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The Digital Interactive Learning Theater in the Classroom for Drama-based Learning

Yu-Tzu LIU, Shang-Chiao LIN, Wei-Yi WU & Gwo-Dong CHEN*
Department of Computer Science and Information Engineering, National Central University, Taiwan
*chen@csie.ncu.edu.tw

Abstract: Learners may have better achievement in learning if they could experience the scenarios of the textbooks in a classroom. Many scholars advocate drama-based learning as the practice of situated learning. However, traditional drama-based learning would encounter several difficulties including the time-consuming scenario construction and the laborious preparation of costumes and stage props.

In this study, we propose the Digital Interactive Learning Theater (DILT), providing performers a mirror-like way of performing. The DILT is to integrate technology into drama-based education and to transform the content of the textbooks into drama scenes so that teachers and students may conduct drama performance in a regular classroom and achieve situated learning. Furthermore, we gradually introduce the interactive digital elements into the theater and expect to maintain students' learning motivation in the long-term use of the DILT. In this study, we applied the DILT to formal English curriculum in an elementary school and examined students' learning after long-term use. In addition, we adopted the idea of immersion in the research in order to further realize whether students would be absorbed in the situated scenarios when conducting drama-based learning.

The experiment result demonstrated that students preferred the DILT compared with the non-interactive Digital Learning Theater (DLT). The statistics on immersion also revealed that learners were maintaining their motivation in the DILT even in the second year of using the learning system. We may conclude that the interactive elements have motivated students in learning even in the long-term use of the DILT.

Keywords: drama-based learning, situated learning, Digital Learning Theater, Immersive, interactive elements

1. Introduction

In 1989, Brown, Collins, and Duguid proposed the idea of situated cognition: "knowledge is situated, being in part a product of the activity, context, and culture in which it is developed and used". In other words, they believe that knowledge should be acquired through learners' interaction with the environment, that learners should learn in situations, and that things in daily life can be teaching materials (Brown et al., 1989). The idea of situated cognition, as applied to education, is to have learners explore in authentic situated learning, discussing and further constructing meaningful knowledge and questions related to learners' real life (Donovan, Bransford and Pellegrino, 1999).

There are several approaches practicing situated learning, and drama is always considered and recognized as one of the most influential ways (McCaslin, 1998). Drama-based learning is one learning approach applying drama to in-class learning. It can be traced to two of the educational ideas of French philosopher Jean-Jacques Rousseau: learning by doing and learning by dramatic doing (Courtney, 1989). Learners are not limited to any form of the theater; they perform what they have learned through role-playing and imitation (Richer and Swortzell, 1992). They may interact and learn through a certain issue. Such learning is learner-centered, and learners may develop their cognition to a certain level by participating in role play and adding incidents or situations to the drama performance (Dewey, 2004).

The Digital Learning Theater (DLT) combines drama-based learning and digital technology, providing teachers and students in conducting drama activities in a classroom, and merging the images of student performers in the scenario on a virtual stage (Luo, 2015). After one-year application of the DLT, however, both our interviews with teachers and classroom observation revealed that some of the students' attention decreased after long-term use of the DLT. In order to maintain students' learning interest and motivation in learning with the DLT, this study proposes to add interactive elements and

virtual props to the DLT to increase the sense of novelty and interaction. The Digital Interactive Learning Theater (DILT) is the DLT with interactive props, dynamic background and dynamic performer's size. We anticipate that this improvement can enhance students' learning motivation in the DILT and maintain their interest in learning with the DILT.

Moreover, in order to further examine whether students are absorbed in the situated dramas, this study adopts the idea of the sense of immersion to observe students' conditions when learning with the DILT. Immersion is a psychological state characterized by perceiving oneself to be enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences (Baños, Botella, Garcia-Palacios, Villa, Perpiña and Alcañiz, 2000). Some research indicated that immersive learning may bring students novelty, cause positive learning attitude, maintain learning motivation, and enhance interactions among learners (Ganskop, 2010). In other words, adding those novel or intriguing elements to virtual scenarios in the virtual environment may make learners feel inspired and highly-motivated (Dede, 1995). Therefore, this study proposes that the maintaining of students' sense of immersion in the DILT may keep students passionate and inspire them in their learning with the DILT.

2. Related Work

2.1 Situated Classrooms and English Villages

Many teachers would lead situated learning by presenting authentic situations for students to learn. English learning, for instance, would require a situated classroom or English Villages. An English Village is for learners to experience the whole English environment. In addition to English Villages, many schools will build situated classrooms. However, the budget for constructing either English Villages or situated classrooms is terribly high, and the location is quite limited (Lan, 2015). The established scenarios cannot be changed easily and their content lacks flexibility. Learners may not be able to maintain their learning interest if they always practice with the same topic.

2.2 Traditional Drama base learning

Traditional drama-based learning puts much more emphasis on improvised performances but less on scenario construction. Building drama scenarios in regular classrooms is less feasible, yet it will become highly significant in order to have students involved in the drama performance (Sun, 2005). Besides, a drama is to have performers present the story on stage and face audience; students as performers will not be able to observe their own acting and adjust immediately.

To overcome the shortcomings of the learning methods mentioned above, we designed the Digital Interactive Learning Theater (DILT). It provides performers a mirror-like way of acting, gives a sense of reality as if performers were into scenario of the drama. At the moment of drama presentation, there is also the audience, and performers can see their own acting in the meantime and make an adjustment quickly. The DILT also solves the problem of building and switching scenarios; teachers and students can control presentation of situated scenarios, costumes, and stage props with a digital tablet. Moreover, to keep students' learning interest in and to attract student's long-term use of the DILT, we designed diverse interactive elements based on different learning topics in textbooks.

3. System Design and Implementation

In order to transform the context of textbooks into visible scenarios and to have students experience the situations, the system integrates various interactive modes and virtual props into the Digital Learning Theater. Teachers, as well as, students can effectively conduct digital drama activities and choose different interactive modes and virtual props based on the learning topics. It helps increase the sense of

novelty and interaction in digital dramas so that learners can maintain their fondness and preference for persistently using the digital dramatic learning system.

3.1 System Architecture

The layout of the DILT is demonstrated in Figure 1. The classroom is divided into a digital theater stage area and an auditorium. Students can perform in the digital theater stage area, and the auditorium area is equipped with a projector and screen in the classroom so that both performers and audience can watch the acting immediately.

The stage area is where student performers perform dramas. We set up Kinect, computers, and screens. Kinect will capture performers' images and sent to the computer to merge the images into the virtual scenario, and performers can watch their own performance on screen and then examine and adjust their performance in time. The auditorium area is equipped with a projector and screen in the classroom. The computer screen in the stage area is projected to the screen in the auditorium. The app installed in pad is for instructors or students to control the flow of scenes in a drama performance. When students are performing, teachers can use a tablet to shift the scenes, display subtitles, play sound effects, and control the flow. In addition, the system supports video recording; students' performance can be videotaped for demonstration and discussion afterward. A script writing tool is developed for teachers to transform the content of the textbook into scripts for DILT.

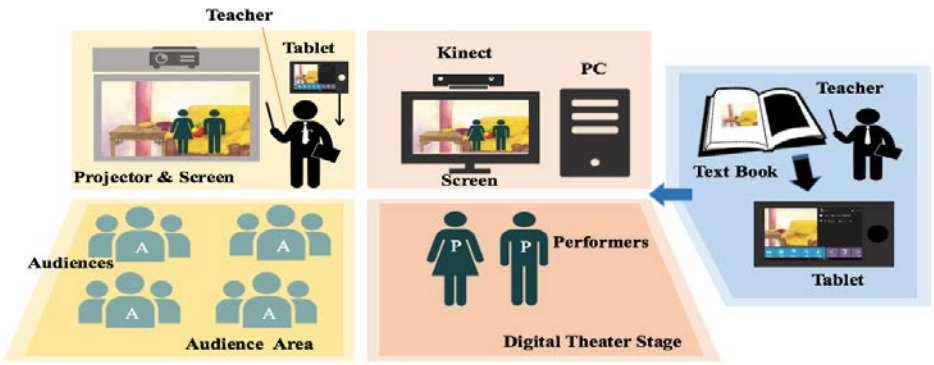

Figure 1. The Layout of the Digital Interactive Learning Theater

3.2 Introducing Interactive Elements into Digital Learning Theater

In the first version of digital theater, it contains basic elements such as background, foreground, sound and music effects. To support more elements required in a theater, the second version extends digital theater with dynamic background such as forest on fire or a magic mirror, digital props such as fans and fruits, and interaction of digital props such as snow balls. We hope that the digital theater can support fantasy scripts such as harry potter and promote the immersion and interactivity of the digital theater. For example, an army keep throwing snow balls to enemy to stop their attach in Figure 2. Another example is we can provide props such as tea cups, apples, masks, and costume for the actors so that the students can use them to perform without the need to prepare real props. Figure 3 depicts a scene that actors perform by using digital props.

Figure 2. Interactive with scenarios

Figure 3. Performers Using Virtual Props

4. Experiment

As mentioned above, we anticipate that students can always keep themselves intrigued and motivated with the learning modes in the Digital Interactive Learning Theater. Hence, our hypothesis are :

- Students maintain their sense of immersion on DILT if we put interactive pros and dynamic background scheme according to the scenario of the textbook.
- Students prefer using DILT to DLT without interactive elements.

4.1 Procedure

Three sixth-grade classes of an elementary school in Taoyuan City participated in this research. There were approximately 30 students in each class, and 92 participants in total. Students in each class were divided into six groups. The experiment was to apply the Digital Interactive Learning Theater to formal English curriculum, and all participants had experience in using the Digital Learning Theater when they were in the fifth grade.

Each class would conduct the Digital Interactive Learning Theater for five times (5 * 40minutes). The textbooks were from Book VII and Book VIII of the English textbook for the sixth grade published by Kang Hsuan Educational Publishing Group. In addition, participants had to fill out the questionnaire on the sense of immersion at the beginning and the end of the school year. At the end of the second semester, they were required to answer online the questionnaire on preference. We also observed students' interest in and impression of the Digital Interactive Learning Theater after conducting such a learning approach for two years via interviews with teachers and experimental results.

4.2 Instruments

4.2.1 Questionnaire on the Sense of Immersion

In order to judge whether students feel the immersion and interaction in situated learning, we adopted Rosa Baños' immersion and involvement scale to design the questionnaire (Baños, Botella, Garcia-Palacios, Villa, Perpiña and Alcañiz, 2000). The questionnaire involved three dimensions: reality judgment, internal/external correspondence, and attention/absorption. Each question was designed in accordance with the five-level scale invented by Rensis Likert, and every participant should choose the description that is the closest to his or her answers. The scaling ranged from five points (strongly agree) to one point (strongly disagree). The result was further analyzed with the Paired-Samples T Test.

4.2.2 Questionnaire on Preference

In DILT, we design interactive elements such as dynamic background, virtual props, and dynamic actor size in the scenario according to the content of the textbook. At the sixth grade, we also provide DLT without interactive elements for some topics. At the end of school year, we ask the students how they like DILT and DLT in 1-7 level. respectively. Then, we do the within group Paired-Samples T Test.

5. Results and Discussion

5.1 Results

5.1.1 Questionnaire on the Sense of Immersion

We examined the reliability of the questionnaires collected from students with Lee Cronbach's alpha (α) coefficient. The alpha value is above 0.7, showing the high reliability of the questionnaires. There

are 27 questions in the questionnaire, and there were total 81 （11 students were not show up at the second time） valid questionnaires collected. The questions focus on four dimensions: reality judgment, internal/external correspondence, emotional involvement, and attention/absorption. The statistics of the Paired-Samples T Test is displayed in Table 1. From the data shown in Table 1, students remain the same score for immersion. The students had the same motivation of using DILT after using DILT for a year.

Table 1: The analysis of students' sense of immersion.

	DLT (N=81)		DILT (N=81)		Significant Test
	Mean	Standard Deviation	Mean	Standard Deviation	
Reality Judgement	3.63	.735	3.75	.749	.087
Internal/External Correspondence	3.78	.710	3.75	.728	.666
Attention/Absorption	3.55	.762	3.59	.765	.613

5.1.2 Questionnaire on Preference

There were 90 participants filling out the questionnaire, and the result demonstrates that students' preference for the Digital Interactive Learning Theater reaches significance (see Table 2). It reveals that compared with the non-interactive digital theater, students prefer the digital theater with interactive elements and show higher interest in drama performance.

Table 2: Preference of interactive elements.

Comparison	Score the results (N=90)		Significant Test
	Mean	Standard Deviation	
DLT	4.10	1.593	0.000***
DILT	5.2	1.755	

(***p<0.001, ** p<0.01, and * p<0.05)

5.2 Discussion

We introduced interactive elements and virtual props to the Digital Learning Theater and turned it into the Digital Interactive Learning Theater, hoping to increase students' interest in digital drama performances. We examined our experimental results as follows to realize whether they correspond with our above-mentioned objectives:

- Students maintain their sense of immersion on DILT if we put interactive pros and dynamic background scheme according to the scenario of the textbook.

We may observe from the statistics in Table 1 that students were maintaining their interest in learning with the Digital Interactive Learning Theater in the second year of using the system. In the questions of every dimension, including attention and motivation, the average score of the sixth grade is higher than that of the fifth grade. It demonstrates that there is no decline in students' learning motivation. Most students agree that they focus wholeheartedly on the drama performance and prefer to learn English with such an approach.

- Students prefer using DILT to DLT without interactive elements.

Judging from the statistics displayed in Table 2, we realize that students show a positive attitude toward learning with the Digital Interactive Learning Theater. Students have experienced various things, and the digital performance has become more interesting and lively. Most students prefer the

Digital Interactive Learning Theater very much. Interactive elements, as suggested in the interview with the teachers, can increase students' interest as well as inspire students in learning. Virtual props make easier and more convenient the preparation for stage props that are difficult to obtain in reality.

6. Conclusion

This study proposes the Digital Interactive Learning Theater for teachers and students to conduct digital drama-based learning in a classroom. In the system, we installed various interactive modes and virtual props in order to enhance students' sense of novelty and learning motivation. We chose the same classes in an elementary school; students learned with the Digital Learning Theater when they were in the fifth grade, and they used the Digital Interactive Learning Theater when they were in the sixth grade. In these two years, we designed scenarios based on the taught textbooks and supported teachers to conduct drama performing activities.

The experiment result shows that students are much interested in the Digital Interactive Learning Theater compared with the non-interactive Digital Learning Theater. Participants mostly agree that interactive elements and virtual props have made drama performances very interesting. With the interactive elements and virtual props designed according to taught textbooks, students would maintain the sense of immersion and their emotional involvement even after the long-term use of the Digital Interactive Learning Theater. In addition, as suggested in the interview with teachers, interaction can increase learners' interest and inspire them, which indicates that the Digital Interactive Learning Theater has a positive effect on motivating students.

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