

Evaluating the Emotional Effects of Role-playing Software on Interactive Digital Storytelling from the Perspectives of User, Storyteller, Teammate and Audience

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Abstract: This paper discusses the applications of emotions in interactive digital storytelling. Emotion is one of the most important elements in digital storytelling. Participants were asked to design a story collaboratively and present it to the audience using the role-playing software, FaceRig. They were asked to fill out a questionnaire about their attitude toward this activity from the perspective of an audience member, a storyteller, a group member, and a software user. The findings indicated that most participants held a positive attitude toward this activity whether as an audience member or as a storyteller. Most participants thought that listening to and telling stories with FaceRig was a pleasant and appealing experience. They loved the idea of performing the facial expressions of the characters during both the preparation process and the performing process. We concluded that the application of emotions in storytelling is a way to improve the storytelling experience of both audience and storytellers. To further enhance user experience, we suggest that designers of such role-playing software could implement features such as voice changing functions and body movement detection.

1 INTRODUCTION

Studies of storytelling have suggested that storytelling has had a great influence on human culture, on education, and even on the medical field (Barrett, 2006; Chandrasekar et al., 2018; Schmoelz, 2018; Psomos and Kordaki, 2012; Tsou et al., 2006). In the field of education, many studies have proposed that storytelling is an effective learning and teaching tool, and that it increases students' learning engagement, learning outcomes, and their creativity (Barrett, 2006; Mokhtar et al., 2011; Schmoelz, 2018; Sandars and Murray, 2011; Tsou et al., 2006). Digital storytelling, or storytelling with the help of technology, has become a common field in the realm of storytelling. The difference between traditional and digital storytelling is that digital storytelling is performed through different kinds of media, such as computer-produced images, typed text, sound effects, music, and video (Miller, 2009; Robin, 2008). Digital storytelling could not only provide positive results in learning, but the media of digital storytelling could also catch students' attention and increase their motivation (Robin, 2008). Furthermore, Dörner,

Grimm, and Abawi (2002) argued that digital storytelling allows learners to actively take part in the creation of the story. Participation in the process of creating the story facilitates some important skills, such as communication skills, ability to evaluate one's own work, social learning, and emotional intelligence (Robin, 2008).

Emotions are one of the essential elements of digital storytelling (Center for Digital Storytelling, 2005). Emotional content can provide the audience with connections to the story content, and can make the audience feel that the discussed issues are more related to themselves (Center for Digital Storytelling, 2005). Freedberg and Gallese (2007) also proposed that when observing people's emotional expressions or pictures arousing strong emotions, observers tend to have emotional circuits in the similar facial muscles or have the same emotions. Moreover, Costa, Brunete, Bae, and Mavridis (2018) suggested that the emotions expressed by the storytellers would impact on the emotional responses of the audience. The emotions can even make the audience stand in the characters' shoes (Costa et al., 2018). Cavazza, Pizzi, Charles, Vogt, and André (2009) also agreed that

emotions could increase the audience's sense of reality. With the impact of emotions, a story could be more than just a simple story. The emotional elements of traditional storytelling were presented by the variations in intonation. However, human beings receive emotional cues not only from vocal messages but also from visual information, such as facial expressions and body language.

In this study, we adopted the role-playing software, FaceRig, which allow users to role-play different 3D characters by performing facial expressions. The integration of role-playing in storytelling helps storytellers depict the plot in detail by presenting the characters' images and emotions. Story listeners could engage in the stories more deeply because they could refer to the characters' images and characters' facial expressions through the role-playing software we adopted.

In this study, we aimed to know whether emotions could arouse the interest, increase the motivations, and improve the state of engagement of audience and storytellers in storytelling through the software, FaceRig.

2 RESEARCH TOOLS

2.1 FaceRig Role-playing Software

This research adopted FaceRig (Version build 1450), a type of role-playing software, as the instrument of storytelling. FaceRig is an open creation platform for users to roleplay different characters with its real-time facial animation feature. It provides users with several characters, backgrounds and props to choose from. The emotions of the characters will change along with the facial expressions of the user, which are captured by the computer camera. Moreover, users can customize their own characters using FaceRig, giving them more possibilities in role-playing, and they can roleplay their own characters while watching one another's performance through either one of the following two functions of FaceRig. First, FaceRig can be linked to online chat rooms, for example, Skype and Hangouts, so the players can watch the others' characters and their performance in the chat room. Second, the real-time facial animation function of FaceRig can detect more than one person's facial expressions and apply the emotions of different users to different characters. That is, FaceRig allows more than one person to use it at the same time with the same computer and interact with each other with different characters.

FaceRig used in this study provides 52 different characters, including humans and animals. It has 32 scenes. For instance, users can role-play as animals such as dogs, wolves, and dragons, or impersonate other human beings of different genders or ages (see Figure 1). They can also choose the role-playing background as streets, forests, a hall, and so on (see Figure 2).



Figure 1: Characters provided by FaceRig.



Figure 2: Scenes provided by FaceRig.

2.2 The Questionnaire of User Experience Evaluation

The questionnaire used in this study was derived from the IRIS evaluation toolkit (Klimmt et al., 2010). We designed the questionnaire based on four perspectives: audience, storytellers, interactions with teammates, and use of FaceRig. Audience refers to participants that watch the storytelling performance of other participants. Storytellers are the ones who perform the storytelling through FaceRig. Interactions with teammates include the interactions during their preparation and performance. Use of FaceRig refers to the usability of the system. We adopted some factors from IRIS, including usability, effectiveness, satisfaction, and user experiences as a reference. De Lima, Feijó, Barbosa, Furtado, Ciarlini, and Pozzer (2014) also adopted these four factors in their questionnaire. The questionnaire includes 22 5-point Likert scale items, with 1 standing for strongly

disagree to 5 for strongly agree, for the quantitative analysis, and four open-ended questions for the qualitative analysis. Four open-ended questions were designed to investigate the “use of FaceRig” perspective.

3 METHODOLOGY

3.1 Participants

The participants were 13 graduate students from a graduate school in Taipei, Taiwan. There were five males and eight females. All the participants were taking the course, Creative Multimedia Design. The FaceRig storytelling activity is a part of the course. Every participant knew that the results of the “The user experience of telling story with FaceRig” questionnaire would not influence their grade.

3.2 Procedure

The researchers held a storytelling activity with FaceRig in order to learn the differences in storytellers’ and audience’s reactions to role-playing storytelling and conventional storytelling. FaceRig is role-playing software, offering users various 3D characters for role playing. It detects storytellers’ facial expressions from the camera and projects them onto the 3D characters.

The procedure is as shown in Figure 3. We introduced FaceRig’s functions and how to operate it to all participants one month before the official experiment. Also, pictures of available scenes and characters were offered, with the agenda of the activity.

Before the storytelling activity, participants worked with their group members to come up with the outline of the story with a concept map, story face (Staal, 2000). There was no limitation to the content

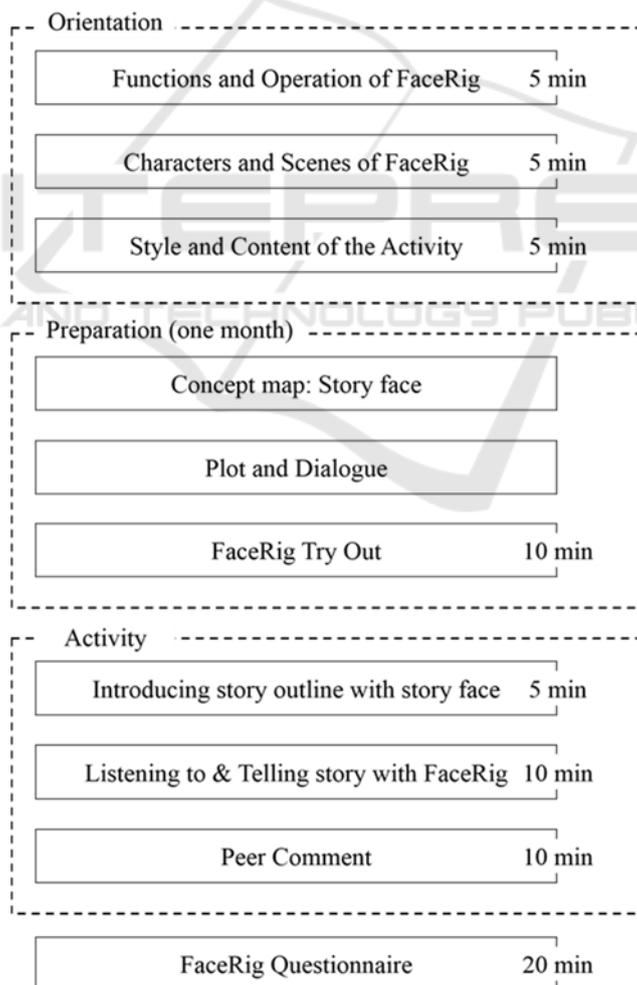


Figure 3: Procedure.

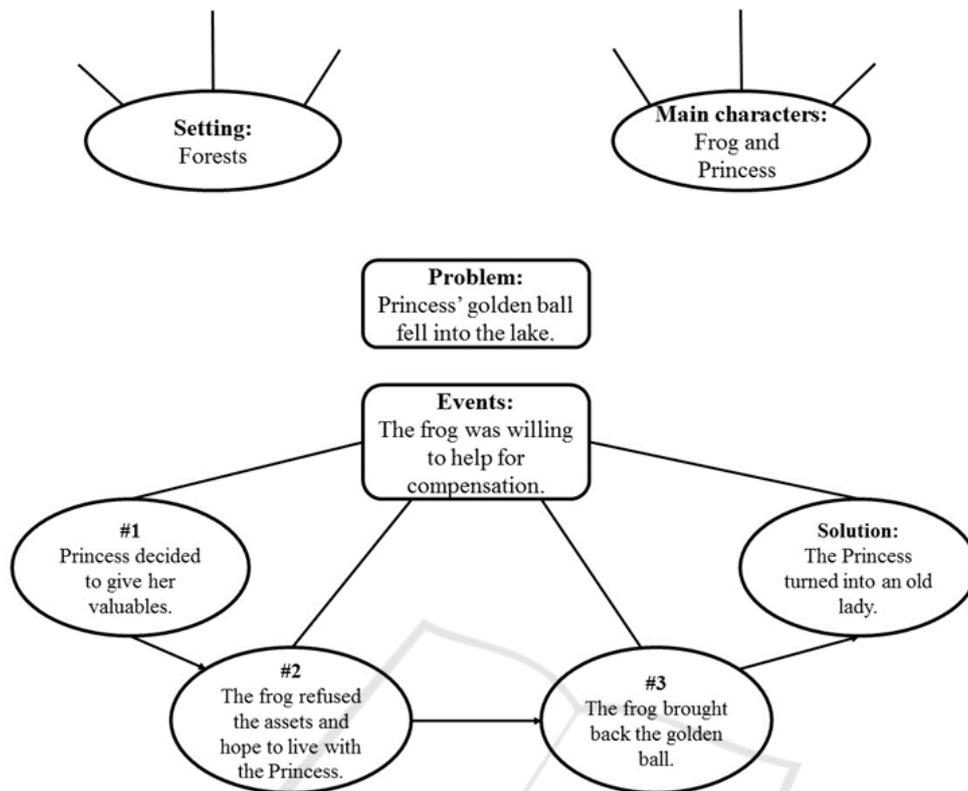


Figure 4: The story face structure (Staal, 2000) and story face of The Frog and the Princess.



Figure 5: Photo of FaceRig storytelling.

of the story. Original and adapted stories were both accepted. After completing the concept map, participants needed to design the plots and dialogues (2 characters). For example, one story topic is The Frog and the Princess. The story face of their story is shown in Figure 4. Figure 5 shows a photo of FaceRig

storytelling.

All participants were both the storytellers and listeners. During the formal activity, participants worked in groups of two or three (2 groups of 2 students and 3 groups of 3 students) to tell stories with FaceRig in the same room. When they were not in

charge of presenting their stories, they listened to others' stories and observed the expressions and interactions between the 3D characters. Two computers were used for the FaceRig role-playing. The role-playing performance from the two computers was linked using the online meeting software, Hangouts. A third computer was also linked to the two computers for the projection. Thus, the audience could easily observe the performance from the big screen. The storytelling process was recorded using the inbuilt recording function of both FaceRig and Hangouts. After each group finished their storytelling, the participants gave comments to each group. Later, the participants were asked to complete the questionnaire.

4 RESULTS

The overall results showed that participants presented a positive attitude toward the different factors of the role-playing storytelling activity with FaceRig from four perspectives: audience, storyteller, team member, and software user. The results are presented based on these four perspectives.

4.1 Watching the FaceRig Storytelling as an Audience Member Procedure

As audience members, most of the participants found watching storytelling with FaceRig a good experience. More than 90% of the audience thought that listening to storytelling with FaceRig was interesting. Besides, all the participants enjoyed the idea of adding emotions into storytelling. Moreover, 85% of the participants found storytelling with FaceRig more appealing than conventional storytelling. For effectiveness and satisfaction, 85% found that storytelling with FaceRig assisted them in understanding the emotions of the characters and connected them to the plot as if they were really experiencing the story. See Table 1 for the items and detailed results of the audience perspective of the questionnaire.

4.2 Telling Stories with FaceRig as a Storyteller

The storytellers' attitudes toward FaceRig storytelling were mostly positive. Most of them found it a good experience. Every participant agreed that telling stories with FaceRig and expressing the emotions at the same time was interesting. Every

Table 1: The results of questionnaire part 1: As an audience member.

ID	Items				
	SA	A	N	D	SD
1	I think it's fun to listen to the stories performed by FaceRig.				
	30.8%	61.5%	7.7%	0%	0%
2	I like to see performers add emotional expressions when they tell stories.				
	76.9%	23.1%	0%	0%	0%
3	Listen to stories told with FaceRig will give me a better understanding of the emotions of the characters.				
	23.1%	61.5%	15.4%	0%	0%
4	FaceRig plus emotional expressions will help me experience better the stories.				
	15.4%	69.2%	15.4%	0%	0%
5	Storytelling with FaceRig is more appealing to me than the storytelling in a normal way.				
	38.5%	46.2%	15.4%	0%	0%

SA stands for strongly agree, A for agree, N for neutral, D for disagree, and SD strongly disagree.

Table 2: The results of questionnaire part 2: As a storyteller.

ID	Items				
	SA	A	N	D	SD
1	I think it's fun that I can express emotions during storytelling by using FaceRig.				
	38.5%	61.5%	0%	0%	0%
2	I think using FaceRig will help me tell better stories.				
	7.7%	76.9%	15.4%	0%	0%
3	I think using FaceRig will help me express completely well the emotions that I want to show.				
	7.7%	30.8%	46.2%	15.4%	0%
4	I can perform more vividly the personalities of the characters when I tell stories with FaceRig.				
	23.1%	46.2%	30.8%	0%	0%
5	In my experience, I think telling stories with FaceRig can engage me more than the way I used to do storytelling.				
	30.8%	59.2%	0%	0%	0%
6	When I tell stories with FaceRig, I am very concerned about the reaction of the audience.				
	30.8%	53.8%	7.7%	7.7%	0%
7	When I tell stories with FaceRig, I will modify my interpretation of the character instantly or improvise according to the audience's response.				
	30.8%	38.5%	15.4%	15.4%	0%
8	I am looking forward to telling stories with FaceRig in the future.				
	7.7%	61.5%	30.8%	0%	0%

SA stands for strongly agree, A for agree, N for neutral, D for disagree, and SD strongly disagree

participant also agreed that storytelling with FaceRig helped them engage in the storytelling process. In all, 85% reported that they cared about the audience's

reactions and responses, 70% thought that FaceRig allowed them to present the emotions and the characteristics they expected. Furthermore, more than 90% are looking forward to the next chance to tell stories with FaceRig. For effectiveness, more than 90% thought that FaceRig helped them tell a better story. In addition, 77% thought that FaceRig could thoroughly present the emotions they expected, while 70% reported that they would adjust their performance according to the reaction of the audience. The items and results of storyteller perspective of the questionnaire are shown in Table 2.

4.3 Interacting with Teammates through FaceRig

The overall opinion on the interaction with team members in the research activity was positive. More than 90% of participants engaged in the preparation process of plot and character design after knowing that they would use FaceRig as a storytelling instrument. More than 90% agreed that they would observe the facial expressions of their teammates while telling stories with FaceRig. Around 70% showed that the emotions expressed by their teammates would influence their facial expressions, 77% declared that they would come up with some new ideas and improvise because of their teammates' emotional expressions, and 70% enjoyed the FaceRig storytelling with their teammates. See Table 3 for each item and result of the interaction perspective of the questionnaire.

4.4 Use of FaceRig

The findings of this section are divided into two main parts: the quantitative and the qualitative results. For the quantitative analysis, most of the participants found FaceRig easy, fun, and effective to use. About 80% strongly agreed or agreed that FaceRig is easy to use. Most participants agreed that the process of telling stories with FaceRig is pleasant. Most participants felt satisfied with the human-machine interaction by role-playing with FaceRig. With regard to the fluency in telling stories using FaceRig, about 85% agreed that FaceRig could increase the fluency of their storytelling. The items and results of FaceRig user experience are shown in Table 4.

For the qualitative analysis, the participants provided some opinions on their FaceRig using experience. Most suggested that they were relaxed when using FaceRig because what the audience watched was not their faces but the faces of the

Table 3: The results of questionnaire part 3: Interaction with team members.

ID	Items				
	SA	A	N	D	SD
1	After knowing that we are going to tell stories with FaceRig, the group members and I are involved in the design of story plots and the emotional expressions of the characters.				
	30.8%	61.5%	7.7%	0%	0%
2	While using FaceRig, I will observe the facial expressions made by the other group members.				
	30.8%	61.5%	7.7%	0%	0%
3	While using FaceRig, the facial expressions of the group members will affect the way I express the emotions of the character when I tell stories.				
	38.5%	30.8%	30.8%	0%	0%
4	While using FaceRig, I will come up with some new ideas and improvise according to the facial expressions of the group members.				
	30.8%	46.2%	15.4%	7.7%	0%
5	I like very much to tell stories with FaceRig with the group members.				
	15.4%	53.8%	23.1%	7.7%	0%

SA stands for strongly agree, A for agree, N for neutral, D for disagree, and SD strongly disagree

Table 4: The results of questionnaire part 4: Use of FaceRig.

ID	Items				
	SA	A	N	D	SD
1	In general, I think it is easy to use FaceRig.				
	23.1%	53.8%	7.7%	15.4%	0%
2	Telling stories with FaceRig is pleasant.				
	23.1%	61.5%	7.7%	7.7%	0%
3	I am satisfied with the human-machine interaction provided by the FaceRig role-playing software.				
	23.1%	61.5%	7.7%	7.7%	0%
4	FaceRig helps me to tell stories more fluently.				
	0%	61.5%	23.1%	7.7%	7.7%

SA stands for strongly agree, A for agree, N for neutral, D for disagree, and SD strongly disagree

characters. "I was comfortable to make facial expressions because the audience could not see my face." However, some participants still felt stressed because they were worried about their performance. Besides, they thought that conventional storytelling required the imagination of the audience, but with the visualization, the audience could easily engage in the story. Moreover, they shared their opinions about the quality of the real-time facial animation features. Some people found that some characters, especially animals, could not express some emotions. For example, some characters were designed to be serious people, and those characters could not express a delightful smile. Last but not least, the participants discussed the functions they expected role-playing

software to have. Some thought that the detection of body movement would be a good idea, while others thought that the software could provide inbuilt sound effects and music. Some expected the role-playing software to have voice changing functions.

5 CONCLUSIONS

In this paper, we have discussed the role of emotions in storytelling using the role-playing software, FaceRig. We argue that emotions could have positive impacts on both the audience and the storytellers. As audience members, the participants found that emotions made them have a better experience of storytelling and be more engaged in the plot. As storytellers, they felt relaxed and engaged in the storytelling process. Moreover, as teammates, they enjoyed the collaborating processes through FaceRig and found that teammates' emotions would influence the way they told stories, and they might come up with new ideas or improvise due to this interactive collaboration process. Finally, as software users, most of the participants found FaceRig easy to use and provided some suggestions for the features that could be included. Those suggestions could be a reference for the role-playing software developers.

There are some limitations in the study which can be improved in the future study. The participants of this study played the role as the storytellers and story listener. They might be more familiar with the software and the storytelling processes. These might have some impacts on the results. The researcher might recruit more participants as simple audience in future study. Furthermore, every participant used the same software to tell story in the same designing and storytelling process in the current study. It is possible that the researcher conducts a comparison between the FaceRig role-playing software and other storytelling approach without emotions and role-playing in future study.

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