Strong Shot, a Student Centred Designed Videogame for Learning English Vocabulary

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Summary. Most of current vocabulary games are simplistic and do not meet student's game preferences. Students are considered digital natives since they have grown up among technology. Thus, they have other preferences that past generations did not have. Consequently, a student centred video game may be a suitable methodology for learning English while meeting those preferences and needs. This paper presents a student centred designed video game as a strategy for learning and rehearsing English vocabulary and shows the process of development based on the active participation of a group of secondary students. Furthermore, a game experience evaluation conducted involving a second group of secondary students is presented. The evaluation confirmed that besides a good story, video game aesthetics also play a crucial role to motivate and engage students. The evaluation also showed that new strategies to present game story should be considered, since intended audience has a very limited English knowledge.

Keywords: Student centred design, Serious video games, Students as designers, English vocabulary learning, Vocabulary in context.

1 Introduction

Videogames have the capability to create an imaginary world that absorbs player's full attention, therefore they have become the new way of playing (Michael, 2006). Furthermore, videogames have clear rules, objectives and challenges that have to be overcome (Bergeron, 2006), and involve repeating actions in different contexts, increasing levels of difficulty and complexity, and providing reinforcement of earlier introduced content (Godwin-Jones, 2014; Lim, 2008; Betrus & Botturi, 2010). Consequently, success enhancement, motivation, attention and engagement may be achieved using video games within a learning process (Zea, Sanchez, & Gutierrez, 2009; Reinders & Wattana, 2014; Godwin-Jones, 2014; Prensky, The motivation of gameplay The real twenty-first century learning revolution, 2002).

Moreover, new generations are considered digital natives, since they have grown up among computers, mobile phones, Internet and video (Prensky, Listen to the natives, 2005). Therefore, they prefer graphics over text, play over work, instant gratification over patience, fantasy over reality and random access over thinking linearly (Prensky, Ask the Expert: Digital Game-Based Learning, 2001).

Consequently, games are a suitable alternative to traditional strategies used to convey second language vocabulary to learners. However, current vocabulary games look like digital versions of vocabulary exercises found in traditional textbooks (*e.g.* word meanings memorisation, fill-in-the-blank or matching words and meanings) (Wood, 2001; Lim, 2008). These mini-games does not have a game story and challenges related to it. Additionally, they are mainly finished within 5 or 10 minutes, and time is critical in the effectiveness of a learning process (Godwin-Jones, 2014). Besides, they may be simplistic, since they do not allow players active exploration (Arnseth, 2006). These games may also appeared isolated, *i.e.* they assess vocabulary which is not in within any context. Finally, most of current vocabulary games are designed without any participation of the intended audience, thus they do not meet their needs and preferences (Lim, 2008; Prensky, Students as designers and creators of educational computer games: Who else?, 2008). As a consequence, these vocabulary games are less effective than those in which vocabulary is presented within an environment, since knowledge growth occurs because the learner has a motivation to solve a problem, he/she is interested or challenged to figure out how to achieve his/her goal. That leads a learner to reconstruct his/her internal representations of the external world (Iran-Nejad, 1995).

In this paper, a video game is proposed as a strategy for learning English vocabulary and the process of development, based on the active participation of a group of group of secondary students, is shown. The video game is called Strong Shot, which has clear rules, challenges, objectives and an associated story. The vocabulary presented through the game is completely based on the story. Strong Shot is an action online 2D-game, which was developed with the active participation of a group of secondary students from *Institución Educativa Multipropósito* in Cali Colombia, who created the story, characters and mechanics of the video game, taking into account some learning and teaching strategies considered suitable when conveying vocabulary. The

process was conducted in that way to create a video game that meets current students' needs and preferences, and assists them in the process of learning and rehearsing basic English vocabulary.

2 Game Story Building

The design of the video game was carried out in a collaborative scheme with the active participation of secondary students, who created the game story. Besides, they supported the process of definition of game rules and structure.

The students were included during the whole development process of the game, based on constructivism theory, which proposes that knowledge is not something outside students that can be acquired from others *e.g.* teachers; instead, it is created by the learner, in his/her own ways using prior knowledge to build meaningful cognitive representations of the world. Hence, students' active participation could help the game meet their preferences and take the advantage of their digital skills (Prensky, Students as designers and creators of educational computer games: Who else?, 2008).

2.1 Participants

Twenty eight students from 8th grade, twelve girls and sixteen boys, from *Institución Educativa Multipropósito* in Cali – Colombia, participated playing the role of designers of the video game. Furthermore, three students from 11th grade, one girl and two boys, supported the process of designing the video game levels, mechanics and means of conveying and evaluating vocabulary. Moreover, they participated as testers along the implementation stage.

These students represent the intended audience of the video game (*i.e.* secondary students with basic English knowledge). None of them had prior experience designing or testing video games. The students from 8th grade were engaged only during story building stage, while the students from 11th grade were engaged during the whole development process.

2.2 Activities

The story building process was conducted during three sessions of one and a half hour. First session, allowed enquiring what the 8th grade students meant by an engaging game and the elements it should have. First, students received a piece of paper to write down or draw what they meant by or knew about the word *game*. The same process was carried in order to enquire their ideas about a *boring game, an engaging game, consoles, fun, story, character and scenario*.

Secondly, a design competition was proposed to the students. They were asked to build the story for a game that met the features they identified during last session. To aim that, students worked in seven teams of four people. Each group was challenged to create a *character and his/her personal information*. After that, every group presented a proposal and received points from the rest. Finally, the character that obtained the highest score was selected to be video game's main character. The same process was conducted to design the following aspects of the game story:

- *Character's traits*: feelings, skills, fears, weaknesses, strengths, birthplace, hobbies, physical appearance, profession, goals, limitations, spiritual side, humour, moods, quirks, problems, preferences, family and friends.
- *Character's story*: important past, current and future events, conflicts, difficulties, challenges, achievements and dreams.
- *Character's world*: terrain, flora, zones, resources, population, landmarks, value system, culture, technology, etc.

Subsequently, the 11th grade students refined the 8th students' proposal. They met on five occasions to define game mechanics and compose the time line and context for each level. Additionally, one of these students made some sketches the game character and world appearance (Figure 1).

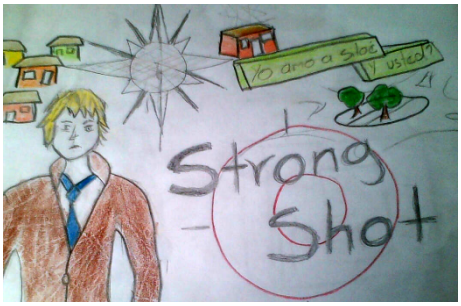

Figure 1. Student's sketch for Strong Shot.

Finally, the students' creations were employed to compose the game design document (GDD), the software requirements specification (SRS) and the user stories of the video game. The whole process is represented in Figure 2.

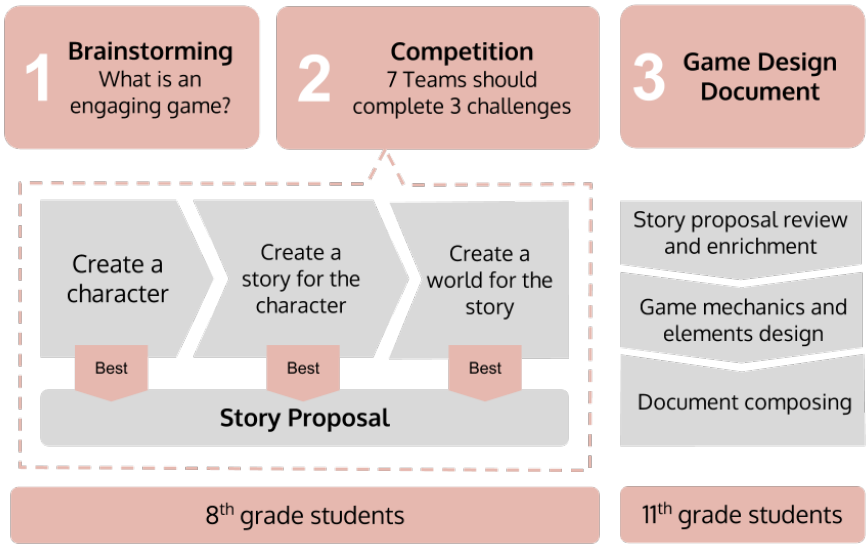

Figure 2. Game design activity scheme.

2.3 Final Story

Strong Shot is a game that takes place in *Hope City*. After Edward, the main character, comes back from work, he realises that his wife Lucia, his daughter Sofia and his son Andres are not at home. Everything in the house is destroyed. He looks for his family in the whole house without any result. After that, he sees some pictures of his family and his best friend Frank. Then, he finds a piece of paper with a picture and information related to a man. Using this clue he starts seeking to find out where his family is. The game story of each level is described below.

During the first level Edward will realise that his family has disappeared. He will gather the first clues and elements that will help him to rescue his family. He will meet an unknown person who will tell him that his family is probably in the *Big Blue House*. Edward will learn how to purchase items in Hope City. During this level Edward will have to defeat some enemies along a journey on a *Jeep*.

Along the second level the main goal of Edward will be to rescue his *wife* in the *Old Factory*. However, before that, he will have to gather a clue and start a new journey on a *Bus* while defeating enemies. After arriving to that place, he will have to fight Carlos, the man who is supposed to be the responsible for the kidnapping. Carlos liberates his wife and tells him that the real responsible of his situation is his friend Frank. Then Edward forgives him.

Finally during level three Edward will have to defeat more enemies while protecting his *wife*. On a *Taxi* he will have to get to the Hotel, the most important place of Hope City. There, he will have to fight his friend to rescue his *children*. However, Edward decides to forgive him. Therefore, forgiveness is the most important lesson that Edward will have to learn along the game.

3 Vocabulary delivery

Vocabulary is defined as the set of words that compose a language. Additionally, clarifies that words should not be conceived as single items, but also as phrases or chunks integrated by several words which convey a particular meaning (Lessard-Clouston, 2013). Thus, vocabulary knowledge can be understood as words knowledge, which involve three aspects form, meaning and usage (Wu, 2013; Milton, 2009).

Additionally, (Wu, 2013) explains how learners acquire vocabulary using three dimensions:

- *Partial vocabulary knowledge - Precise vocabulary knowledge*: vocabulary knowledge is achieved after different exposures to the word. First, learners archived word recognition in form *i.e*. partial knowledge. Second, they aim word recalling, which involves not only form, but also meaning and usage *i.e*. precise knowledge.
- *Breadth of vocabulary knowledge - Depth vocabulary knowledge*: breadth knowledge concerns with the amount of vocabulary a learner has and depth knowledge involves complete word knowledge, its form, meaning and usage.
- *Receptive vocabulary knowledge - Productive vocabulary knowledge*: receptive knowledge involves the words that a learner can recognise when listening or reading. Meanwhile, productive knowledge encompasses the words that a learner uses when speaking and writing.

3.1 Delivery Strategies

Strong Shot may assist students to explore those three dimensions except for precise and productive vocabulary knowledge, since the game does not ask students to speak or compose a text. The following strategies were taken into account to deliver vocabulary to the player:

- *Incidental learning and context*: knowledge acquisition is achieved naturally and successfully trough repetition, the learner should have several exposures to the target vocabulary by means of a range of contexts, in order to aim memorisation and long-term retention (Nagy, 1995; Hulstijn, 2001; Pavičić Takač, Vocabulary Learning Strategies and Foreign Language Acquisition, 2003). Which may be aimed incidentally as consequence of participating in any activity without a real intention of learning (Wu, 2013), *e.g*. playing Strong Shot.
- *Negotiation of meaning*: learners should have the opportunity to request the explanation of unknown words since they may not always infer words from context (Cornillie, Jacques, De Wannemacker, Paulussen, & Desmet, 2011). In Strong Shot they can aim that using the vocabulary list.
- *Elaboration:* explanations and meanings should be comprehensible for non-native speakers, thus they should be modified or elaborated (Cornillie, Jacques, De Wannemacker, Paulussen, & Desmet, 2011). Therefore, all the definitions used in Strong Shot are extracted from the Merriam Webster Learner's Dictionary (Merriam-Webster, 2015).
- *Self-directed language learning*: learners also dedicate time to learn outside classroom. They learn what and how they desire or need (Wu, 2013). Strong Shot may assist this process since it is available online students can play it whenever and wherever they want.
- *Vocabulary presentation*: vocabulary can be presented using different means, *e.g*. connecting meaning to real objects or phenomena and stimulating involvement of learners in vocabulary meaning discovery (Pavičić Takač, Vocabulary Learning Strategies and Foreign Language Acquisition, 2008). In Strong Shot vocabulary is presented as clues, within vocabulary lists along with definitions and through game messages and story comics.
- *Vocabulary review*: learner should have the opportunity to review the learned vocabulary continually and gradually. Some strategies than can be employed are: integrating new words with the already known, relating words to drawings, illustrations, real events or learner's personal experiences, word identification tasks, recalling words from memory tasks and activities for productive use of words (Pavičić Takač, Vocabulary Learning Strategies and Foreign Language Acquisition, 2008). Strong Shot allows player reviewing vocabulary mainly through the different means of delivery.
- *Computer assisted language learning*: uses multimedia, hypermedia and interactive technologies to present content. Therefore, it can be a more effective method to offer a variety of pedagogic tasks. An important advantage to highlight is that immediate and personalized feedback can be provided to learners (Wu, 2013).

3.2 Means of delivery

The vocabulary set presented to player within Strong Shot is completely based on the game story built by the secondary students. Therefore, the story delivery plays an important role to convey vocabulary to the players. The Game story is delivered to the player through comics and game messages, which create real communicative contexts in which words have sense using images and short sentences, without the need of complex English vocabulary. Furthermore, comics foster creative language growth because they can provide new vocabulary to the reader and content for further reflection (Perú, Embassy of the United States Lima). Additionally, comics present vocabulary through connected sentences that follow a story line and a logic structure, hence it would be easier for the players to understand and recall what comics convey without having to rely only on memory (Csabay, 2006). Thus these might be effective means of vocabulary delivery.

Another way to present vocabulary to the player is using the game elements, *i.e.* when the player gathers an object (*e.g.* a clue) its name and a description will be delivered to him/her (Figure 3. a.). This time context is the situation that Edward is living currently in the game. Moreover, when the player accesses the inventory and the store every item has its name, a description of its usage and a related image (Figure 3. b.). The player can buy and then use all available items, thus he/she can also comprehend vocabulary meanings as consequence of usage.

Figure 3. a. Clues description. **b.** Game store.

Moreover, the instructions to control the videogame are delivered to the payer using different animations, which show the player how to move, shoot, jump, run, buy items or play an English challenge (Figure 4). These instructions are presented when the player may need them, *e.g.* when he/she runs out of money, the game will suggest him/her to complete an English challenge.

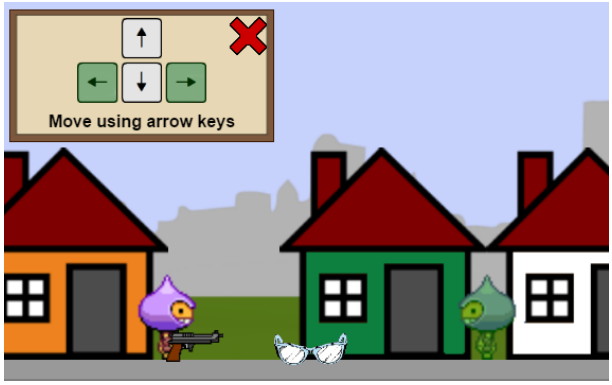

Figure 4. Game instructions at level one.

3.3 Vocabulary categories

Along the three game levels, a player will have to interact with vocabulary related to five categories. The vocabulary is delivered to the player progressively and stored in the vocabulary list (Figure 5.) as long as it is presented. The categories are described below:

- *Transport*: in every level the player will be provided with a vehicle. When the player drives a vehicle, he/she can defeat enemies easier and faster. Furthermore, he/she can purchase same or more capable vehicles using the store.
- *Places:* during every level the player will visit different city places (*e.g.* Bank, Bookstore or Fire Station). Every city place is accompanied by a board with its name in English.
- *Personal items*: the player will gather clues along the game. These clues are main character's family belongings, which indicate the player that he/she is in the right way.
- *Family and friends*: the game story is all about the player's family, and so these vocabulary will be delivered along with story and clues.
- *Buying and purchasing:* player can use his/her score to buy new items at the store in order to improve his/her current inventory, *e.g.* a new car or a health pack.

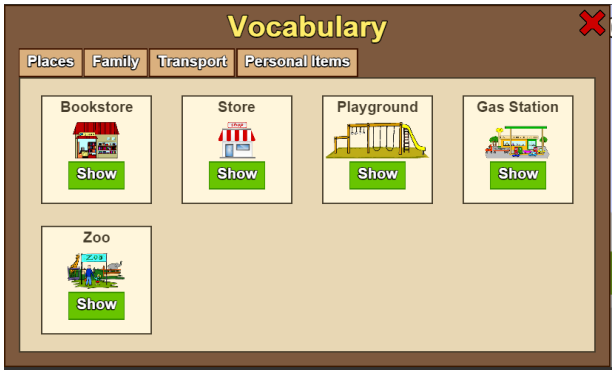

Figure 5. Player vocabulary list.

4 Vocabulary Evaluation

The goal of vocabulary assessment is to measure the level of vocabulary knowledge and the ability that learners have reached (Read J. A., 2000). There are two aspects that can be measured or assessed trough a vocabulary test. On the one hand, when testing vocabulary knowledge, it is important to measure *vocabulary breadth*, it means the number of words that learners know and recognize. On the other hand, *vocabulary depth* should also be measured using tests that consider aspects involved in form, meaning and usage of a word (Read J. , 2007; Milton, 2009).

Strong Shot assesses vocabulary knowledge using English challenges, which are short English vocabulary tests that evaluates the player's ability to select the sense that a word makes or what it refers to in the context where it is presented. Consequently, all aspects of vocabulary breadth and depth are measured, except for vocabulary usage, since players do not produce any speech or text.

Game money plays an important role in vocabulary evaluation since in Strong Shot, like in real life, money means luxury, *e.g.* player can use it to buy a better car or a better weapon. Moreover, it is very useful in emergency cases, *e.g.* when player's health level is getting close to zero. The player can get points by aiming the game goals, however it takes more effort and time. Meanwhile, completing and English challenge takes a few minutes to get a good quantity of points. Additionally, English challenges evaluate already presented vocabulary and if player fails there would be no further consequence. The decision to complete an English challenge is up to the player. Therefore vocabulary evaluation is voluntary and motivated by game circumstances, which means that evaluation do not interrupt the game flow.

The player can access English challenges using the *Add Money* button on the main game bar. When accessing the English challenges menu, the player will find the name, icon, description and button to play each English challenge (Figure 6). At the first level only one challenge is available and as long as the players access new levels a new challenge becomes available.

Figure 6. English challenges menu.

The first available challenge is *Unscramble*, here the player should arrange the letters of a word represented by an image in the correct order. Thus, player should already recognise it in order to complete this challenge (Figure 7. a.). If the player completes this challenge successfully he/she will received 10 points.

Figure 7. a. Unscramble English challenge, **b.** Image match English challenge **c.** Contexts groups English challenge.

When a player accesses second level, he/she will be able to complete the *Image Match* challenge, here the player should match a word with an image which represents its meaning (Figure 7. b.). This challenge gives 30 points to the player.

In third level the Contexts Groups challenge becomes available, here the player should match a group of words with their category (Figure 7. c.). After completing this challenge the player will gain 50.

5 Technical Details

Strong Shot development was carried out following the eXtreme (XP) Programming agile methodology. This methodology was used since it allowed active participation of the students during the whole process and an iterative development of the video game. Consequently, students could test video game features as long as they were implemented.

5.1 Videogame architecture and technologies

The video game is structured using a three layer architecture as follows (Figure 8):

- *Application - view layer*: this layer is mainly responsible for reading input devices, managing game resources, rendering and physics supporting. Here, Phaser, a free and open source HTML 5 game framework created by Photon Storm (Photon Storm Ltd., 2016), is employed. It was necessary to implement new classes for GUI elements *i.e*. panels, panel layouts, pop-up windows and tabs, since Phaser did not supported them.
- *Logic layer*: it is responsible for controlling game state (using data structures) and how it changes owing to external stimulus. This layer deals with the triggered events, process management and game rules. It was coded using JavaScript.
- *Persistence layer*: it is responsible for persisting game state using HTML5 local storage. Therefore the game can be saved and then loaded.

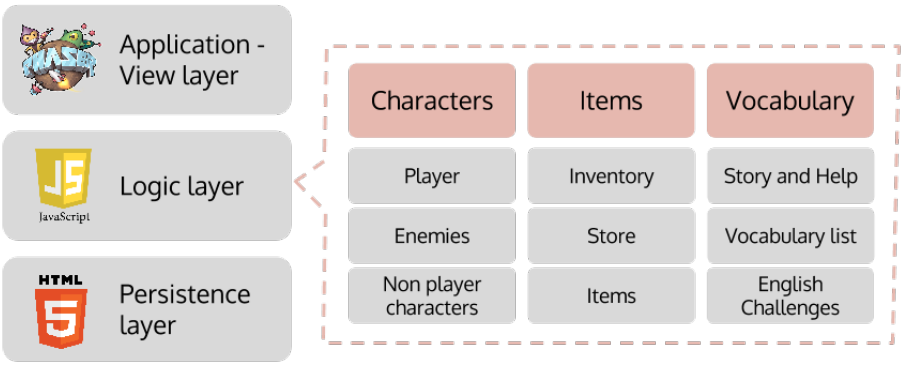

Figure 8. Game architecture and development tools.

5.2 Videogame modules

The videogame is composed by three main modules:

- *Characters management*: this component deals with characters, their features, their skills and the way they should behave within the video game.
- *Items management*: this component is responsible for controlling items which player can interact with (*e.g*. weapons, health packs, vehicles and clues). It controls how the player can gather, purchase, store and use the items. Therefore, inventory and store management belong to this component.
- *Vocabulary delivery and evaluation*: this component allows conveying vocabulary to the layer through game story comics and In-Game messages. Additionally, it controls the English challenges, which allow the player increasing his/her score to purchase new items. Finally, it deals with the vocabulary list, where the words are stored to be consulted by the player.

6 Game Experience Evaluation

The main reason for using a videogame to convey vocabulary is that it may be a suitable alternative to traditional strategies since they could enhance players' attention, creativity and motivation. Consequently, the video game Strong Shot was evaluated regarding to motivation, ease of use and learnability perceived by a group of secondary students.

6.1 Evaluation group

Twenty eight students from 8th grade, fifteen girls and eleven boys (two students did not report their gender), participated in the evaluation voluntary. These students are different to the group of students who

participated during the design phase, but are from the same school. The participants are between the ages of 12 and 17 (*mean* 14.20 years, *standard deviation* 1.13 years).

Regarding to participant's game preferences and habits, 67.74% started playing videogames at least three years ago. Their favourite game genres are action (51.62%), adventure (48.39%), sports (38.71%) and racing (35.48%). Moreover X-Box (38.71%), PC (25.81%) and Play Station (25.81%) are their preferred game consoles. Finally, eleven students (35.48%) play video games every day, seven students (22.58%) play at least once per week, five students (25.81%) play at least once per month and the rest of them (16.13%) do it less than once per month.

6.2 Players' experience test

The test was performed at the *Institución Educativa Multipropósito*. The students were welcomed by the evaluator, who gave them general instructions to the test.
Then they were asked to perform the following tasks:

- Access and load the game at http://edwingamboa.github.io/StrongShot/deploy/
- Try to complete at least one level of the game (25 minutes)
- Use the game tools *i.e.* inventory, store, English challenges and vocabulary list (20 minutes).

After that, the students filled out a questionnaire to enquire information about their age, gender and game preferences and habits, *i.e.* how long they have played games, how frequently they play, which are their preferred genres and platforms.
Finally, they were asked to evaluate their experience regarding to motivation, learnability and ease of use. These aspects were evaluated by the students using fourteen statements (Table 1). Each statement was rated using a scale from one to five (*i.e.* 1. Absolutely no, 2. Mostly no, 3. Neither yes nor no 4. Mostly yes and 5. Absolutely yes), in order to indicate to what extent the students considered that the video game enhanced their experience. The next two sections presents and discusses the obtained results.

Table 1. Employed statements to evaluate the videogame.

Aspect	Related statements
Motivation	I enjoyed the game
	Game graphics were attractive
	I was motivated to continue playing
	I wanted to explore the world
Learnability	I found the game instructions
	I understood the story easily
	The game goals were clear
	I could find my way in the world
	I knew how to aim the game goals
Ease of use	The game difficulty level is adequate
	The elements of the inventory are easy to use
	The elements of the store are easy to use
	The vocabulary list is easy to use
	The English challenges are easy to understand

7 Results

The results of this questionnaire are presented in Figure 9, Figure 10 and Figure 11. In this study the results are considered positive when the students answered *4. Mostly yes and 5. Absolutely yes*; *neutral* when they answered *3. Neither yes nor no*, and *negative* when they answered *1. Absolutely no, 2. Mostly no*.

Concerning motivation (Figure 9), the students evaluated the enjoyment produced by the game, the attractiveness of the graphics and the motivation to continue playing negatively (42.86%, 32.29% and 50.00% of the respondents respectively). However, 67.86% of the respondents gave a positive feedback regarding to their willingness to explore the world while they were playing. These results show that some students felt motivated by the game while they were playing, however, some of them did not enjoyed the game enough to wish to continue playing. Game aesthetics might be related to that issue, since they were not considered attractive enough by the students.

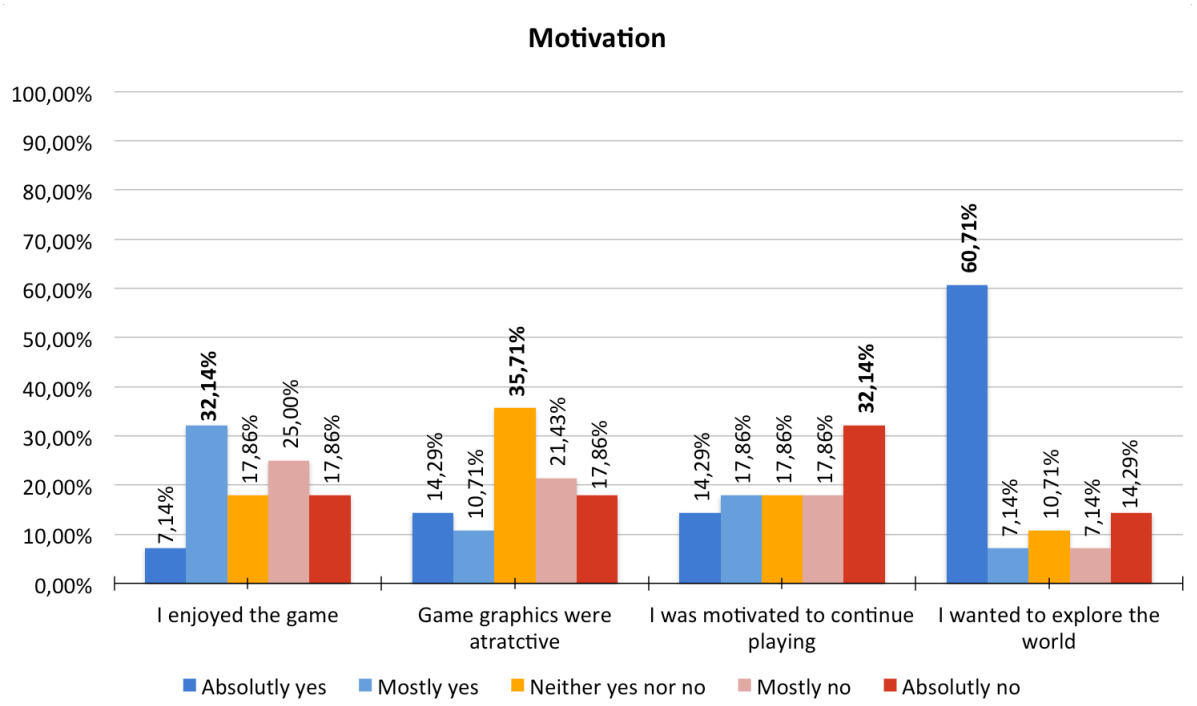

Figure 9. Students' answers concerning motivation.

Regarding to the learnability (Figure 10), the students evaluated the instructions availability, the game goals understanding, their confidence to aim the game goals and world recognition and familiarity positively (67.86%, 50.00%, 50.00% and 71.43% of the respondents respectively). However, regarding to the story understanding, most of the students (42.86%) gave a negative feedback. This issue may be related to the student's unwillingness to continue playing (Figure 9).

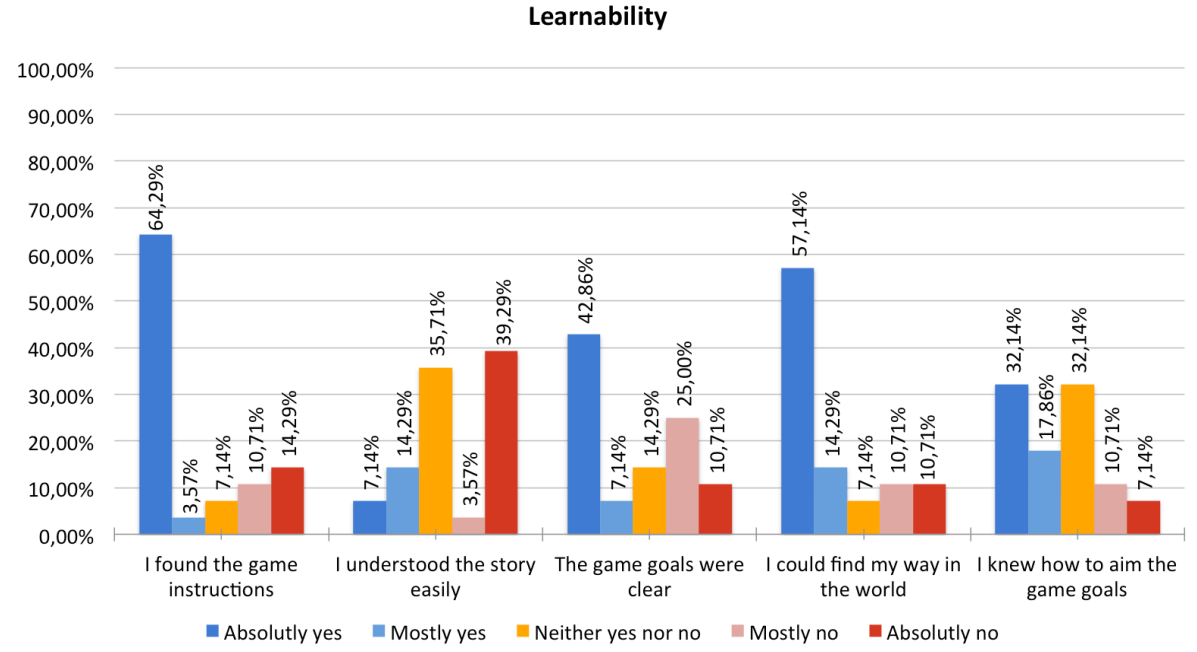

Figure 10. Students' answers concerning learnability.

Finally, regarding to the ease of use of the game (Figure 11), the difficulty level adequacy, the ease of use of the game inventory, the store, the vocabulary list and the English challenges were positively assessed by 64.29%, 60.71%, 71.43%, 64.29% and 57.14% of the students respectively. These results suggest a positive attitude from the students towards the ease of use of the game tools, which allow them to manage the items, money and vocabulary. Additionally, these results indicate that the students felt comfortable with game difficulty of level.

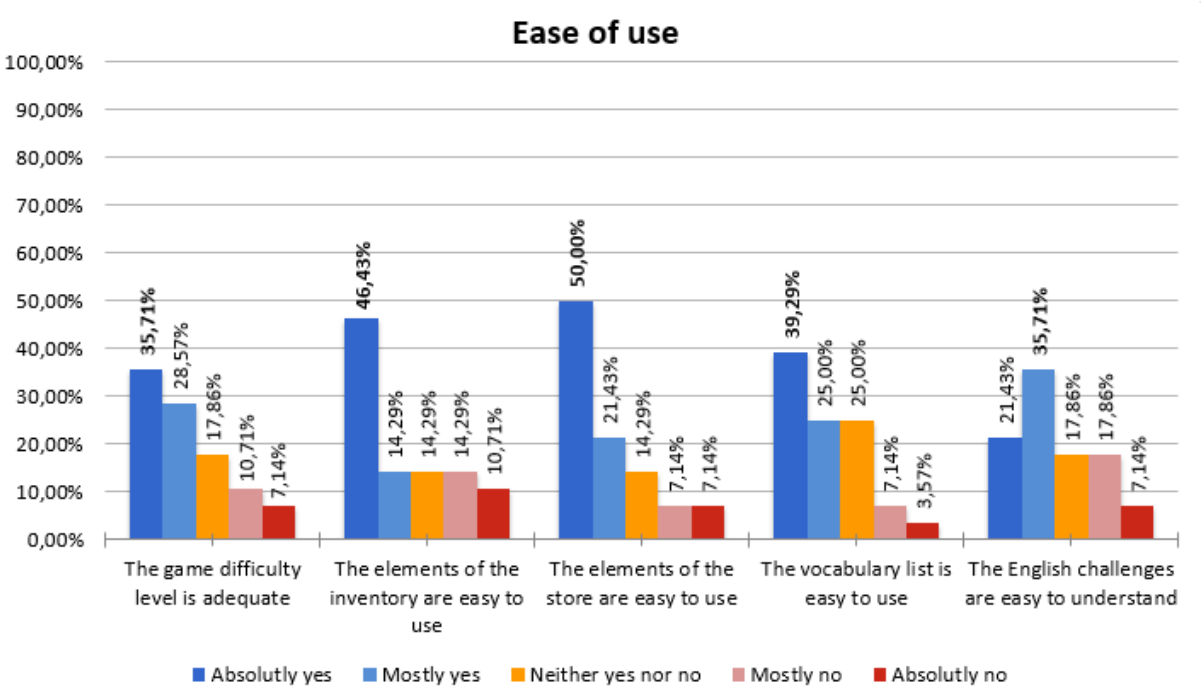

Figure 11. Students' answers concerning ease of use.

8 Discussion

On the one hand, the results suggest a sceptical attitude from the students towards the motivation generated by the video game. Those results might be explained by the following aspects:

- *The graphics were not designed specifically for this video game and its story*, instead they were collected from different sources. Consequently, game graphics are not uniform and they might not be coherent with the story that was composed by the students; therefore students evaluated them negatively.
- *The group of students were very diverse and not all of them were used to or liked action games*. That may make more difficult for some students to understand game mechanics and controls. As a result, some of them could not complete a level to feel motivated and start enjoying the video game.
- *The time students could actually play was very limited*. They could play 25 minutes since the rest of the time was dedicated to use the game tools. This might prevent students from interacting enough time with the game to wish to continue playing. However, as the results showed, they wanted to explore the game world while they were playing.
- *The students experienced performance issues while playing*. The game stopped unexpectedly, went slow or flashed continually since the test was performed in of the computer rooms of the student's school and the only browser available was Internet Explorer.

Additionally, the story understanding was also a negative evaluated aspect, some of the issues that could prevent students from understanding the game story are:

- *The background story of the video game was presented at the very beginning using a comic*, which can be skipped by the player in order to start playing immediately.

- *The English level of the students was extremely limited* and hence they could not understand the messages along the game properly.
- *The images used to accompany the video game were not always self-descriptive or completely suitable*

The above aspects could lead students to frustration, therefore enjoyment and motivation was negatively affected. This is expected since the video game enjoyment is directly related with its ability to absorb players' attention and to place them into the world, which is also related to game story, art and performance.

On the other hand, the students gave a positive feedback regarding to learnability and ease of use of the video game. That could be explained by the following reasons:

- *The game tools had a uniform and consistent user interface*, they have a GUI with a very similar structure, consisting of a title and a list of items, with an action button, grouped by categories when needed (See Figure 3. b., Figure 5 and Figure 6). This could lead students to feel that those tools were easy to use.
- *The instructions used animations specially designed for this game* (Figure 4), which might help students understand the game guidance easily.
- *The situation itself made it easy to understand game goals*, *e.g.* the main character had a weapon and enemies were approaching him. As a result, they felt a sense of control, because they knew how they could achieve the game goals and the felt confident about their world familiarity.

9 Conclusions

This paper described the development process of a video game used to convey basic English vocabulary to the players. Secondary students who represent the intended audience participated as designers and then a second group participated as evaluators. Although, learnability and ease of use of the game tools were evaluated positively, the results of the game play evaluation showed that students' motivation and engagement was affected by a lack of story understanding, game performance and game aesthetics. Which confirms the important role that those aspects play in a game.

Although game messages use elaborated vocabulary and is always supported by images, the intended audience of the game may be students who have a very limited or no English knowledge, which can prevent students from understanding game story. Therefore, new strategies should be considered.

The evaluation was limited by some aspects. The employed computers affected game performance and hence players experience. Moreover the game belongs to action genre, which could limit experience of those who prefer another kind of games. Furthermore, story coherence and student's perception of the game aesthetics were affected by the game assets since they were collected from different sources which affected.

Even though the video game was developed with active participation of target audience and having into account different strategies to convey vocabulary to the players, a further work could focus on evaluating the role of the video game in the process of English vocabulary learning. This can be achieved, for example, allowing a group of students to use the game for a certain time and monitoring their behaviour and learning progress.

Along with improving motivation generated by the video game, it may also be necessary to include an expert in second language teaching and learning in the development team in order to evaluate the employed the pedagogic strategies, propose new ones and hence improve the game story understanding.

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