Robot as a Storytelling Partner in the English Classroom - Preliminary Discussion

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Abstract

This paper introduces software which enables teachers create robot as a partner easily and find out how to help a teacher difficulties when using storytelling lessons. First of all, we must understand the relations between storytelling and language learning, and the benefit of a robot being the assistance of a teacher during the lesson. In the next step, let teachers use the "programming a robot into a storytelling tool" and design the "Story Time" during English class. According to the evaluation result, there was highly satisfied in the new system implementation and effectively improved teacher’s organization and technique of difficulties in the storytelling lesson. In addition, tester also had the confidence to improve students' participation and atmosphere during the storytelling activities.

1. Introduction

Following the improvement of modern information technology and in order to help the domestic information service industry, the Taiwanese propelled various types of intelligence technology by combining technology and service together. One of all is to use the intelligence robot and therefore is the one of the nation’s six major studies for industry growth tactics.

The study of robot is no longer aiming for the hardware improvement. Closer relationship to human’s daily lives and to provide actual assistance are the major studies in the service types of robots. For example: Leonard has the ability to learn and to finish tasks with people. [1]

However most robots were developed base under the goal of entertainment and socialization. Even if one is being used in educational situation, it is simply basic information transferring media system. For example the iRobi is a home use robot that provides children with online English learning systems [6], and Robovie [10] teaches children vocabulary by social activities. Adapting robots into classes as a third party that interactively communicate with the teacher and children was less being heard. Therefore our study aims to discuss how to make a robot an effective assistance to a teacher and create a fun atmosphere.

From the perspective of learning atmosphere, some study had interviewed the elementary English teacher to observe the current teaching system in the basic level educational system [2]. Over 90% were taught by listening and speech, designed activity lessons were 44.2% during the teaching process. Of all kinds of English teaching lessons, storytelling also holds 6.9%. 60% of the elementary English teachers approve the activities and designed lessons in order to raise the student’s interest to learn. Students like to see plays and participating in activities in despite of which kind of teaching method. The ultimate goal is to interest all levels of students in a happy English Story time.

Therefore teachers use massive media to aid the teaching lessons in order to attract students’ learning interests. To the teachers, what they need is a teaching aid to get materials that matches the lessons in seconds in combination with strong sound and light effects for students. Regardless of lessons or storytelling, they often felt unable to coordinate properly between the teaching prearrangement and the teaching technique.

Four Reasons why Taiwanese English teachers do not like to use storytelling lessons: Limited lessoning time, lack of experience in storytelling practices, selecting the right story, lack of language background and fluency to tell the story.

The goal of this study paper is to solve the above difficulties, and in proceeding develop an efficient and effective robot, giving the teacher timely help. Through GUI’s robot control interface, even the teachers whom are not familiar with computer or robot related knowledge can easily adopt the system to enhance the current storytelling lessons. The teacher
may easily instruct the robot to tell the story together cooperatively during the lesson.

Given the effective results of storytelling in English lessons described in section 2, the basic system design and the related knowledge concept will be established in section 3 to describe the scenario of interactive teaching method. After then providing the evaluation of programmable storytelling robot tool in section 4 will all be concluded in section 5 plus some suggestions.

2. Robot as a storyteller

Telling story can be influencing in many sides. Including storytelling in the curriculum can improve the level of learning in speak, listen, read, and write language skills [11]. Listening to stories draws attention to the sounds of language and helps children develop sensitivity to the way language works [5]. In addition, storytelling is one of the most powerful tools for surrounding the young learner with language [7]. It contributes to a relaxed and intimate classroom atmosphere [8]. Scott & Ytreberg [9] described in their study: “only when students are comfortable in the class, then they will be encouraged to be independent and initiating their involvement in language lessons.” Therefore if we wish to see the student to maximize they study in a new language, we must create a pleasant learning environment in order for them to join the class naturally.

Telling stories is very important and critical to an elementary teacher’s foreign language lessons. Most teachers understand the benefit of storytelling, but how to make such a method more pleasant? One may use different voices to create different characters. Significant body gestures, facial expression, images, slide shows, sounds, and puppets are all helpful to encourage children using sight and listening abilities. Or perhaps the teacher can design a game or singing during the story. After the actual observation in a storytelling lesson we have made the following comparison (Table 1).

<table>
<thead>
<tr>
<th>Media Characteristics</th>
<th>Playing Video Clips</th>
<th>Playing Sounds</th>
<th>Play acting by Teacher</th>
<th>Play action by teacher &amp; puppets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple characters in story</td>
<td>Easy</td>
<td>Change of tone</td>
<td>Difficult</td>
<td>Substituting puppets</td>
</tr>
<tr>
<td>Special effects</td>
<td>Sound and Light</td>
<td>Sound effects</td>
<td>Difficult</td>
<td>Difficult</td>
</tr>
<tr>
<td>Body gestures</td>
<td>Screen display</td>
<td>N/A</td>
<td>Actual performance</td>
<td>Actual Performance</td>
</tr>
<tr>
<td>Interactions</td>
<td>Special design required</td>
<td>N/A</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Mutability</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

3. Programming a robot into a storytelling tool

The programming is to allow a teacher without any robot control or related experience, too, can easily control the software, basing on his/her needs to design an unique robot assistant, to tell a story cooperatively in the English classroom. This tool is now being tested on the SAPIEN created by NASA, which allows the user to use his/her Bluetooth built in the computer to control the robot, and through programmable software to control the robot’s acting procedures.

3.1. System Architecture

In order to design a robot that provides the teacher effective assistance in storytelling, the interface of the system has to be simple and the robot will require multiple modules in basic and complex body movement designs. The complex body movement is actually a series of simply body movement combined together. For example: salute movement modules is to have the robot raise its right hand, resting the inward and bend the body to say “welcome.” Similarly the robot’s emotion movement module is multiply designed based on David B. Givens’ definition [3] of emotional expressions, and assisted by adding in the sound effect to identify the emotions more efficiently.

Previously we pointed out that most teachers would use many medias to assist the storytelling, and this system also combines many media to enhance the
robot’s character in storytelling (Figure 1), instructing the robot to perform operatively with screen display medias.

**Teacher**

**Graphic Tangible User Interface**

**Storytelling Functional Interface**

**Figure 1. System Architecture**

3.2. GUI Control Interface Design

The system interface in this study is divided into two parts. One is to let the user manual script the robot’s story telling plays, and the other is to allow the teacher to remote the robot’s action during the storytelling. The idea is to create a interface that uses only the mouse pointer to manual script the contents of play. The design is created based on the following two most popular software concepts.

3.2.1. Scratch Software. According to characteristic of MIT’s Scratch software [4], children are given a theme project to construct a product by dragging the motional object or multimedia sources together. The software interface is displayed into three parts. Command area on the very left given many simple terms with selectable blocks, in the middle is the script area allowing the user to compose the action with sound, and on the right side is the pre-playing clip area.

Our interface design is to allow users to use scratch software concept to design (Figure 2.). On the left area of the interface breaks down into the basic body movement, background sound, defined emotion display, and multimedia assistance selections for users to edit the plotline of story. Thanks to the GUI’s friendly interface, users can easily adopt the program and efficiently control the robot.

3.2.2. Video Clip Editing Software. According to the video clip editing software such like Window Movie Maker’s Timeline and clip partition concept, our robot can be manual scripted into a motion module clip. On the right side of the interface users can take a look at the result of the editing and therefore adjust the procedure accordingly.

**Figure 2. System Interface**

As for the second part of the remote interface, it is for teacher to use conveniently in class that allows the user to organize the robot’s usual complex motion modules, and at the same time giving the teacher a chance to interactively telling the story together, or to activate the robot during the play by pressing the play button. This remote interface can be break down into five parts. The top part is for the teacher to control the robot while playing the story, sound setting in the second part, basic body movement in the third part, emotion module in the fourth, and finally the result of movement module scripted by the user (Figure 3.).

**Figure 3. Remote Control Interface**

3.3 Scenario: The robot and teacher telling a story together in the class

In order for the robot to act like a real human being and interactive with teacher and student, it has to do more than just telling a story or constant communication with the teacher, the system will also design several strategies for the robot to perform high interactive teaching activities according to the robot’s characteristics. The robot can be seen as the teacher’s treat for the student raise and maintain interest to
participate in the lesson. The interactive strategy during the storytelling time is like follows:

1. Self Introduction Strategy: by using the human like characteristic, robot can imitate people’s body gestures and emotional expressions, thus to introduce the state where the robot is at and its characteristics. By designing several dramatic and erotic entrances will convince the student to believe that the robot is very much like a human being.

2. Random Score Strategy: given the characteristics of robot’s unpredictable performance, it can replace the teacher to evaluate the student in order to change the image that teachers are always stern discipline and serious, therefore creating a much more pleasant atmosphere and narrow the space between them.

3. Random Performance Strategy: the robot’s amusing characteristics would encourage student to learn through many different gestures and sounds, and also to keep student a fresh mind.

4. Instruction Strategy: unlike the multimedia, the robot repeat itself and materialize the thought, in sequence the student can instruct the robot to perform an act repeatedly. For example, letting a student to decide how the story should continue and what the robot should do next. At the same time the teacher may also allow the robot to implement the teaching contents or activities.

The above interactive teaching methods help the teacher to overcome the storytelling difficulties, and through the system he/she can efficiently compile the story beforehand. Such efficiency allows the student to tell a story in shorter time during the intensive class time and helps the student to concentrate on the course.

Additionally the teacher and the robot telling a story together is highly interactive, therefore it takes away the teacher’s fear in English storytelling because of the lacking experience and practice.

The last of all, robot’s pronunciation will be programmed in the native accent from the language’s origin country; therefore the student will observe the language in the traditional English speaking. This will effectively improve the background and language fluency when telling a story, and enhance the level of students’ listening ability.

4. Evaluation

This tool combined visible teaching equipments and English materials for teachers to design a collaborative robot, which helps to create a fun and interesting storytelling lesson. Therefore, our evaluation of robot as a storytelling tool breaks down into system usability and teaching strategy.

System usability is the usability of questionnaire and interview for testers to understand their satisfaction about our tool. The survey first introduces the system and explains the purpose, and then shows the preview clip to the user so that they will have an idea of how the result will turn out. Then we ask the Usability problem before using the system and then let the user to actually control the software after explaining all the function and instruction procedures. At last users are asked to answer the Usability questions after using our program. All the results are recorded in Table 2. (The numbers in the table represent the number of people)

<table>
<thead>
<tr>
<th>Table 2. Usability before / after using the software</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Usability before using the tool</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Guess ability</td>
</tr>
<tr>
<td>Understand the general idea how to use the program?</td>
</tr>
<tr>
<td>Appearance of the interface</td>
</tr>
<tr>
<td>Learn ability</td>
</tr>
<tr>
<td>Understand how to use the program after listening to the explaining of instruction.</td>
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<tr>
<td></td>
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<tr>
<td>Usability after using the system</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
</tr>
<tr>
<td>Feel a lot easier to adopt teaching material editing after using our program.</td>
</tr>
<tr>
<td>Useful</td>
</tr>
<tr>
<td>Easy to control this system?</td>
</tr>
<tr>
<td>Fun</td>
</tr>
<tr>
<td>Is it fun software to use?</td>
</tr>
<tr>
<td>Memorable</td>
</tr>
<tr>
<td>Still remember how to use this software the next time?</td>
</tr>
<tr>
<td>Satisfaction</td>
</tr>
<tr>
<td>Satisfied after using our software?</td>
</tr>
</tbody>
</table>

Roughly to say, the usability of system is highly satisfied. All testers felt that the teacher told the story together with the robot is well prospected, and are willing to try it during the class time. In regard to the best function of our system is easy and has instructions.

In order to realize the dream of teaching through entertainment, we must to find out the English learning problems and treated them. We surveyed 20 five grade students about the English learning of the worry anxiously. After that, we discussed several teaching strategies in last section with testers whether can let students are more effective to learn and involve in activities through the robot acceded to storytelling.
According to questionnaire, 60% of students are interested in robot SAPIEN and want to play with it. 50% deeply hope to learn English with it. In addition, Teachers conceive that robot will have a great effect for students to perform with robot’s characteristics.

1. Nervous to speak English during class: This problem can adopt "Random Performance Strategy" and "Random Score Strategy" to create happy English learning atmosphere.
2. Fear to speak English when classmates laughing: Robot’s encouragement to make student forget frighten.
3. Fell afraid to not to understand what teacher says: Robot as an assistant in students’ place student to ask questions or repeat emphasis let them know.
4. No interesting in English: Story Time can inspire English enthusiasm, because students like to see plays and activities.

In brief, teachers have confidence to highly interaction performance together with robot. Let robot be a role of changing characters, promoting atmosphere and unexpected performance to maintain students' interests. Some wrong motions can also attract them attention easily, and give English learning the biggest avail by pointing out wrong performances to increase story’s memory.

5. Conclusions and future works

This study is to discover the benefit of a teacher and a robot telling story together during the foreign language class, and whether or not we can solve the difficulties that many Taiwanese Teachers may have when telling English stories in the class.

The robot telling a story is a new idea. Such a robot storytelling tool not only will convince the teacher to try but also it reduces the difficulties that a teacher has to face when using a storytelling lesson. Because of the many characteristics of robot, teaching strategy modules design makes teachers to have confidence to tell a short story and create a happy and effective English learning atmosphere, and more students’ involvement and participation.

The current design is to have the teacher pre-design the module of the robot, the actual control still needs the teacher to remote the robot during the performance. The motion will not be able to use repeatedly or extend to the next level, which limited the utility of our design. As for the storytelling of the future robot we hope to repeatedly perform the designed module, create a more motional robots and a random reaction performance.

At the same time, we will hope to perform actually in the classroom aftertime, and also add in more human hoping to be going to experiment actually in the classroom aftertime. Make the robot’s characteristics more like a real teacher, and so naturally interactive perform with the teacher in the class. Students will change their mind that robot is just a machine or a toy. We will in the future test the student’s satisfaction in such a teaching system, in turn shares the burden of the teacher’s teaching volume and efficiently increase the students’ learning motivation, listening and speaking skills. Moreover the system will be more valuable in terms of education after reducing the gap between students’ English skills.

6. References