Effects of Writing for Digital Storytelling on Writing Self-Efficacy and Flow in Virtual Worlds

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Abstract: A significant amount of research examines using video editing software such as Windows Movie Maker to create video clips. However, in this study, the researcher suggests performing digital storytelling in virtual worlds, and places more stress on the writing process. The purpose of this study is to examine the effects of writing for digital storytelling on writing self-efficacy and on flow in the virtual world of Second Life. The researcher organized an activity for undergraduate students creating digital stories. Participants were divided into two groups. One group created their digital stories in Second Life. The other group created their digital stories off-line. The two groups' independent samples *t*-tests were employed to compare writing self-efficacy and flow. The results of the experiment demonstrate that digital storytelling in virtual worlds is more effective than digital storytelling off-line. The findings of this study suggest that the technique of digital storytelling can be used effectively in classroom settings as a way of teaching writing.

Introduction

Everyone has their stories to tell, and every day we hear from others about their experiences in the form of stories. Storytelling is a quintessentially human experience, when conveying stories about oneself, others, or about the world (McDrury & Alterio, 2003). Nowadays, with the rapid development of technology, a new version of storytelling is emerging: digital storytelling. The outcome of digital storytelling is a video clip which is two to five minutes long. Storytelling integrated with powerful technology can be an effective tool to enhance teaching and learning. The educational application of digital storytelling is attracting the attention of many educators. Furthermore, many studies have verified the benefits of digital storytelling in education.

Writing is an important part of the process of creating digital stories. Some researchers stress the writing process in digital storytelling (Robin, 2007). Researches has verified the effectiveness of digital storytelling in improving students' writing skills (Ballast, Stephens, & Radcliffe, 2008; Gakhar & Thompson, 2007). It is, therefore, worth thinking about virtual worlds, which contain various multimedia components, as an ideal location for digital storytelling. Creating digital stories in an immersive virtual location may attract and motivate people to get into writing unconsciously. Ultimately, digital storytelling may motivate and encourage people who don't like writing or who have no confidence in writing. Therefore, the purpose of this study is to examine the effects of writing for digital storytelling on writing self-efficacy and flow in the virtual world of Second Life.

Literature Review

Definition and Procedures of Digital Storytelling

Definitions of digital storytelling differ among researchers, but demonstrate several important similarities and main ideas. The definition from The Digital Storytelling Association (2002) describes digital storytelling as giving expression to old forms of storytelling in a modern way. People deliver their knowledge, values, and wisdom with stories. Emerging technologies make it possible to see such stories on the computer screen. According to Armstrong (2003), digital storytelling is the same as reading and writing stories. However, digital storytelling's defining feature in teaching and learning is that it shares information through multimedia.

The University of Houston Instructional Technology Department has conducted and continues to conduct studies examining the educational uses of digital storytelling. They suggest the following procedures for digital

storytelling:

PART ONE: Define, Collect, Decide
- Select a topic for your digital story.
- Create a folder on the desktop where you can store the materials you find.
- Search for image resources for your story, including: pictures, drawings, photographs, maps, charts, etc. - Save these resources in your folder.
- Try to locate audio resources such as music, speeches, interviews, and sound effects. - Save these resources in your folder.
- Try to find informational content, which might come from web sites, word processed documents, or PowerPoint slides. - Save these resources in your folder.
- Begin thinking of the purpose of your story. Are you trying to inform, convince, provoke, question?

PART TWO: Select, Import, Create
- Select the images you would like to use for your digital story.
- Select the audio you would like to use for your digital story.
- Select the content and text you would like to use for your digital story.
- Import images into Photo Story.
- Import audio into Photo Story.
- Modify the number of images and/or image order, if necessary.

PART THREE: Decide, Write, Record, Finalize
- Decide on the purpose and point of view of your digital story.
- Write a script that will be used as narration in your digital story AND provides the purpose and point of view you have chosen.
- Use a computer microphone and record the narration of your script.
- Import the narration into Photo Story.
- Finalize your digital story by saving it as a Windows Media Video (.wmv) file.

PART FOUR: Demonstrate, Evaluate, Replicate
- Show your digital story to your colleagues.
- Gather feedback about how the story could be improved, expanded, and used in your classroom.
- Teach a colleague how to create their own digital story.
- Congratulate yourself for a job well done!

If you follow the above steps, a digital story is completed. (Robin, 2005)

Benefits of Digital Storytelling in Education

Digital storytelling has the potential to facilitate classroom teaching. Consequently, many intend to utilize the technology in classroom in all levels of schools, ranging from K-12 to higher education. Digital storytelling, when it is integrated into the classroom setting, can be a compelling teaching method to gain and hold students' attention. It provides a creative and open-ended environment (Sadik, 2008). It is worth considering the application of digital storytelling in various subjects. When digital storytelling is integrated with content areas and across the curriculum, it can be a way of expressing students' ideas and thoughts (Gakhar & Thompson, 2007). This expression can promote learners' active participation and emphasize the active role of students rather than teachers. Therefore, it encourages student-centered learning. The following figure depicts how digital storytelling enhances the convergence of four student-centered learning strategies (Barrett, 2006). The four learning strategies, student engagement, reflection for deep learning, project-based learning, and technology integration into the classroom, can be facilitated through digital storytelling activities. All of the four strategies are attracting a great deal of attention from educators and teachers nowadays.
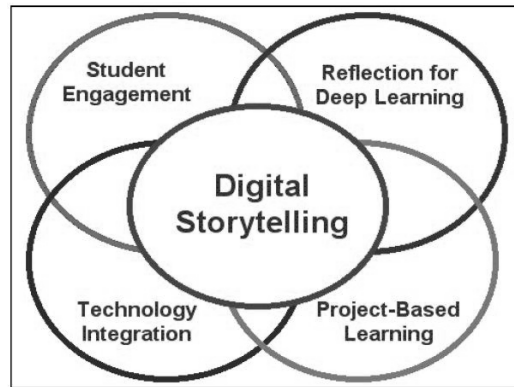
Figure 1: Convergence of Student-Centered Learning Strategies (Barrett, 2006)

Han (2007) contends that digital storytelling is a necessary element in producing edutainment learning contents. Edutainment is a core concept in creating learning contents in the 21st century. The word "edutainment" consists of "edu-" which means education, and "-tainment" which means entertainment. Baek (2005) states that with the help of rapid development of computer technology and multimedia elements, edutainment can make learning contents more attracting, and thus can lead to learners' active participation and facilitate learning.

Additionally, students should utilize a wide variety of skills in order to accomplish the creation of a digital story, including traditional oral storytelling, written composition, visual literacy, media literacy, as well as an understanding of film conventions (Banaszewski, 2005). It is challenging for students to create their own digital stories and simultaneously acquire such skills. Although challenging, we can expect digital storytelling to foster such skills. Research on digital storytelling continues.

Writing in Digital Storytelling

Although the ultimate purpose of digital storytelling is to tell the story to the audience, story writing is also important. A good script makes the digital story more effective and successful. Robin (2007) stresses story writing, describing how people usually spend more "digital" time, other than the story itself, searching for images and audio files to present their stories. However, he emphasizes that the process of selecting a meaningful topic and writing the story about the topic is the most important process in digital storytelling. When students pay more attention to the writing process, they will have the ownership of their stories. Likewise, students will be motivated and engaged in the process of digital storytelling. Finally, although digital elements are important, writing should not be neglected, because it is an essential part of digital storytelling.

Gakhar and Thompson (2007) point out that digital storytelling provides students with opportunities to perform creative writing and organize thoughts in coherent ways, by designing and producing realistic artifacts. They also demonstrate that digital storytelling can improve students' writing skills, critical thinking skills, and media literacy.

Ballast, Stephens, and Radcliffe (2008) utilized digital storytelling as a means of improving students' writing, and examined the effects of digital storytelling on sixth grade students' writing and their attitudes toward writing. The experimental group was asked to craft a digital story with Photo Story. The control group was asked to convert a story which was written in advance into a word document, and then upload it to a class online magazine. At the end of the course, the researcher interviewed the students about their revision they made in the process of creating their digital stories. According to the interview data, the researchers found that experimental group students were more engaged in digital storytelling, and paid more attention in revising their writing compared to the control group who did not create digital story. The traditional writing group edited their writing merely by checking spelling and counting words. The digital storytelling group edited their stories more carefully, by choosing appropriate words, adjusting the sequence of sentences, or removing sentences.

Digital Storytelling and Virtual Worlds

Warburton and Perez-Garcia (2009) review Multi User Virtual Environments, mainly Second Life. They

list the features of virtual environments and Second Life. First, virtual worlds can assist in visualizing and contextualizing objects we cannot see because of distance and monetary restrictions, or things which cannot be seen in real life situations. Second, there are a variety of interactions, including avatar-to-avatar interaction and avatar-to-object interaction. Third, the user is presented as an avatar, feeling the sense of really being in a virtual environment, unconscious of the mediation of the computer. Such feelings of immersion in virtual worlds enrich learners' experiences.

Digital storytelling gives expression to old form of storytelling in a modern way. Multimedia components, such as images, sounds, music, and others, are added to present the story. General digital storytelling is edited with software, such as Windows Movie Maker, Apple iMovie, and Adobe Premiere. However, the 3-D virtual world of Second Life, maximizes the effects of multimedia, potentially employing components such as 3-D objects, images (snapshots), sounds, videos, and others. According to Sanchez (2009), in Second Life, digital storytelling follows the same premise as general digital storytelling, but instead of creating a video, students create an experience or a space in which others can walk through their stories.

Research Methods

The purpose of this study is to examine the effects of writing for digital storytelling on writing self-efficacy and on flow in the virtual world of Second Life. To achieve this purpose, the research methods described below are used in this study.

Participants

The target population for this study consisted of sixty-four undergraduate university students in South Korea. They were from two classes taking "Media Production for Teaching and Learning", at Korea National University of Education. There were 32 students in each class. Their ages ranged from 20 to 22 years old. One class was selected to perform digital storytelling in the virtual world of Second Life, and the other group was selected to perform digital storytelling off-line utilizing the video editing software Windows Movie Maker.

Tools

The tools used in this study were the virtual world called Second Life, and two tests. One of the tests was the test of writing self-efficacy, and the other test was the flow state scale.

- Second Life

Second Life is a 3D virtual world imagined and created by its residents. Since it was launched in 2003, Second Life has attracted attention from educators all over the world as an instructional technology platform (Sanchez, 2009). Academic institutions from at least 14 countries are engaged in Second Life. The number of institutions is more than 150 (Foster, 2007). Recently (2009), Second Life has been the most popular multi-user virtual environment being used in education (Warburton & Perez-Garcia, 2009).

Residents in Second life are presented as avatars. They can easily build, walk, fly, and teleport to anywhere they want to go in the virtual environment. There are also communication tools, like Instant Message, Local Chat, Note card, and Voice Chat. The functions integrated with its interface make it possible to build an environment in which to do digital storytelling.

- Tests

Two kinds of tests were administered in this study: first, the test of writing self-efficacy, and, second, the test of flow state. Both of them included a pretest and a posttest. They were administered twice, before and after the experiment. Details about the tests are described below.

- *Test of Writing Self-Efficacy (Pre-post Test)*

The writing self-efficacy questionnaire by Pajares and Valiante (2001) was used in this study. The questionnaire consists of 10 questions measured on a ten-point Likert scale. The total score of this test is 100 point. The reliability of this test is .88 (Cronbach's α). In this study, the questionnaire was modified and translated into Korean.

- *Flow State Scale (Pre-post Test)*

The Flow State Scale was developed by Jackson and Marsh (2006). The scale was developed on the basis of Csikszentmihalyi (1990)'s flow theory. It contains of 28 items assessed on a five-point Likert scale. The total

score of this test is 140 point. The reliability (Cronbach's α) of the test is .95. In this study, the scale was modified and translated into Korean.

Procedures

In this study, participants were divided into two groups. One group performed digital storytelling off-line, utilizing Windows Movie Maker. Another group performed digital storytelling in Second Life. The off-line group followed the procedures of general digital storytelling suggested by the University of Houston. The activity for the Second Life group was designed by the author of this study. The procedures were as follows:

- Step 1) Introduction to Second Life
First, ask students to make an account of Second Life. Then, introduce the basic functions of Second Life, such as walking, flying, teleporting, communicating, object building. Also teach students how to search for freebie items, how to upload images, how to take snapshots, and how to buy items.
- Step 2) Introduction to Digital Storytelling
Teach the definition and procedures (step 3 to step 7) of digital storytelling, and demonstrate an example of digital storytelling in Second Life.
- Step 3) Story topic: Travelling through spaces and time
The topic of the story is travelling through spaces and time. The story can be real or imaginary.
- Step 4) Imagination of the story
The students will do team work. There will be five students in a team. In this step, travel through the places that students like in Second Life and capture places they plan to use in their story. They should get ideas from the places they visit in Second Life, and then gather ideas to compose a story.
- Step 5) Writing the story
On the basis of step 4, they should write down the story in a word file.
- Step 6) Creating the environment of the story in Second Life
After finishing the story, pick up the main sentences and add them into the images they captured. Then, build panels and upload the images to create the environment. Finally, arrange the panels in the sequence of the story, so that other Second Life residents can walk through the path to see the story. Throughout this process, the learner should try to uncover some shortcomings in their story writing, and go back to step 5 to modify the story. Then they can create the environment again, according to the modified story. As mentioned above, repeat the process, until the story is completed.
- Step 7) Sharing stories
In this step, each team tells their story. One student should narrate. Other students should be the audiences. Afterwards, they can give advice to each other.
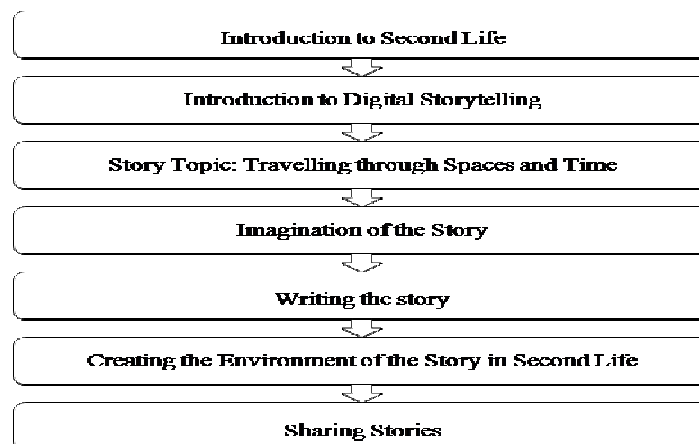

Figure 2: Procedures of Second Life Group

Research Design

A quasi-experimental analysis was carried out in two classes at Korea National University of Education,

during 6 weeks in the second semester of the 2009 academic year. In this study, the activity of writing for digital storytelling was the independent variable. The dependent variables were writing self-efficacy and flow. There were two groups in this study. One group performed digital storytelling in Second Life, and another group created their digital stories off-line. Two-independent samples t-tests were used to compare the changes in writing self-efficacy between two groups, and also changes in flow score between two groups.

G_1	O_1	O_2	X_1	O_3	O_4
G_2	O_5	O_6	X_2	O_7	O_8

G1 : Second Life Group
G2 : Off-line Group
O1, O5 : Writing Self-Efficacy Pre-test
O2, O6 : Flow State Pre-test
X1 : Writing for Digital Storytelling in Second Life
X2 : Writing for Digital Storytelling Off-line
O3, O7 : Writing Self-Efficacy Post-test
O4, O8 : Flow State Post-test

Results and Discussion

The main purpose of this study was to examine the effects of writing for digital storytelling on writing self-efficacy and on flow in the virtual world of Second Life. In this study, one of the groups created their digital stories in Second Life, and the other group created their digital stories off-line with Windows Movie Maker. Before and after the activity of digital storytelling, students' writing self-efficacy and flow were measured, using the tests mentioned above in the research methodology section. Two-independent sample t-tests were performed using the SPSS 17.0 statistics program. The change scores of writing self-efficacy between the two groups were compared, and the change scores of flow between the two groups were also compared. This test was found to be statistically significant. The following table summarizes the results of the two-independent samples t-tests.

Table 1: Results of two-independent samples t-tests

	Group	N	M	SD	t	p
Change Scores of Writing Self-Efficacy	Second Life Group	32	6.6250	7.76157	2.307	0.024*
	Off-line Group	32	2.5000	6.48572		
Change Scores of Flow	Second Life Group	32	5.9688	6.02406	2.154	0.035*
	Off-line Group	32	2.3750	7.26791		

*significant at .05 level

As indicated in the table above, the difference in the mean change score of writing self-efficacy between the two groups was significant, $t(62)=2.307$, $p<.05$. The mean change score of writing self-efficacy in the Second Life group ($M=6.63$, $SD=7.76$) was significantly higher than that of the off-line group ($M=2.50$, $SD=6.49$). The alpha level was .05. The total score of writing self-efficacy is 100 point. The mean change score has been improved 4.13 point. Namely, the activity of writing for digital storytelling was effective in improving students' writing self-efficacy.

The difference in the mean change scores of flow between the two groups was significant, $t(62)=2.154$, $p<.05$. The mean change scores of flow in the Second Life group ($M=5.97$, $SD=6.02$) was higher than that of the off-line group ($M=2.38$, $SD=7.27$). The alpha level was .05. The total score of writing self-efficacy is 140 point. The mean change score has been improved 3.59 point. It indicates that the activity of writing for digital storytelling in

Second Life is effective in enhancing students' flow level.

The experiment results demonstrate that digital storytelling in Second Life is more effective than digital storytelling off-line.

Conclusion and Suggestions

The purpose of this study was to examine the effects of writing for digital storytelling on writing self-efficacy and on flow in the virtual world of Second Life. Through the statistical analysis undertaken, we can conclude that digital storytelling in Second Life is more effective than digital storytelling off-line. Writing self-efficacy and flow can be improved through the activity of writing for digital storytelling in Second Life.

The findings of this study have implications for writing teachers. Digital storytelling can be used in classroom settings as a means of teaching writing. In the virtual world, students can visit virtual places using the teleporting function, without any constraint of time and space. It can trigger their imaginations and assist their writing. Then they can visualize the stories they imagine, by creating objects and changing the texture of objects, in order to depict their stories on the objects as a texture. Through the visualization process, they can see the structure of the whole story clearly. It will help them to identify and correct some mistakes they have made, to construct a solid logical structure, and to rearrange their thinking in a logical way.

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