

EShadow: A Tool for Digital Storytelling Based on Traditional Greek Shadow Theatre

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ABSTRACT

Storytelling is a very common educational practice that is used in every level of education. In particular the use of storytelling in children education can have beneficiary results in the learning and creativity process of children. In this Note we present a storytelling tool inspired by the Greek traditional shadow theater. EShadow is a storytelling tool that can be used from both adults and children in order to create, record, share and watch digital shadow theater plays. It provides alternative methods for controlling the virtual puppets either through mouse or through a motion sensing controller. We present our findings from the use of eShadow in a children's creativity exhibition and a field trial of eShadow in two elementary schools in Greece. Our findings illustrate that eShadow is very easy to use, attracts the interest of both children and teachers and has a positive impact on the development of children's creativity.

Keywords

Storytelling; shadow theater; creativity; children; emotion; usability

ACM Classification Keywords

H.5.0. Information interfaces and presentation: General.

General Terms

Design; Experimentation; Verification.

1. INTRODUCTION

Storytelling is a very common educational practice that is used in every level of education. Storytelling promotes children's learning, helps them organize their thoughts, extends their imagination and creativity, reinforces their collaboration skills as well as their writing, presentation, and problem-solving skills [1]. Storytelling is also an important tool for teachers because it can make difficult topics easier to understand, it provides them with the means to integrate multimedia content in the curriculum and helps them generate discussion topics in the class [1].

Shadow Theater is popular in many countries around the world like Greece, China, Taiwan, France, India, Turkey, Malaysia and

others. Children in Greece watch traditional shadow theater plays, learn about shadow theater in school and play with shadow theater puppets. Shadow theater is a very popular element of Greek folklore. By exploiting this fact another possibility emerges: The enactment of intra-family communication scenarios that promote intergenerational bonding and playful learning. Imagine the following setting: a child, who lives in the United States of America, could present a shadow play story to his/her grandparents in Greece. The grandparents are able to watch and encourage him/her or even try to cooperate with him/her by controlling other virtual puppets on-line. Such kind of new opportunities for intergeneration bonding that overcomes the physical separation of children and their grandparents is important for children's development and contributes to the well-being of the elderly as well [2].

EShadow has been inspired by this combination of tradition, education and intra-family communication to offer a storytelling collaboration platform inspired by the Greek traditional shadow theater. The main goals of eShadow are: (a) to adapt traditional shadow theater in modern times; (b) to preserve traditional art as much as possible and make traditional shadow theater more popular; (c) to offer informal collaborative learning experiences for both children and adults; (d) to offer opportunities to children to express and improve their creativity; (e) to provide means for in school and out of school continuation of activities.

With eShadow users can create, record, share and watch digital shadow theater plays. It provides alternative methods for controlling the virtual puppets either through mouse or through a motion sensing controller. EShadow also offers the ability to video chat for collaborative creation and watching of plays.

The current eShadow prototype gives children and adults (teacher, parents etc.) the ability to create their own shadow theater plays, collaborate with each other for the creation of the play, share their creations and play with a motion sensing controller that resembles the traditional way of controlling shadow theater puppets.

In the rest of the Note we will have an overview of related work followed by the detailed description of eShadow. Finally we present the findings from two field experiments where children used eShadow.

2. RELATED WORK AND ESHADOW OVERVIEW

A very interesting approach for supporting children's creativity and storytelling is proposed in [3] where children interacted with a robotic character and created stories. Another approach that is more relevant to eShadow is [4] where children control a virtual puppet with their bodies. Also a relevant system is Shadow Story

[5] where children create shadow theater plays based on traditional Chinese shadow theater.

All the systems mentioned above have common characteristics and provide means for children to enhance their creativity. EShadow has some unique features that combine creativity, cooperation, education and intra-family communication. These are the ability to create a play in cooperation locally or via internet, use different kind of controllers such as motion controller (Nintendo wiimote) and mouse. We are currently working to integrate Sony Move controller. Furthermore, eShadow offers the ability to record a play, share a play and export a play to video format which later can be edited with any video editor to create a full play with music and other effects. Finally, eShadow integrates a physics engine that controls the shadow theater puppets and thus produces a very realistic movement as compared to the traditional control model used in Greek Shadow Theater as revealed during the field trials as well as during testing with actual professional performers.

3. ESHADOW DEVELOPMENT

During the development of eShadow we followed a development process which consisted of many evaluations, including a think aloud evaluation with users aging from 10 to 40, and iterations on which we revised the user interface and the handling of virtual puppets. Most of the principles listed in [6] for the development of new tools to support creative thinking were followed during the development of eShadow.

4. FIELD TRIALS

Two field trials were conducted for the evaluation of the current version of eShadow. In total 70 children used eShadow and recorded shadow theater scenes. The field trials were conducted in a children's creativity exhibition that took place in PLACE and in two elementary schools of Chania Greece.

4.1 First field trial

The first field trial took place in a Student' Creativity Exhibition. Students and teachers visiting the exhibition space of eShadow had the opportunity to watch a seventeen minute shadow theater film. The film was created using eShadow in cooperation with a professional traditional shadow theater performer. Figure 1 shows one classroom of students watching the film. After watching the film students were given the script of the film (written in paper) divided in nine separate scenes.



Figure 1: Students watching the film



Figure 2: Students using eShadow to create scenes

The next step was to organize students in groups of 2-4 persons. Each group selected one of the nine scenes and then used eShadow to perform and record it. Figure 2 shows the children creating their assigned scenes using eShadow.

The setup for the first field trial consisted of two computers for the students to test eShadow and record the scenes. Each computer had one motion sensing controller connected, a mouse and a microphone. In the beginning of each team session the controls for the motion controller and the mouse were explained to the students. This was the only help provided to them. No other explanation was given about the interface or the location of the options because the objective was to test the usability and HCI metrics of the eShadow interface. The questions made by the students about the interface and the location of some options were minimum and almost exclusively in the form "This is where i press to begin the recording?" After the explanation of the controls the students were free to interact with eShadow.

Due to hardware limitations the maximum number of virtual puppets that could be controlled simultaneously was two. If the team consisted of more than two members, the students that did not control a virtual puppet were doing the voice acting for the virtual puppets. Each team had two options. The first was to recreate a scene from the film they watched (this is the reason they were given the written script) or to improvise and create a completely new scene. No specific time limit was imposed in order to minimize interference. The time limit was set from the escorting teachers according to the timeframe of the school visit. After each team finished its experimentation with eShadow, the students were invited to fill a questionnaire. This questionnaire was the major means of documenting user feedback and complemented the direct observations made.

4.1.1 Questionnaire design

The questionnaire consisted of 3 demographic questions, 26 rating questions (0-9) and 2 text completion questions. The completion time for the questionnaire was about 3-4 minutes. The questionnaire was designed to collect data for evaluating the usability aspects of the prototype and its creativity support. For the design of questions a standard methodology was adopted [7]. To measure the creativity support of the prototype, a topic that is not so well-engineered, the approach adopted stems from design principles that the software designer can follow in combination with metrics such as the user interest shown, the time they spent on the system, the improvisations they made etc [3].

4.1.2 First field trial results

In total more than 100 children and teachers participated in the evaluation made during the first field trial. From them 50 questionnaires were collected. Then number difference can be explained by the fact that some of the children did not have time to complete the questionnaire due to time limitations set by their teachers. Also 3 questionnaires were discarded because one or more sections were not filled. Questionnaires that had less than four questions unanswered were considered valid. The missing responses, in this case, were not taken into account. The calculation of questionnaire reliability was made using Cronbach's alpha metric which gave a value of 0.908, which is acceptable. The overall results were supporting the hypotheses that eShadow is a usable and creativity-promoting tool.

The mean value of all responses was 7.9 (the range of the values was 0-9). The participating students did 31 recordings with eShadow. From these 20 were based on the scripts from the film they watched and 11 were improvisations they made on the fly. This result is very encouraging because in the limited timeframe available, the students had to learn the controls and the interface and make their recording of the scene. The percentage of improvisations (1/3 of the total recorded scenes) is also an indication of the potential of eShadow regarding children's creativity support. As already stated the only time constraints were set by the escorting teachers. On average the teams spent 15 minutes for each session with eShadow. The minimum time was about 10 minutes and the maximum time spent was about 25 minutes.

4.2 Second field trial

The most direct impact of the first field trial was the interest some teachers expressed in using eShadow with their students in classroom. They wanted to exploit eShadow as a storytelling tool in order to create plays for their school annual festivals. Figure 3 shows the presentation of a play created in the second field trial. Following this request, a process was proposed to the teachers that included a preparation stage before the usage of the system. The version of EShadow that they used had some technical constraints. The first one was that only two virtual puppets could be moving at the same time. The second limitation was the number of virtual puppets and sceneries available for use. The number of virtual puppets available was 8 and the number of sceneries was 3.

With these limitations in mind teachers guided their students through the creation of the script for the play they wanted to record. The objective was for the children to have the major role in the creation of the script and the teacher's role was to facilitate the process. The created scripts consisted of small stories along with the characters and dialogs.



Figure 3: Photo from the children school festival presentation

When the scripts were ready the children used eShadow in the classroom and recorded the play based on their script. The next step of this field trial did not involve the children but the cooperation of eShadow team with the teachers in order to produce the video from the children's recordings. The process involved steps to: export the video from eShadow, clean up the sound of the recordings (they were made in a class room and there was a lot of noise), provide music for some parts of the play according to teachers' instructions, develop the final film using the videos, the audio recordings and the music files.

4.2.1 Second field trial results

The results that we collected from the questionnaires at the second field trial were in the same level with the results from the first field trial. In addition to the described questionnaire an emotional response evaluation was conducted following the procedure proposed in [8]. A translation in Greek of the emotions was created keeping the same images. The results collected can be divided in two categories. The first one is the emotional strength and the second is the type of the emotion. The mean value of the emotional strength is 4.7 in the range 1-5. The types of emotions that eShadow caused were: excited and pleasant for 8 children, average and pleasant for 3 children and calm and neutral for 1 child. The emotional response evaluation was conducted in one of the participating elementary schools.

Another interesting result from the second field trial is that children generated again many improvised recordings along with playing with each other. They were not instructed to do so. Two very distinct examples of games the children played were the following:

- Two boys playing: They improvised a fighting game where the virtual puppets were trying to fight each other (inspired by street fighting as they stated).
- One boy and one girl: The girl's virtual puppet wanted to marry the boy's virtual puppet and she was chasing him in order to give him a kiss.

Some of the videos that the children produced along with the original film that was shown to them can be watched at: <http://www.youtube.com/eShadowTheater>

5. NOMINAL GROUP EXPLORATION

In addition to the field trials we investigated new ideas for the development of eShadow using the Nominal Group methodology [9]. The nominal group consisted by graduate and undergraduate students participating in an HCI class in the Technical University of Crete. The main ideas for the future directions in the eShadow project were: (a) the development of a comprehensive environment for the development and management of figures and sceneries; (b) support for scenario development; (c) support for domain oriented plays; (d) development for students and children with special needs. Several of these topics are currently in development.

6. CONCLUSIONS AND FUTURE WORK

EShadow leverages on the rich tradition of Shadow Theater to create an engaging storytelling environment to promote learning and creativity. The findings from the questionnaire results are absolutely aligned with the initial expectations of the development team and further strengthened by the qualitative finding regarding the creativity support facilitated by the current prototype. As already stated almost all the twelve design principles that are proposed in [6] were followed during the development of

eShadow. Although this has introduced a level of complexity during the development of eShadow, it emphasizes the fact that eShadow is on the right track of becoming a creativity support tool for both children and adults.

In the following months, eShadow will be used in the learning interventions that will be organized in Greece in the context of the ALICE project (<http://www.alice-llp.eu/>) to enable the animation of selected folk tales and stories inspired by children literature. In parallel, a tool enabling users of eShadow to develop their own virtual puppets and scenery is under development and will be soon ready for evaluation and testing.

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