to the communicative approach, language ceases to be regarded as a list of grammatical content to teach and becomes a mean to communicate meaning and a tool of interaction, in which the message and the use of language are relevant and topics must be significant and interesting for students. A negative point to consider in language teaching in our country is particularly the former mentioned by the government. It is extremely important to consider as learning topics relevant contents in relevant contexts. Otherwise, there is no way to guarantee the interest of the students in the subject matter, and even less, an effective communicational skills development to meaningful learning.

3. GAME- BASED LEARNING AND EDUTAINMENT

Nowadays, games play an important role to the learning process as a teaching tool, introduced as a facilitator. Sanchez and Arteaga (2015) mention that the game is an innate activity in human beings; it is part of their own development, however there are different drivers that do share in it. Revuelta and Guerra (2012) argue that the game has always been an important educational tool in all of human culture. This consideration has been changing over time and has been relegated to a mere object of leisure. The Adimark survey conducted in Chile in 2006 showed that 50% of pupils in primary and secondary schools use the Internet to play. Therefore the inclusion of video games in education was the next step. Sanchez (2012) argues that video games that have been labeled for over fifty years as stimulants adrenaline and promoters of violence, but in recent decades, this perception has been changing and today is recognized as a resource sustained in training based on the game, which encourages activity through exploration, experimentation, competition and group collaboration also helps stimulate self-learning, interest in further learning or deeper learning in certain subjects.

To Revuelta and Esnaola, (2013) teachers who incorporate videogames in the classroom warn that to start a process of integration of this technology, have to prepare in the same way that prepares his classes, who must have played well and analyzed what students expected to learn through this.

In Chile some relevant initiatives take place exploring the use of this kind of technology in education. Good national examples of video games for learning science, are Kokori and the VIDHaC2 software. The first is a free video game, developed by University Santo Tomas (<http://www.kokori.cl>) focused on learning cell biology; and the second, called also, Computer Gaming Skills Development through Science Stem Cell, created by the University of Chile (<http://www.c5.cl/ticedu/?content=home>) is oriented to produce role video games for mobiles and exercises to develop problem-solving skills, improving science learning

among students and strengthen the teaching process. There is another more recent initiative called Run for Life, developed by Medina and Badilla (2015) which seeks to increase the development of student's cognitive skills for learning process of human fertilization in the subject of Biology.

In relation to the impact of video games and immersive technology there is interesting literature about it. In the first topic Yu-Chu, Jen, Fu, Wei and Chun (2015) published results in leading research focused on analyzing how stress affects creativity in situations based on the game. Its main findings argue that stress stimuli employed influence on creativity during the games through two different ways: improving creativity through cortisol concentration and working memory and decreased creativity by causing negative emotions centered in frustration and anger. In the same line, Connolly, Stansfield and Hainey (2011) examined attitudes toward teamwork and motivation among high school students who were exposed to Alternate Reality Games (ARGs) for the learning of modern foreign languages. They found among its main conclusions that stress stimuli employed influences creativity during the games through two ways: improving creativity through cortisol concentration and working memory, and decrease in creativity cause negative emotions focused on the promotion of frustration and anger. Another recently published by Shute, Ventura and Ke (2015) study found significant increases in spatial tests applied to college students after playing the popular video game Portal 2. The differences in relation to those exposed to the game Luminocity were also found in problem solving and persistence.

Learning mathematics, Kebritchi, Hirumi, and Bai (2010) investigated the effects of using the series DimensionU math games for high school students by assigning a treatment group to play the games for 30 minutes every week for 18 weeks. Even though it could not be compared with the control group due to lack of development of similar activities without using videogame, the results indicate that the treatment group increased their scores on a standardized test in mathematics performance.

Rosas, Nussbaum, Cumsille, Marianov, Correa, Flores, et al. (2003), reported positive results obtained by the use of a set of five educational video games, collectively known as Sugoi. The video games teach basic Spanish language and mathematics skills to children ranging from kindergarten to second grade. Both math and spelling, the use of video games in the experimental group had a significant impact on post-test scores controlling for pre-test ability; and for reading comprehension, the effect was positive, but not statistically significant.

On the other hand Buckingham and Scanlon (2010) define the concept of Edutainment as a hybrid genre combining learning and fun. It relies heavily on visual material, in narrative or game formats, and from a more informal hearing, less didactic styles of address.

To Okan (2012) the purpose of edutainment is to attract and hold the attention of students to engage their emotions through the computer screen filled with vivid and colorful animations. So also it specifies that the games include learning materials with messages aimed at both children and parents. Therefore, this type of software encourages parents to believe they are beneficial in the development of skills in various subjects. Also, it increases learning expectations of students, learning to be a fun experience and can enjoy. Therefore, depending on the focus and aim to have a video game, it can be used for educational purposes as play leads to other actions as: learn, communicate, read, write,

calculate, experiment, research, test, think, sharing and participation, between others. (Revuelta, 2004).

According to Larrea (2012) not all games can be used for teaching or learning, but that they must meet certain conditions of technical and pedagogical nature, without losing its primary goal is to entertain. It can then define as intelligent game those that generate ecosystems they invite to use the intellect in an entertaining way to explore its environment. Thirty years ago Loftus and Loftus (1983) already reported that some video games take advantage of visual auditory stimuli, which are relevant to the game, but also produce inferences between video games previously learned or the former can be interfered with by the new game, which causes work of the short-term memory and long term memory. Therefore, talking about video games as a learning environment, is talking about a paradigm shift in education.

4. METHODOLOGY

4.1. Pedagogical Objective

The current project is taking place in Concepción, Chile, with the development of a 2D videogame named Word-y, created using the program Construct2 in its free version. The aim of the videogame is to generate a friendly game-based environment to promote the learning process of English vocabulary according to specific units and contents.

In order to develop this project it is necessary to consider the incremental prototyping model, developed by Lehman (1984) which considers the cascade model principles but adds improvements to the prototypes created, generating a better model than the previous version. It is important to mention that the contents selected belong to the English Teaching Program for first year secondary students in Chile and aims to create a friendly environment in which students may learn or reinforce vocabulary seen in class in an unconventional way, associating specific vocabulary to clear images, having fun, without even noticing they are immerse on a learning process, which is the research pedagogical goal.

4.2. Estimated users

The users to whom the videogame will be eventually focused on are first year secondary students or any other kind of second language learner who manages a basic number of English vocabulary related to daily actions, routines, food, and numbers and possess basic communicational skills on the language.

4.3. Storyboard

Due to the lack of videogames created to reinforce English vocabulary with second language learners, the following storyboard presents how Word-y videogame has been created.

The first step was to decide the most appropriate contents to work with, according to the learning problem detected. After analyzing the Chilean English teaching program, the most accurate contents selected to create a basic vocabulary reinforcement videogame the following vocabulary topics were selected:

- a. Food
- b. Numbers and figures.
- c. Daily routines

The reason to choose these topics is that they take part on the first year of secondary school programs and are also taught during primary school. In this way we can consider the student's background knowledge.

The next step was to create a storyboard, considering an appropriate and attractive setting, a main character, select a pertinent number of vocabulary and chapters, and later decide whether the game will punish or award the player. The former was taken, in order to diminish a negative experience.

As soon as basic vocabulary data was selected, it was time to create a background story and missions for the character performance. The story takes place in a small town. The main character, a secondary student called Patrick, will face the important mission of gathering a considerable number of concepts on his way to school. He will have to face three different levels of difficulty, being chapter three the most challenging one as he is about to complete the final mission. He has the ability to move back and forward, jump and catch objects. Chapter one's objective is to find and match concepts and pictures related to food. He has to touch a mystery box which will reveal a concept that will appear on the screen in bold. Patrick has to move around the block to find the specific concept required. If he catches a mistaken object, he will have to find the mystery box and try again.

The game does not punish the students mistake in order not to raise their anxiety levels, but at the end of the chapter mentions how many tries the student gave to the game.

The videogame has been called this way because of a pronunciation word game, mixing word and worthy, and becoming a word-y to play videogame.

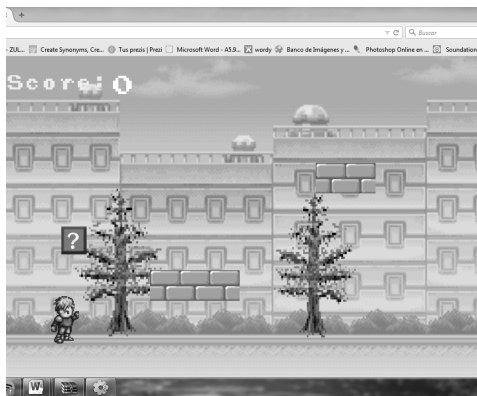


Figure 1. Word-y videogame background setting screenshot.

4.4. Videogame design and construction

Word-y videogame has been created with 4.3 free version of Construct 2, a 2D videogame program. The construction and design period took over 8 weeks in 2015, according to the following tasks:

4.4.1. Background layer Design

Three different backgrounds were chosen, one for each chapter. At this moment it was important to design and select 2D similar backgrounds of a small town, in order to provide coherence to the story.

Some obstacles are considered on the background setting too. Small cement bricks are part of the way. Some of them will help the character to reach easily the mystery boxes and pictures. Some

others will be just an obstacle on his way to reach his objective sooner (see Figure 1).

4.4.2. Character's design

With the help of Construct2 tutorial it was simple to design with the help of events, the character's movement skills, which are easily related to a computer's keyboard arrows. Left arrow moves the character to the left, right arrow moves character to the right. Up and down arrows makes Patrick jump and go down, respectively. The game instructions and mission will be explained at the beginning of each chapter, in which movement arrows are clearly instructed.

4.4.3. Structural Item Design

Besides the background layout of the game, some other important elements were created, specifically mystery boxes, from which concepts will appear and pictures to associate them.

To continue the coherent 2D design, every single concept and picture was created with pixel's style or picture quality.

4.4.4. Sprites and Items Action

Every single item considered to be part of the game is called a sprite (see Figure 2). Each picture is a sprite, and to each picture an action was added. In order to make a concept appear, a mystery

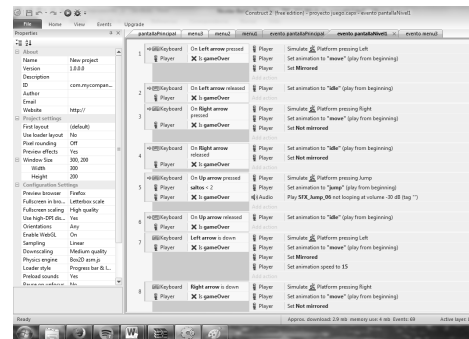


Figure 2. Word-y videogame event sheets.



Figure 3. Word-y videogame concept items.

box has to disappear and pictures or items have to be visible for the character to reach and catch. In order to make a more challenging project, if the videogame user makes a mistake, every single item disappear and the mystery boxes appear once again.

4.4.5. Game Cover, Instructions, Commands and Scores

The game cover was created with chapter's one background picture, the videogame name and the main character's image (see Figure 3). The 2D structure gives an appearance of a friendly and easy game and invites the player to give it a try. The cover has a button which moves the player to the second and third layout where the game commands, instructions and mission are presented. As it can see in the Figure 4, the game commands and mission instructions are text mixed with icons for an easier understanding of them. In terms of score, there is a point counting space on the screen, where the player will keep count on his score and performance.



Figure 4. Word-y videogame background cover.

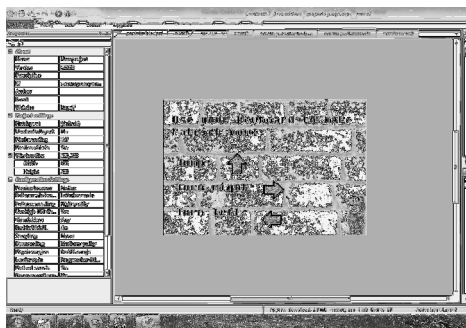


Figure 5. Word-y videogame commands menu.

In case the player commits a mistake, the score counter will reveal at the end of the game how many tries gave him to complete the chapters' mission.

5. PRELIMINARY RESULTS AND FUTURE WORK

Preliminary results are related to the videogame construction and design according to the pedagogical objects proposed in the project. The use of layers and event sheets, from Construct2 program, an appropriate storyline taking into special consideration the students' context and the use of specific vocabulary contents taken from the English teaching program for first year secondary students in Chile aims to promote vocabulary learning or reinforcement with the help of the videogame created, as a facilitating tool in the learning process.

The projects' next step is to create a content and structure videogame survey to validate Word-y. A non-probabilistic sample of people who will be intentionally selected, considered experts will validate or not the final videogame prototype through an online survey which will be created and shared through Google Drive. As soon as the data gathering is over, data will be analyze with Cronbach's Alpha which will reveal if the videogame, to the eye of the experts, may or may not be considered as an effective tool to learn or reinforce English vocabulary.

For proper results in relation to increasing students' vocabulary in the English language, it is expected to develop a set of didactical material to support teachers to using the game in educational settings.

6. CONCLUSION

The creation and introduction of a videogame in the conventional educational system may be considered a deal breaker. It is no mystery that there are still a high number of teachers who reject the use of ICT's during the teaching-learning processes. It is important to point that the aim of this research is not to solve the second language vocabulary learning issues of first year secondary students, but to substantiate if English teachers consider that the videogame presented could be a useful tool to reinforce the vocabulary contents presented on the game and, best case scenario, implement new prototypes, versions or chapters to the game, to complement, in an anxiety free setting, the vocabulary contents of the Chilean English teaching program.

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