

Supporting Creativity in Designing Story Authoring Tools

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ABSTRACT

In this paper we describe our experience in designing an application to support children in producing their stories in a formal setting, a primary school. In particular, we reflect on the implications of our findings on levels of creativity found in the produced stories. Besides, we compare two versions of our application: one is text-based and the other is image-rich. Feedback from teachers and children is presented and discussed in terms of implications for the design. We will then use our experience to revise the existing guidelines to design authoring tools to stimulate creativity.

Categories and Subject Descriptors

H.5.2 [User Interfaces]: Evaluation/methodology.

General Terms

Measurement, Performance, Design, Experimentation,

Keywords

Creativity, Digital Storytelling, Design, Evaluation, Guidelines.

1. INTRODUCTION

In this paper we reflect on the findings from the evaluation of our mobile application, *Fiabot!*, designed to support children in creating their stories in a primary school setting (as described in [3]). We focus on a specific aspect of the study: how *Fiabot!* stimulates creativity in the narrative process as well as whether the process of imagination, triggered by *Fiabot!*, is reflected on the quality of the story. We are using the feedback provided by multimedia experts and primary school teachers as main evidence and consider both the process and the final product. Here, we report findings from a sub-study, which shows a comparison between stories created by using two versions of our application: one Text-Based and the other Image-Rich. We discuss how this gave us a richer insight into how to stimulate creativity in children and an opportunity to contribute in our research community by validating and expanding the design guidelines described by Chu and Quek [1]. Creativity is a recurring and highly debated topic in Children Interaction Design, as much as one of the authors organized a workshop on Interactive technologies that enhance children's creativity at IDC 2013 [2]. Our definition of creativity,

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see end of section 2, was discussed and finalized there.

2. MEASURING CREATIVITY

In this study, we explored the concept of creativity in a formal educational context, such as creating a story by following a well-defined structure introduced by teachers at school as part of the current syllabus. Among the three different perspectives on creativity described by Shneiderman [5] next to the inspirational and the structuralist ones, we focus on the situational one as it enables us to take into consideration the social and intellectual context in which the story is created. We also gladly embrace the view of the same author advocating that software tools. In general ICT can play an important role in supporting creativity as much as the other types of innovative technologies, which have helped famous artists and scientists in the past, such as Leonardo da Vinci or Galileo Galilei. However, we are not as ambitious to expect such groundbreaking results from our school children but we feel that ICT can have a positive impact on more than one facet of their creativity. Equally, we can easily apply the four-phase *genex* framework described in that article to our study, where Collect, Relate, Create and Donate are not run in sequence but through a number of iterations. Collect is explicitly supported in our application by providing children with instructions taken from relevant literature, including their textbook, as advised by teachers on the appropriate structure for a story and its essential ingredients. Relate is implicitly covered by our system as it facilitates group work, making it easy for children to exchange ideas and quickly picture them in order to get extra options from teachers and mentors. Create is supported by our application that provides easy ways to compose text, images and audio into a story. In this way, we assist the children through their ideation process and possibly enhance their ideation fluency by providing a stimulating environment with more options and possibilities than just a pen and a paper, as reported in the comments in sections 3.2 and 3.3. Donate is indeed the children's favourite stage and our application supports it very well in preparing a clear and complete story to share with their peers and adults. In fact, we go even further and refer to an inspiring perspective on creativity given by Vygotsky [6] that follows a very similar path as Shneiderman's but provides us with a stronger theoretical base. Vygotsky defined the mechanisms of imagination and creativity as the experience and the re-elaboration of experience through disassociation, association and mutation. The imagination cycle of Vygotsky inspired the development of Narrative Activity Model (NAM) on which our application is based [4]. NAM identifies four stages in the process of narrative creation: exploration, inspiration, production, and sharing. This model describes the development of stories through the process of internalization and elaboration of external stimulus for the creation of the story elements i.e. plot and characters. Likewise, our application is made of three modules that support this process:

1) Definition of story structure and plot;

II) Media creation and editing;

III) Sharing within the class and publication of the story.

These modules take children through a well-defined path that they have to complete in order to create an interactive multimedia story. Each module can support specific stages of the NAM: the first module supports the *exploration* and *inspiration* stages, the second *production*, and the third *sharing*. Each module corresponds to a specific task that the child, or the group, has to accomplish in order to create an interactive multimedia story.

Within our project, we evaluated the stories by using several criteria, and among them creativity. In our perspective creativity “rests upon real experience with the world, and its interaction with imagination. It is a special and unique interpretation of our real world experience.”[3] Thus, creativity was measured considering several elements of the story: the complexity of the plot, the originality of its elements, character’s personality, role and contribution to the story. These elements are considered as clues of children’s ability of thinking outside the box, or as divergent thinking. This is why they are all considered as indicators of good creativity levels. In the evaluation, teachers gave high scores to stories that demonstrated an original combination of different elements and their elaboration, whereas stories that had no imaginative elements or included elements that were copied from a movie/cartoon or book, received a low score.

3. COMPARING CREATIVITY

3.1 Study Setting

Our study involved two teachers and 43 primary school children aged 9-11 and took place over a period of 6 weeks. We evaluated separately the two versions of the application (Text-Based and Image-Rich) within 7 months distance (October-May) as the two versions were tested in two different classes. Each evaluation session lasted for four days and was articulated in three stages:

- i) Children’s training, 1 hour.
- ii) Stories Creation and sharing, 6 hours each day.
- iii) Focus group and contextual inquiry, 3 hours.

At the end of each session, 9 digital fairy tales were created (4 and 5 each class).

We developed these two versions of the application in order to investigate the impact of predefined images on stimulating the creativity process in children. Within the study, we observed the activity in the classes. HCI experts and teachers evaluated the main outcomes, stories, by using a set of criteria inspired by the curriculum: Creativity, Collaboration, Media Literacy, and Consistency with the narrative genres. Creativity was one of the most distinctive criterion. Regarding Creativity the main issues considered by HCI experts and teachers in their evaluation were:

- The plot structure,
- The characters’ behavior and role,
- The children’s ability to elaborate and use their experience as elements of the story.

Besides, we gathered the children’s comments during the debriefing interview organized after each session. In respect to creativity, the interview focused on the process of the story creation and the sources of inspiration.

Following, we compare the results of the two versions of the application. Our main objective thought is to contribute to the debate on how to find the right balance between guidance and freedom to support creativity when working with children.

3.2 Creativity with Text-Based Application

The text-based version of the application allowed children in module I (Definition of story structure and plot) to choose the type of character (hero, anti-hero, hero helper, anti-hero helper and magic object, in the fairy tale context,) and describe it by using a text. The description includes a series of elements such as name, surname, living location, body type, hair, eyes, and particular sign (Fig. 1). Therefore, the children have to follow that structure when describing each fairy tale after having selected the background for the story. In module II (Media creation and editing) they are asked to insert an image of the character, which will take life in their story. Our initial hypothesis was that children would focus more on characters’ role and habits without any insights of predefined characters’ images.



Figure 1 A screenshot of the Antagonist description schema of Module I Definition of story structure and plot in the Text-Based version

All the children, teachers and HCI experts appreciated the scaffolding offered by the system and how it actively supported the creation of an appropriate structure for the story. Working on the description of the characters brought the children to focus on the story plot. The creation of the plot and the description of the characters went in parallel and one fed the other. Moreover, some children even started to draw characters on the paper while brainstorming about the plot (Figure 2).



Figure 2 A child drawing during the group discussion about the story plot

Nonetheless, HCI experts noted that children were spending quite a bit of their time in drawing and preparing each individual character of the story. This level of attention paid off as it was reflected by the insight each character had in the story but also took resources and time away from working on the plot and its originality, somehow interfering with the creativity flow. When asked about where they took the inspiration for the story the majority of children mentioned their own *imagination*, second popular answer was an *experience they shared with their family or friends*. Only few children referred to *books they read or cartoons* they had watched as sources of inventiveness.

Overall, teachers commented on how the stories produced with this version of the system were very original and explicitly mentioned how they believed the combination of creating both text and images and combine them together triggered higher levels of creativity. Teachers also commented on children making a creative use of different media: text, images and audio by combining them freely on the story stage. Finally, teachers appreciated the original use of riddles and rhymes, as special elements of narrative. They also appreciated references to myths and legends as they had covered these in previous lectures.

HCI experts observed that the references to books, cartoons and adverts were done after an elaboration process. In addition, children were seen delving into their memories and personal experiences in order to get inspired for the story.

3.3 Creativity with Image-Rich Application

The image-rich version of the application offered children the possibility to select pre-defined images for the main characters of a typical story. For instance, this version offered a choice of typology of characters such as hero (e.g. princesses, princes, knights, etc.), anti-hero (bas guys such as: ugly witches, smelly trolls etc.) and magic elements (e.g. magic wands, mysterious potions etc.). Some of the images had a neutral connotation, as they were not obviously linked to a well-known fairy tale, movie or cartoon. Others, instead, belonged to recognizable contexts such as popular books, movies and cartoon series (Figure 3). In fact we wanted to explore how children would react to popular images and whether their presence would trigger different reactions in terms of being creative.



Figure 3 A screenshot of the Antagonist description schema of **Module I Definition of story structure and plot in the Image-Rich version**

Children commented that the Image-Rich version offered them *guidance on how to build a story and ideas for characters*, as well as *a great and helpful combination of resources*. They liked it and, in particular, the ready-made images helped them focusing on the story and get started quickly (Figure 4). Teachers' evaluation exposed the ambivalence of the situation. On one side, they stressed the fact that *having ready-made scenarios made children explore location in a more creative way by considering different possibilities*. They found this to have a *positive effect on the plot, by making it richer*. On the other side, they observed *how children focusing on the visual ready-made characters often left these unexplored in the story*.

HCI experts specifically noticed how visual ready-made characters had a different impact on story making. *Neutral characters were inspirational as children used them to get started and mixed them with some they created specifically for the story*. In general, children using neutral characters produced some in depth description that boosted the originality of the whole story.

On the contrary, *characters taken from popular sources (movies, books and cartoons) were not elaborated any further and moreover, the resulting story would just follow the original one they were borrowed from*. Of course, there were also few stories where both types of characters were used. In that case, the negative effect of the popular characters would override the inspirational power of the neutral ones, penalizing the overall creativity of the story.

3.4 Differences and Opportunities for Design

Given our analysis we feel that in general the design principles we followed responded very well to the needs of our users. The application, in both versions, provided scaffolding to children in the process of making stories. The Text-Based and Image-Rich versions offered them a well-defined structure and this was a feature everybody agreed as very effective. In particular, children appreciated to have an initial empty structure to fill.

In the Image-Rich version children were carried away when the images offered by the system were already linked to well-known stories or cartoons. In that case, they felt they had to adopt a story in line with the pre-existent one. Indeed, the characters were not explored any further, and both experts and teachers gave a poor creativity score to these stories. When the chosen image was neutral children felt free to explore it and elaborate on its personality that in turns had positive effects on the creativity of the overall story. Teachers showed a clear preference for the text-based version. They even asked for a further version that would force children to provide a complete textual description for each character before letting children go on and provide a visual representation of it. Motivation was another big plus of using our application in both versions. Experts, teachers and children commented on how motivation was higher when using this application during the literature class. In particular, one teacher commented that: "...when children use the application, the iPad comes to life and involves the child that cannot be passive anymore but are forced to be active... The use of iPads enhances the level of engagement of children, of all of them! Your application takes life and stimulates children by speaking a familiar language, a language they share".

4. DESIGN GUIDELINES REVISITED

We feel that this comparative exercise has enabled us to contribute specifically to the argument presented by Chu & Quek [1] and in general to the debate on how to design systems to support children's creativity.

The role of contextual digital structures.

Chu and Quek [1] investigated the role contextual digital structures could play in the design of tools to support children perform creative activities such as the production of stories. In their user study they provided children, of the same age as ours, with digital backgrounds and observed how these enhanced children's motivation and level of engagement with the overall process. They also noticed that the quality of the stories produced was somehow spoiled in terms of their creativity as the visual dimension was added. In addition, they reported how the digital background produced a cognitive overload in children who were distracted by them.

The outcomes of our study showed that, even considering the problems, reported in 3.3, our Image-Rich version addressed the process of creative imagination towards specific tracks connected to the images-related universes. On the other hand, the Text-

Based one offered more freedom to the imagination and allowed children not only to take inspiration from but also to further elaborate experiences taken from personal memories, books, movies and cartoon.

The importance of clear guidance for the definition of the story structure.

While we agree with these authors that a compromise has to be found when introducing digital elements with a strong visual impact, the stories produced with our system did not suffer of poor structure. Our application in both versions gave a clear guidance to children when they had to define the structure of the story (plot and type of character). As learning the appropriate story structure is an important educational objective, the design process had to focus on providing appropriate guidance to students on the structure. *The stories produced during the two sessions matched the fairy tale structure. Indeed, even if stories differed in terms of creativity they met the requirements of the specific literary genre with appropriate plot and characters. Both experts and children commented on this positive feature.*

Coping with cognitive overload.

During the story creation with both versions, we observed two main sources of cognitive overload leading to distraction:

1. The call for children to draw their own characters that took their attention away from enriching the plot,
2. The use of popular images that interfered with children's elaborating both characters and plots in a personal way and using other resources from their experience.

The first issue could be solved by granting children more time to prepare their story, also given that there were meaningful positive effects in letting them craft and draw the characters. While the second issue needs more attention also in the light of related guidelines and similar concerns found in Chu and Quek [1].

In fact, it is important to offer children the possibility to pick and mix different elements from an image gallery. On the contrary, a hard-wired set of characters plus background should be avoided as it would force children to develop a story in a pre-defined direction.

Looking for the right point in a continuum spectrum.

Nonetheless, we encountered a similar phenomenon to that described by these authors when it came to the impact of the images proposed. *We observed that backgrounds and all other visual elements already available to children had a very different effect on the level of creativity of and in the story, depending on their position on the cultural specificity spectrum.* This ranged from very familiar to the child and with a strong story connotation to familiar but with neutral valence, which is not linked to any popular fairy tale, movie, and cartoon series.

We feel this is an area that needs further study and will explore it by designing new user studies as described in next section.

5. CONCLUSIONS

Our experience has provided us with a better understanding of how to design authoring tools to support children in the creation of creative stories in a formal educational context. We have run a series of experiments in two primary schools and gathered a meaningful set of data. From its analysis and the comparison with

similar examples in literature we were able to refine some existing guidelines and propose some interesting further investigations. Finding the right balance among constraint, support and freedom is the main challenge when designing authoring tools to support children in exploring their creativity. Besides, from comments reported in section 3.4 we have gathered some clear indications that technology plays an inspirational role in this context. Teachers and HCI experts also observed that children use the analogical and digital artifacts i.e. tablet, pen and paper, by moving from one to the other naturally according to their needs. Another sign that we cannot be prescriptive with our users specially when designing tools to support a creative process.

We are aware of the many limitations of our study in terms of the numbers of its participants, even if 43 is a reasonable size for a sample, still we would like to include more children and teachers from different schools in our study. As for the features we tested in our prototype, we are aiming very shortly to go back to our schools and run a new user study with a selection of neutral-only images to measure creativity levels with and without images. We feel, like other colleagues, that instead of a dichotomy it would be preferable to offer a spectrum of possibilities for teachers and children to choose from. In this way, we could take into account children skills, inclinations, maturity, experience in creating creative stories and in using similar technologies so to end up with an authoring system able to maximize creativity levels of its different users.

6. ACKNOWLEDGMENTS

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