ABSTRACT
The use of video games as an educational tool initially causes a higher degree of motivation in students. However, the inclusion of educational activities throughout the game can cause this initial interest to be lost. A good way to maintain motivation is to use a good story that is used as guiding thread with which to contextualize the other video game elements (characters, scenarios, challenges, scores, etc.). A method is necessary for analyzing the effectiveness of the story in a video game. We propose a user-centered method that has been applied to a specific case study: the design of “Ato in Numberland”, an educational video game in the field of mathematics.

Categories and Subject Descriptors
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Keywords
Educational video games, storytelling, user-centered evaluation method, narrative efficiency.

1. INTRODUCTION
Stories have been used traditionally to keep an individual’s attention. Over time, a lot of effort has been made in the effective design of stories to maintain the attention of the audience. With regard to story design, one of the first challenges we come across consists of defining the storyline and translating it to a more or less complex narration in which the characters that participate in the story and the scenarios in which the story develops are described. In order to encourage user involvement, it is very important that both the protagonist and the other characters are coherent and credible.

There are two strategies to presenting a story: linear and non-linear storytelling. In the former, each element of the story is planned and defined previously. In the latter, elements external to the story could change its content in some way. In such cases, the user becomes more involved in the story because he/she feels he/she is part of it.

The non-linear and interactive concepts should be differentiated. For example, there are interactive books that allow different stories to be read depending on the readers’ decisions, but each story or combination of parts of it is presented to the reader in a linear way [1]. However, this interactivity is a way of making the reader participate and get involved in the story, which is going to generate greater motivation in him. Non-linearity is a more specific concept. In this document, it is assumed that the interest value that video games offer to storytelling lies precisely in non-linearity, and because of this we use interactive story as a synonym of interactive non-linear story.

At the educational level, offering different paths in the story and developing it in a non-linear way facilitate learning, as the users act according to their own criteria, velocity, strategies and skills in general. In fact, the user is responsible for shaping the story and this provides an added motivation that encourages learning through the narrative [2]. If we want to design a good interactive story, we need to consider the interaction to be performed by the user. The effectiveness of the story will have to be evaluated from the point of view of the player. So we have to take into account
parameters such as the usability and the playability of the game [3].

To analyze the effectiveness of a concrete story in a video game, we may take Joseph Campbell’s works as a model [4], which present a set of patterns that are assiduously repeated in all kinds of stories and which have been classically used as a representation of the structure that every good story must have.

In the current document we firstly review our previous works. Then, we analyze the need to structure the story to facilitate its design, evaluation and inclusion in a video game. We then present a player-centered technique of evaluation to analyze the story of a game. Lastly, we present the case study carried out, drawing the main conclusions as well as suggesting further works that follow from them.

2. PREVIOUS WORKS

This work is the result of comprehensive research into the quality of educational video games and its relationship with their design. We began our research by proposing a framework for the development of a specific educational game. This framework attaches great importance to the necessary balance between the ludic component of a video game and the educational content to be taught [5]. We have continued working on the process of enriching the evaluation of video games by incorporating the analysis of emotions that are produced in the player [6].

In recent works, our interest has been focused on learning at an early age, as many of the techniques used in the aforementioned works could not be used with children (3-5 years). This interest led us to the proposal of a method of assessing emotions in children [7] based on the three typical milestones of assessment (pre-test, test, post-test), but incorporating different elements that allow us to apply it to younger users.

As a result of this work and its application in the educational video game "Ato's Adventure" (an educational game for graphomotor skills practice), we began to analyze the potential importance of the story as a motivating factor while maintaining acceptable levels of playability throughout the game time.

3. GIVING STRUCTURE TO THE PLOTLINE OF A VIDEO GAME

It is important to outline that the narrative content of each game must have different structures and characteristics depending on aspects such as the gender of the video game or the use that will be made of it (purely entertainment, education, serious games, gamification processes, etc.).

We define story as all the elements that are part of the narrative content of the video game. As Figure 1 indicates, when analyzing the story that will be incorporated into a game, we propose the study of the following four elements:

- Narrative evolution or storyline. A global concept that corresponds to what happens in the story. It is outlined in a literary script using a traditional narrative. It will be part of the concept of the game and it is defined in the early stages of design.

- Narrative structure. This is how the development of the storyline is finally designed. It sets the order in which the events are narrated and how the player can influence them and their order. We propose a structuration whereby all the events in the story are clustered into scenes, which are grouped in sequences; the sequences are grouped into chapters and chapters in stories [10]. This is defined in the technical script (oriented to define all aspects of the game and oriented to implementation) of the story, because the developers implement this structure in the final story used in the game. It will appear as an important element in the game design document (GDD).

- Scenarios. Settings in which the story takes place. These provide a context for the characters and the objects in the story. Each scene occurs in a particular scenario. In a video game, the definition of the scenarios must be highly comprehensive, since the player can interact with them and they have a fundamental role in the quality of the dive. Therefore, a storyboard is usually included in the technical script with a formal description of each scenario for developers and artists. In any event, as discussed in section 1, the definition of these scenarios should be made taking into consideration the audience to which the video game is oriented.

- Characters. These are involved in one or more scenes and have a role in the narrative evolution (note that the proposed narrative structure component of the story has a different meaning to the global concept of narrative evolution (Figure 1). The characters must have well-defined characteristics and their actions must be consistent with those characteristics. Both the design and the evaluation of the characters cannot be made independently of the story and, as in the case of scenarios, must be adapted to the type of audience targeted.

These four components must be studied in an interrelated manner. Thus, scenes act as the core of the model and are related to the elements of the other components of the story: the characters are involved in these scenes and the scenarios are the locations in which they occur [10]. Each element in the narrative structure can interchange its order with others, within a set of constraints. The flexible relationship between the scenes, characters and scenarios allows us to model and use interactive stories, wherein the evolution of the game can be conditioned to some extent by the player's decisions.

The narrative component of a video game could reach a considerably high size. Because of the need to manage this component, we propose that the story be structured. This structure must be hierarchical to allow for the possibility of working with the story at different levels of abstraction. Based on this idea and on the widely accepted structure that divides the stories into
chapters, scenes and sequences [11], we propose the conceptual model that can be seen in Figure 2 [10].

Figure 2 Story Conceptual Model

If we propose to analyze the narrative efficiency of a story, we must study the narrative structure, characters and environments, all within a context focused on the evolution of the narrative of an educational video game.

In the following sections, we analyze various characteristics of the narrative structure and evolution, the characters and the scenarios in order to offer a theoretical basis for the method of analysis we propose.

4. NARRATIVE EVOLUTION IN A VIDEO GAME’S STORY

According to Vogler [12], a succession of common techniques appears in every narrative composition. The author denominates this kind of narrative structure the hero’s journey and describes it through a set of steps that abstract the different typical milestones of a plot line. The work of Vogler is not intended to provide a mold in which all existing stories fit, but a style guide that enables a narration to be created and evaluated.

The structure of the hero’s journey presented by Vogler is widely accepted in the film community [13], video games, writing communities and, generally in any art that features the narration of complex stories.

It is true that the world of video games is clearly different from any other media through which it is possible to narrate stories. For this reason we cannot ignore theories such as that expounded by Jenkins in [14]. Here, the author analyzes 5 specific aspects of the use of the narrative in video games:

1) “Not every game tells stories”.
2) “Many games have narrative aspirations”.
3) “The diversification of genres should be fomented in games, so the analysis should not be prescriptive”.
4) “The experience of playing video games can never be simply reduced to the story experience”. In this way, the author highlights the importance of a well-constructed ludic component in the video game.
5) “If some games tell stories, it is unlikely that they do so in the same way as in other media”. This contrasts with remarks made earlier in this section and suggests that videogames require specific narrative theories. In our work we follow the structure presented by Vogler. However, we intend to move towards the construction of a more concrete adaptation of this structure to video games.

Given that we use the story as a motivator, it is important to focus on these two last aspects.

4.1 Incorporation of the narrative in video games

In previous works [7], we have studied video games’ characteristics as learning process motivators and we think that, particularly in the case of children, the transmission of feelings and emotions is an efficient way of encouraging motivation. Also, video games are highly interactive, which helps the player to become involved in the story and facilitates the emergence of emotions.

On the other hand, the incorporation of educational content to a structured story, turning it into a game, is a complex task: the narrative rhythm should be adjusted to make all the parts have an adequate duration (otherwise it could lead to a decrease in the motivational flow), the story has to be developed according to the player’s actions, the characters should support the player and the story development and, all this should be synchronized with a content that the student is learning while he/she is playing.

To carry this out, the model we are working on formalizes the non-linear structure, facilitating its design, integration in the EVG and evaluation [10]. Our representation of EVG started with the design of a model that represents the educational and ludic objectives, and the relations between them. Now, when incorporating narrative to the model, the elements of the story have to be related to such structures.

Figure 3 EVG model proposed in which the scenes are related to Ludic Activities and these, at the same time, to Educational Tasks.

In the particular case of games for children, it is necessary to consider that the stories we are modeling are, naturally, very simple. This implies that the interactivity that these stories present is low enough not to cause confusion in a younger player, but to instil the desired motivation. Therefore, there are some steps (in accordance with the hero’s journey) that could present some different paths that could be played in any order. For example, the approach to the inmost cave could consist of several scenes that could be played in any order but which all end in confrontation with the enemy in the odyssey stage.
Of course, in games for young children, many of the steps described are not going to happen in the story, due to its simplicity and its particular characteristics. In fact, the refusal of the call makes no sense in a story for children, as this may confuse them, unless the educative or moral component obtained from the story has something directly to do with this negative attitude of the protagonist. In *The Odyssey* step, for example, there is also an attitude of surrender (or symbolic death) of the hero that is not easy to transmit in a proper way to young children.

5. THE CHARACTERS
The characters constitute an absolutely essential element for a story since, throughout its development they produce the progress of the narration. Furthermore, the story affects the characters, provoking samples of feelings and emotions in them that are reflected in the user who identifies with them. For that reason, it is very important to make the character credible, consistent and with characteristics and attitudes common to everyone, not forgetting to provide some special feature that makes him/her more attractive. It can therefore be deduced that the characters’ design requires a high level of effort and thoroughness in order to make the story work correctly and for it to serve as a motivational element.

5.1 Customization of characters
In [12], a set of characters that usually appear in any kind of story is analyzed. These characters were described by the Helvetic psychologist Carl G. Jung [15], and are used to illustrate the concept of the archetype, with which he makes reference to models of personality embedded in the human species. These archetypes are: the hero, the mentor, the shapeshifter, the trickster, the herald, the ally, the shadow and the threshold guardian.

Based largely on this study, in [16] the authors describe a specific proposal for video games. This proposal is based on Vogler’s theories that are, as we have said, widely accepted. Therefore, the following nuances are added to the archetypes mentioned: the hero can be reflected as a young hero or an antihero; the figures of the best friend and the special person appear in an explicit way, and the veteran and the habitual criminal appear as different versions of the mentor figure.

As in the case of the hero’s journey’s steps, the archetypes are not conceived of as having to be mandatorily included in the story. However, they are proposed as models that help to create consistent characters. During the development process of a character, his actions and his evolution, the author may use one or several archetypes that he/she considers proper to the role the character plays in the story. This helps to ensure that the character does not act in a contradictory way or exhibit strange behavior that provokes user disinterest.

The use of archetypes allows the author to create characters that are adapted to the story and whose thoughts and actions are credible. At the same time, it allows the players to quickly get an idea of his personality and his objectives. Also, mixing some archetypes contributes to the creation of deeper, more nuanced characters.

Nevertheless, not all the stories require all of the archetypes, and not all the characters need to match a concrete archetype, but rather can switch between one and another. The key is that each character works inside the story and enriches it. It is also necessary to be careful throughout the design process, as it is risky to create characters that stick too closely to a basic archetype because they can become predictable.

5.2 Designing characters for children
Children aged between 3 and 5, who constitute our main target audience, have a wide experience of audiovisual aids. Designing characters for children usually consists of giving human characteristics to an entity that does not have them of itself, giving it its own personality and locating it in specific circumstances [17]. In our case, we focus on the characters for video games and, particularly, for educational video games, in which positive conduct is strongly reinforced and which tends to create behavioral patterns which children can imitate. Also, it is tended to stimulate logical reasoning, to encourage decision making and independence.

6. SCENARIOS
In the case of video games, the elements that surround the characters and in which the story is developed, have a very important role. This importance lies in the fact that the story is not given to the player in a passive way, but rather he/she gets involved in it, interacting with characters, objects and scenarios. These scenarios should be carefully designed to allow the player to explore and to interact with the video game’s world, to adjust to it, and to feel at one with the video game, to appreciate the coherence of the story and, most importantly, to maintain motivation and immersion. The same story can be developed in different scenarios, but it is important to choose one which most encourages the player’s immersion at the same time as it complies with the video game’s genre (platforms, FPS, adventure games, action games, RPG, etc.).

Structuring the scenarios allows us to structure and divide the video game at the same time as the story. The model of figure 2 shows our proposal that says that, if each video game scene occurs in a particular place or scenario, several scenes that narrate a succession of linked events (a sequence) occur in a set of associated scenarios (a zone) and, therefore, a group of sequences, i.e., a chapter takes place in a group of zones which we call a region.

7. EVALUATION METHOD FOR THE DESIGN OF AN EVG’S STORY
Initially, in the process of defining and building the story, we propose a player-centered design, applying the techniques of participatory design and usability analysis (in our case, highly focused on our vision of the gameplay) [6]. Thus, once the initial shape and the narrative structure on which the story of the game will be developed have been designed along with a set of characters and scenarios, it is necessary to know the opinion of the students and the teachers to whom the game is oriented.

In terms of narrative, a set of experiences can demonstrate whether students feel involved in the adventures related, whether they can understand the purposes of each character, if they know why the story began and if they can recognize the triumph at the end of it. It is also important to note whether the characters and their designs convey the emotions for which they were designed and whether they invite students to participate with them in the story, as opposed to a possible game rejection caused by a boring or scary character. Finally, it is possible to analyze the degree of immersion that the scenarios cause in players. Certain issues can be analyzed such as adaptation to the story, the emergence of
important objects at a certain point in the narration, the excitement generated in the player by the atmosphere created in the scene, etc. To analyze these aspects of the story we propose a method based on the user and which consists of a classic assessment test divided into three phases: Pre-Test, Post-Test and Test. Table 1 shows a summary of the activities undertaken in each of the phases.

Table 1 Activities in an assessment of the story and characters of an EVG

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activity</th>
<th>Actor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>Completing the participants' profile</td>
<td>Teacher</td>
</tr>
<tr>
<td></td>
<td>Organization in small groups</td>
<td>Evaluator +</td>
</tr>
<tr>
<td></td>
<td>Evaluation of the educational level of students</td>
<td>Evaluator</td>
</tr>
<tr>
<td>Test</td>
<td>Direct the narration and the test</td>
<td>Evaluator +</td>
</tr>
<tr>
<td></td>
<td>Complete the mural</td>
<td>Teacher</td>
</tr>
<tr>
<td></td>
<td>Write down the answers and opinions of the groups of students</td>
<td>Evaluator</td>
</tr>
<tr>
<td>Post-Test</td>
<td>Check that the role of the characters in the story is understood</td>
<td>Evaluator</td>
</tr>
<tr>
<td></td>
<td>Evaluation of the test</td>
<td>Teacher</td>
</tr>
</tbody>
</table>

7.1 Pre-test phase
In this phase, the teacher makes a report of the participants' profile, their knowledge of the educational content shown in the game, their ability to conduct such activities and their ability to work in groups. This information is particularly important for evaluators to plan in detail how to carry out the test with this particular group of participants. For example, more emphasis may be placed on explaining concepts that the participants are not familiar with or planning time to be devoted to each activity of the test depending on the capabilities of the participants.

In terms of educational content, to incorporate it into the game and therefore into the story designed, it is important to analyze the initial knowledge of the participants at this stage in order to assess their educational attainment after completing the test.

7.2 Test phase
During the test phase, we apply an adapted version of a prototyping session based on the technique of Wizard of OZ [18]. A teacher or one of the evaluators tells the story to the group of participants. Developing such a story for the experience, the narrative evolution of the game is used to create a narrative structure. In short, we start telling a story that is useful to contextualize characters and scenarios. This story is designed so that it is independent of the activities of the game. The aim is to assess the effectiveness of the story independently of the game, which is useful to defining the story in the early stages of design.

In addition, according to teachers’ advice, the story cannot be read, but must be told. That means you have to act out and dramatize the events that occur to keep the children's attention. Finally, since the story can be relatively long, the selection of characters and scenarios must be made as events occur. That is, it cannot be done at the end of the story, but instead by pausing throughout the story.

To select characters, students, divided into groups of 3 to 4 resulting from the pre-test, complete a mural. This mural is a map showing the location of the principal scenarios of the story on which students should place the characters. That is because, as shown in the proposed model (Figure 2), we consider that the definition of the environment and scenarios helps to structure the story. During the experience, students must stick the chosen characters on the mural. The choice is between several designs provided for each character. Participants must select the most appropriate for the story and the most attractive design to them. At the same time, the evaluator accompanying the group notes the number of children who selected each of the options (see case study examples in Tables 2 and 3) and the entries that the evaluator deems appropriate. The group sticks the character with the most votes on the mural. In certain key scenarios different locations (pre-designed) are proposed to the students and a similar selection process takes place.

7.3 Post-test phase
After performing the test, the evaluators conduct an overall assessment of the selection through a questionnaire. They interview the group of participants to make sure that they have understood the role of each character and the selected scenarios in the story and the reason for their choices. They also write down any matter that may be relevant. In addition, a second questionnaire is offered to the teacher with questions about the test and the defined story so that his opinion is reflected in the documentation of the experience.

The analysis of the educational component of the story should not be forgotten. This is conducted with students, taking into account the notes made about their levels of knowledge in the initial phase of the test.

7.4 Using the test as an educational tool
One of the applications that we observed when using the proposed method of analysis is its usefulness as an educational tool. This means that it could be used as an educational activity in the classroom, but eliminates the ultimate goal of designing a game. Do not forget that digital narrative and its manifestation in the story of a video game is just one of the oldest human activities: storytelling. This process has not changed over time and we still have the need to narrate events and use these stories to teach.

The introduction of narrative into the classroom [19] has highlighted storytelling as one of the core capabilities in education on a personal and professional level. The performance of the proposed evaluation experience generates important learning elements in students such as the structure and rhythm of the stories, as well as the practice of emotional commitment that they generate. Digital storytelling helps students to develop creativity and skills of innovation necessary to solve important problems in imaginative ways.

8. CASE STUDY: ATO IN NUMBERLAND
The proposal presented in this paper has been applied to character design in the video game “Ato in Numberland”, which is in its
early stages of design. In this video game, the educational goal is to practice the recognition, depiction and meaning of numbers. Currently, it goes up to number 5.

The game “Ato in Numberland” is an adventure game in which the students join Ato to travel to Numberland, where his friends have been frozen by the power of the evil Emperor Zero. During the design, the story has been considered as an important element.

8.1 Initial story design

As has been explained in section 3, a narrative composition can include a set of stages or phases that helps to formalize it. In the narrative design for the game “Ato in Numberland”, we have pointed out these elements as follows: the ordinary world can be seen at the beginning of the story, in which Ato and his friends live, who later travel to Numberland, the place where the story takes place. The call to adventure is done when the King’s child from Numberland (prince or princess, the player chooses) arrives in Ato’s country to ask for help. This character can be considered as the mentor, since he/she tells us what has happened and guides us to Numberland. The crossing the threshold takes place when Ato realizes that his friends are in Numberland and without them his party cannot be celebrated. The test, allies and enemies constitute the central core of the story and matches with the educational content. In this stage, the students learn the numbers at the same time as they rescue them from the power of Emperor Zero. The odyssey takes places in the King’s castle, where Ato and the rescued numbers face Emperor Zero and his minions, the little zeros, managing to overcome his power and free the King. The reward consists of a big party that the Queen organizes for Ato on his birthday, making a big birthday cake for him and all the characters.

Following the recommendations explained in [17], we have designed a set of characters (Tables 2 and 3). The characters have been designed taking into account the children the game is oriented to, their characteristics and their tastes.

Regarding the archetypes they play, we have selected only the basic ones to prevent the students from becoming distracted from the principal tasks of the game: that the story guides the activity and the educational content we want to practice. So, the archetypes are: the young hero (Ato, who can be seen in the mural of Figure 4 in the top left), his best friend (the Prince or Princess), the mentor (the Prince or Princess), the villain (Emperor Zero, flying over the kingdom in Figure 4) and the threshold guardians (little zeros). In addition, although this archetype does not appear in the proposal, we have only included the good and the bad boys, to create a simple and an easy to follow story for the students.

In the case of the scenario used in the story, for each of the game’s steps, a set of scenarios have been selected that are recognizable to children (a park, a lake, a castle) so that the child feels identified with them and becomes involved in the story in a natural way. Nevertheless, inasmuch as the analysis of immersion is not very relevant to this particular case, more attention has been paid to other aspects involved in the story.

8.2 Application of the evaluation method

The initial evaluation of the students lets the evaluators know which ones have some prior knowledge of the concept of quantity, the numbers and their depiction, and are capable of understanding the metaphors used for the characters’ definition.

Knowing these and other characteristics and skills of the group of participants, the evaluators and teachers split them into smaller groups. The selection of the members of each group should be balanced and done in such a way that the groups formed are easy to work with in an efficient way.

The mural designed for this particular experience can be seen in Figure 4. In this case, two different scenarios were designed for one of the scenes so that it would be possible to evaluate which of the two designs was more appropriate during the experience. Specifically, the scene where the character number 2 is presented was described so that it could take place in a farm or in a lake.

![Figure 4 Representative mural of the scenes from the story.](image)

8.2.1 Test results

For this case, two experiments have been carried out. The first in a children’s educational center in Granada, with a group of 10 children aged 3 years old (6 boys and 4 girls). Thanks to the results obtained in this first experience, the character design has been improved to achieve its goal in the story and the video game. The second experience has been realized using these improved character designs in two different schools: in the first one (E1) we had 61 students and in the second one (E2) we had 27. In what follows, we present the quantitative results obtained from the survey about the characters as well as the results obtained during the observation of the development study.

<table>
<thead>
<tr>
<th>Table 2 Prince or Princess choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Experience 1</td>
</tr>
<tr>
<td>Experience 2</td>
</tr>
</tbody>
</table>

Firstly, we have studied the influence of the students’ gender in the mentor selection, i.e., the Prince or the Princess, who join Ato in his adventure (Table 2). Then, we focused on the character selection for each number (Table 3). In the experiment, the children were asked about the scenarios to deduce which of the two they felt more identified with. In this case, choosing between a lake and a farm, the farm was more accepted. Finally, we asked the children about the emotions that the characters transmitted,
including: The friendliest, the most fearful, the best worker, the most athletic, and which one they liked the most and the least (Table 4).

8.2.2 Post-Test results
As we can see in the tables presented above, the method proposed in this paper allows a group of evaluators to carry out an analysis of the initial story design included in the video game from the point of view of those who will be the players of the video game.

Table 3 Character selections for numbers

<table>
<thead>
<tr>
<th></th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>E2</td>
<td>1</td>
<td>47</td>
<td>21</td>
</tr>
<tr>
<td>E1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>E2</td>
<td>2</td>
<td>24</td>
<td>45</td>
</tr>
<tr>
<td>E1</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>E2</td>
<td>3</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>E1</td>
<td>4</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>E2</td>
<td>4</td>
<td>22</td>
<td>29</td>
</tr>
<tr>
<td>E1</td>
<td>5</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>E2</td>
<td>5</td>
<td>32</td>
<td>27</td>
</tr>
</tbody>
</table>

It has been shown how the elaboration of the story and its narration have allowed the students to feel identified with the characters and contextualized within the story, being able to make decisions about the characters and the scenarios that are most suited to each situation. In this way, the obtained video game should be closer to the student, more motivational and attractive and therefore facilitate the learning of the educational content included in it.

Table 4 Emotions transmitted by the characters

<table>
<thead>
<tr>
<th></th>
<th>E1</th>
<th>E2</th>
<th>E1</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>The funniest</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>The most fearful</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>The best worker</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Furthermore, from this study we have been able to obtain several conclusions that have helped us, on the one hand, to redefine some test aspect and, on the other hand, to design a new set of characters to study.

We have also found some significant indicators that will allow us to move forward with our research and refine our subsequent experiences. For example: While we narrate the story, it is a good idea to introduce participatory elements, such as making the children repeat through gestures the actions that the characters do in the story, the evaluator in charge of a small group should support the narration, the groups should not be bigger than 5 members and other issues related with the implementation of the method.

9. CONCLUSIONS AND FURTHER WORK
In this work we propose a player-centered design process for analyzing the effectiveness of an educational video game’s story. For that reason, we follow a model that allows us to structure the story so that it facilitates the analysis of each of its components. This method is based on user-centered experiences that are useful in analyzing the effectiveness of the story from the beginning of the video game design process.

This method has been applied to a set of experiences in which the narrative effectiveness of the characters and the scenarios from the video game “Ato in Numberland” has been evaluated. In the presented case study, the final user (children) has subjected both the story and the characters to evaluation.

The proposed method has allowed us to evaluate and, therefore, to improve the character design and the scenarios, as well as their integration in the story in its function as a motivational element. What is more, the design of the experiments has revealed that they can be used in the classroom as educational experiences in themselves, independently of their purposes in the design and analysis process.

From the story components we have proposed (narrative evolution, narrative structure, characters and scenarios) the first two are the most complex and difficult to analyze. Our further work is to apply these structures and the models we have designed with the purpose of generating a deeper and more solid method of analysis for these story components. In addition, our research is going to move forward with the definition and modeling of narrative structures and more specific character archetypes for video games.

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11. REFERENCES


