Evolution of Literacy in Software Functions by Creation of Storytelling

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Abstract: "Creation of storytelling" using PowerPoint was conducted so as to raise computer literacy and to foster the students' self-understanding. They were required to draw a figure using Excel and stick it on a report. They were expected to write their reports using Word. The pre and post literacy in functions of the software of three kinds was investigated to know the computer literacy which students were able to raise by "creating the storytelling". As a result, the pre literacy in functions of PowerPoint was lower than those of Word and Excel. After this practice, the post literacy in the functions of PowerPoint significantly became higher. This paper will report that students became able to utilize the functions of PowerPoint as same as those of Word and Excel.

Keywords: Storytelling; slide-show storyboards; literacy in software; peer assessment; self-understanding

Introduction

Creative activities that produce works that inform and entertain people by describing real and imaginary events, using graphics, narration, and music are called storytelling [1]. In digital storytelling, still pictures such as photographs, figures, and drawn pictures are displayed sequentially to create a storytelling and narrated. Digital stories can be easily reconstructed, and producers can distribute a story to many people through the Internet.

A practice method or a purpose is reported a lot in until now about storytelling [2], [3], [4], [5], [6]. Sadik calls digital storytelling a meaningful technology-integrated approach [2]. Effects of creating digital storytelling are reported as follows. Still pictures are easy to handle for the producers of such assignments, and students can reflect upon memories or what they have learned through reviewing still pictures. It has been reported that the practical class improved the quality of their text narratives through the practice of digital storytelling [7]. It has been reported that storytelling task showed effect of similar patterns to the other tests in written language comprehension [8].

When persons used WBT as a supplementary material, Hirose et al. have reported that the person who has weak point awareness toward PC operation used the WBT for the number of fewer times as a study on the software literacy [9]. In addition, Yamagishi et al. reported that achievement degree of operation for the applied software is low for persons who have uneasiness about PC utilization [10].

The literacy of word processor, spreadsheet and presentation becomes required as a member of society. The literacy of presentation is inferior to the literacy of word processor and spreadsheet about students in our department. We made a study on designing and devising a class so that these three kinds of literacy became the same degree. We adopted evaluation and modified activities through creating storytelling using PowerPoint. We told meaning to revise it and method to convey oneself idea to the other persons. As a summary

of the classes, students were required to write the report which included consideration for the contents of the work, self-evaluation, peer-evaluation after filling in them. It was reported that the blended class which utilized e-learning inside and outside the class was effective [11]. We conducted the blended class which utilized e-learning under such contents. We investigated the literacy in the software function in pre and post time to know the literacy in a computer as an effect of this class. In this paper, we will analyze them and report knowledge obtained from them.

1. Instructional Design and Method

The target subject in this study is called an information science experiment, consisting of three hours per week as one of the compulsory subjects in the second semester at the department of information science in a university. The content which the author was in charge of was “creating digital storytelling.” Students are separated into three groups. Each group creates the storytelling for four weeks. Each class session was 180 minutes long, and the class proceeded according to the plan shown in Table 1. The themes of each group are different as shown in Table 1. Each group carried out the class by four weeks. The first, second and third groups created each theme of storytelling from 1 to 4, from 5 to 8, and from 9 to 12 weeks respectively. The class was conducted by a teacher and a teaching assistant. After explaining the activity contents of the day at the beginning of each class, the teachers walked around the classroom and responded to questions as needed. The number of students attending a lecture of three groups was 63 persons in total, that is, 21, 22 and 20 persons respectively.

Table 1 Lesson plans

<table>
<tr><th rowspan="2">Week</th><th colspan="3">Theme</th><th rowspan="2">Experiment contents</th><th rowspan="2">Distributed survey sheet and deliverable in the session</th></tr>
<tr><th>first group</th><th>second group</th><th>third group</th></tr>
<tr><td>1</td><td rowspan="4">Self-understanding</td><td rowspan="4">Children's story</td><td rowspan="4">Future course</td><td>Submitting a story, Creating story slides</td><td>Attitude related to abilities (pre)</td></tr>
<tr><td>2</td><td>Creating story slide, Narating a story, Self-evaluation</td><td>Complete story slide, Self-evaluation 1</td></tr>
<tr><td>3</td><td>Viewing 1, Peer evaluation 1, Modifying slides, Self-evaluation 2</td><td>Peer evaluation 1, Modified slides, Self-evaluation 2, Report 1</td></tr>
<tr><td>4</td><td>Viewing 2, Peer evaluation 2, Self-evaluation 3</td><td>Peer evaluation 2, Self-evaluation 3, Report 2, Attitude related to abilities (post)</td></tr>
</table>

1.1 Purpose of Classes

One of the purposes of this class is to heighten students' literacy in computer and self-expression through creative activities. The literacy in computer means that the PC can be smoothly operated using functions of Word, Excel, Power Point and so on. Self-understanding and self-analysis are important when searching for jobs. Another purpose is to deepen self-understanding and a meaning to work through creating a storytelling on the assigned theme.

1.2 Lesson Plans

The teacher recruited three groups for a class some days ago. Then he distributed an experiment description document (A4 paper, 31 pages) to the students and explained the

outline of class method. Based on the experiment description document, the teacher explained the experiment's purpose, contents, plan, slide creation method, experimental method, and related details. He distributed one A4 sheet on which six pictures and the narrative stories could be entered. Students were assigned to write a story on the right-hand page and to draw a related picture within the square frame on the left-hand page before the first session. The illustration and character for an animation are drawn outside of the square frame. The students were instructed to paint handwritten picture with colored pencils.

The students were instructed to download the story slide of the "My course in the future" as an example for their assignment. The teacher explained how to animate slides in the first session. They subsequently scanned the images of their sheet with an image scanner. Then they imported the images to Paint software, which were installed as part of Windows XP Microsoft? suite of files. The students cut the images on Paint software and pasted them on slides with PowerPoint. The teacher instructed a student who completes the work and has room at time so as to attach an animation using a function of PowerPoint.

At the beginning of the second session, the teacher explained how to write reports. They were required to enter the final image works into PowerPoint to create their slides. They attached an animation to illustrations and characters for deeper understanding for their stories. Students then recorded their storytelling narrations using a microphone while viewing their slide show after their works were completed. At the end of the second session, the students required to submit the file of the storytelling slide.

Students themselves rated their works on an evaluation sheet after completing the works. At the start of the third session, the teacher printed and distributed a peer evaluation sheet and a handout in which all works by the students were printed. The slide shows of all members in the class were sequentially projected on the screen and viewed. Then they were required to evaluate them for one minute. After the students evaluated each story, the evaluations were entered into the peer evaluation sheet. After viewing all the story slide shows, the students entered the rating value and comment to spreadsheet in Excel, and the files were submitted using the Internet. The teacher gathered and summarized the evaluations in each student's file, then gave each student access to an e-learning portal so that they could download the peer evaluations. The teacher also pointed out the points that should be revised in the printed work and distributed instructor feedback to each student. The students were then required to modify their digital stories and slides by referring to the peer evaluations and the instructor feedback provided. Students performed the second self-assessments after modification in the third session. After the correction, they submitted the file of the story slide. Students themselves rated their works again.

The modified story slides were viewed again in the same manner as during the third session, and then evaluated once again in the fourth session. The second peer evaluation was entered into an assessment spreadsheet, and the files were also submitted.

The teacher gathered and summarized the evaluations in each student's file, then gave each student access to an e-learning portal in the same manner as in the third session. Students then pasted the second peer assessment for themselves on an assessment spreadsheet. By comparing the first and second evaluations, students could learn from and interpret the appropriateness of the corrected elements. Students performed the third self-assessments after the final evaluation in the fourth session.

1.3 Theme of Storytelling

The storytelling of the theme directed was created in this class. Students draw six pieces of pictures matched with the scene of the story of the theme and create a slide of PowerPoint in accordance with it. We require students to consider about oneself, to view a work to another persons, to know the reaction, and to revise a work through creating digital storytelling. A

student talks about oneself creating a slide work, after writing its scenario so that a person can understand it.

As expression unlike the sentence, a student was made to consider how to draw and express a picture to supplement the sentence in the story. A student was made to tell one's thought to a person utilizing a PC, using characteristic of a picture and the narration, and being made a story plain. A digital picture book completes when a story was narrated using a microphone so as to promote the understanding of the story contents attaching animation and to reach the feeling of the contents of the story.

We made the first group create a work according to theme of "self-understanding", the second group create a work according to theme of "a children's story", and the third group create a work according to theme of "a future course" as a theme of storytelling. Each group creates it in four weeks respectively.

A story related to autobiographical topics was made to deepen self-understanding as the first theme. “My hobby,” “my memories,” “a childhood dream” and so on are shown as an example. A student was required to create a story which reflects and tells oneself about contents related to oneself.

A student was required to create the story for children so as to make a student understand to act for a person as the second theme. "Fantasyland," "a dog’s adventure," "an insect’s life" and so on are shown as an example. Students were told to create a story that a child would interest in or that is educational and useful for a child.

A student is made to create a story about one's future to make a student have consciousness to work after having done a self-analysis enough as the third theme. “A job that I would like to get,” “workplace where I want to work,” “my dream job” and so on are shown as an example. The students were requested to think about a future course and to create the work with an attitude towards work based upon this theme.

2. Analysis Results and Discussion

Literacy in software functions was investigated before and after the course. Based on the assessed changes in literacy, the degree of achievement of the objectives of this course was estimated. In this study, the term *literacy* represents the skill and ability of use of software functions shown in Table 5. Hereinafter the existence of significant difference is inferred using a criterion of a level of significance of 5%.

2.1 Description of Computer Functions in which Literacy is Acquired

Students were advised to describe in a report what they have understood in the course about the use of a personal computer. They stated that they have learned to use either "narration, PowerPoint, personal computers, Word, Paint, animation, image scanners, or Excel", as presented in Table 2. In all, 102 descriptions and an average of 1.65 per person were obtained. All students described that they gained literacy in at least one function.

2.2 Computer Literacy Investigation Method

Literacy in software functions was investigated as shown in Table 5, to measure computer literacy more quantitatively than the descriptions written in the report and to ascertain the details of its improvement. The survey was administered twice, before (at the beginning of the first lesson) and after (at the closing of the fourth lesson) the course. Students were advised to fill out a questionnaire that surveys literacy level in the functions of three application software: PowerPoint, Word, and Excel. Nakamura et al. proposed

measurement of basic knowledge about information technology using questionnaire on computer technical terms and reported its application to evaluation of information education that we could know enough the understanding degree easily and in a short time [12].

The questionnaire presented a total of 60 items, respectively including 25, 17, and 18 items on the functions of PowerPoint, Word, and Excel. Responses of 62 students who answered both before and after the course were used. Literacy levels were classified as "1. do not know, 2. know the name but cannot use, or 3. can use." Students were asked to assign an appropriate number from 1–3 to each item. This rating suggests that the present survey is based on students' personal assessments.

2.3 Comparison of Literacy for Three Software Applications

Table 3 presents the variance analysis results of average literacy in all items for each of three software applications, where *m*, SD, *F*, *p*, Cond, Error, and df respectively signify the average, standard deviation, *F* value, significance probability, between-groups, within-groups, and degrees of freedom. The factor of conditions was significant, as evident in Table 3 (F (5,114) = 34.3, $p < 0.001$).

Multiple comparisons were conducted according to Tukey's method. The result is presented in Table 4, where n. s. represents no significant difference, which indicates that literacy in PowerPoint was significantly lower before the course than that in Word or Excel. However, literacy in PowerPoint was significantly improved after the course, up to a level at which no significant difference was found from either Word or Excel. No literacy difference was observed in Word, although literacy tended to be improved significantly in Excel after the course compared with before. Consequently, results suggest that this practice brought about a good effect on literacy not only in PowerPoint but also in Excel.

Table 2 Personal computer functions for which literacy is acquired

Literacy contents	No. of students
Narration	29
PowerPoint	26
PC	17
Word	8
Paint	8
Animation	6
Image scanner	6
Excel	2
Sum	102

Table 3 Result of variance analysis of literacy in three application software

PowerPoint				Word				Excel			
pre		post		pre		post		pre		post	
m	SD	m	SD	m	SD	m	SD	m	SD	m	SD
2.33	0.67	2.92	0.23	2.82	0.45	2.96	0.15	2.58	0.30	2.93	0.10

Sum of square		df		Mean square		F value	p
Cond	Error	Cond	Error	Cond	Error		
6.37	4.23	5	114	1.27	0.04	34.3	***

*** p<.001

Table 4 Result of multiple comparison of literacy for three software applications.

Time		Pre		Post		
Time	Software	Word	Excel	PowerPoint	Word	Excel
Pre	PowerPoint	***	***	***	***	***
	Word	—	n.s.	n.s.	n.s.	n.s.
	Excel	n.s.	—	**	**	+
Post	PowerPoint	n.s.	**	—	n.s.	n.s.

*** p<.001, ** p<.01, + p<.1

2.4 Applications Comparison of Literacy in Each Software Function

Wilcoxon's signed-rank test was performed to rank values obtained before and after the course for each function of the three software applications. The result is shown in Table 5,

where z denotes the Wilcoxon test statistic. A significant difference was observed in 23 of 25 items for PowerPoint. Many students were surprised that a story was presentable in a slide show with voice narration. Presumably, this is the reason why "11 Record narrations" is greatly strengthened. Moreover, literacy in items 15–25 related to animation was remarkably improved compared with other items. Students were instructed to assign a motion to characters, personae, etc. in all six pages. This is regarded as having brought about a good effect.

No significant difference was found in items "1 Launch PowerPoint" and "8 Execute a slide show" for PowerPoint. Their respective rankings had been 2.92 and 2.90 before the course. Improvement was not found after the course because there was little room for improvement.

Significant difference was found in 10 of 17 items for Word for the reasons given below. Items "26 Role of windows in Word" and "28 Page layout" were improved because students were asked to use Word to write a report. Because they were instructed to insert a table in their reports, items "34 Draw a ruled line" and "35 Erase a ruled line" were enhanced. Moreover, because they put the graphs for self-evaluation and peer-evaluation or slides for storytelling in their reports, item "37 Insert an image" was improved. Item "42 Count text characters" cannot be used fully yet, although significant difference was found. Students were advised to include the number of characters and graphs into a table in their reports when they were asked to summarize the story contents. Therefore character counting was explained by necessity. Nevertheless, the story was so short that characters were easily countable without using the function "Count text characters." Therefore, not all the students used the function. Significantly different tendencies were found in each of items 32 and 38.

No significant difference was found in five items for Word: items "30 Change font", "31 Character style", "36 Input characters", "39 Print previews", and "40 Print." They had already been well understood (ranked as much as almost 3 before the course), so there was little room for improvement. No significant difference was recognized.

Significant difference was observed in 14 of 18 items for Excel. The reasons are considered below. Items "48 Arithmetic operation", "49 Copy a formula", and "60 Function" were improved because students were ordered to execute arithmetic operations and to copy the results to some cells when calculating the average of self-evaluation or evaluation of others. Items "45 Make a table", "46 Save a table", and "50 Edit a table" were improved by creating a table with Excel. Item "53 Change the number of digits" was enhanced because students were ordered to arrange the place after the decimal point when writing average ranks in a table in the report. When making a table, students were advised to narrow or extend column width and to center numbers in the case of a numerical column, if needed, for better appearance. These operations strengthened items "51 Width change of rows and columns", "52 Centering", and "54 Draw a ruled line." Students used Excel in various scenarios and tasks, such as placing data into an evaluation sheet, creating a table, and drawing a graph. For this reason, item "44 Role of window in Excel" was enhanced.

Although there were few occasions to print something using Excel before this practice, one required part was exclusively printed with a print range specified in this course. This improved item "55 Designate print range" and "57 Print." When making a report and an evaluation sheet, students were instructed to perform operations so that a table might be well understood by everyone. The items strengthened as above suggest that this instruction enhanced effectiveness. Marginally significant difference was found in two items 47 and 59 for Excel. No significant difference was found in two items for Excel. "43 Launch Excel" and "58 Make a graph" had already been well understood, ranked as much as almost 3 before the course. Therefore, there was little room for improvement. No significant difference was found.

Table 5 Survey results of literacy in software functions

		Items of evaluation	Pre		Post		Test	
			m	SD	m	SD	z	p
PowerPoint	1	Launch PowerPoint	2.9	0.4	3.0	0.0	1.6	
	2	Role of windows in PowerPoint	2.5	0.7	2.9	0.3	3.4	***
	3	Layout of slide	2.7	0.6	3.0	0.2	3.5	***
	4	Size of place holder and change of position	2.1	0.8	2.5	0.7	3.1	**
	5	Input of title and change of font size	2.7	0.5	3.0	0.1	3.3	***
	6	Input a text	2.8	0.5	3.0	0.1	3.1	**
	7	Save a slide	2.9	0.4	3.0	0.1	2.0	*
	8	Practice of slide show	2.9	0.4	3.0	0.2	1.2	
	9	Interrupt slide show	2.8	0.5	2.9	0.2	2.1	*
	10	Set background	2.6	0.6	3.0	0.2	4.4	***
	11	Record narrations	1.6	0.7	3.0	0.0	6.7	***
	12	Print distributed document	2.4	0.7	2.9	0.2	4.6	***
	13	Set slide show	2.5	0.6	3.0	0.2	4.9	***
	14	Set effect to change a screen	2.2	0.7	2.9	0.3	5.4	***
	15	Set animation	2.3	0.7	3.0	0.2	5.2	***
	16	Method to play back repeatedly	2.0	0.7	2.8	0.5	5.4	***
	17	Set special effects in a text	2.1	0.8	2.9	0.4	4.9	***
	18	Set special effects to an object	2.0	0.8	2.8	0.5	4.9	***
	19	Change animation	2.2	0.8	3.0	0.1	5.5	***
	20	Practice animation	2.3	0.8	3.0	0.1	5.1	***
	21	Change a kind of animation	2.2	0.8	3.0	0.1	5.5	***
	22	Change the order of animations	2.2	0.8	3.0	0.1	5.4	***
	23	Change to distribute time of animation	2.0	0.8	2.9	0.3	5.4	***
	24	Delete animation	2.3	0.8	3.0	0.0	4.9	***
	25	Set the trace of animation	2.0	0.8	3.0	0.3	5.6	***
Word	26	Role of windows in Word	2.6	0.7	2.9	0.4	3.1	**
	27	Save a document	2.9	0.5	3.0	0.0	2.1	*
	28	Page layout	2.7	0.5	3.0	0.2	3.2	**
	29	Set letter format	2.9	0.4	3.0	0.1	2.4	*
	30	Change font	2.9	0.4	3.0	0.0	1.6	
	31	Character style, a size, underline	2.9	0.3	3.0	0.2	1.2	
	32	Make a table	2.8	0.5	2.9	0.3	1.8	+
	33	Insert a table	2.7	0.5	2.9	0.2	2.9	**
	34	Draw a ruled line	2.8	0.5	3.0	0.2	2.6	*
	35	Erase a ruled line	2.8	0.5	2.9	0.2	2.5	*
	36	Input characters	2.9	0.4	3.0	0.0	1.6	
	37	Insert an image	2.8	0.5	3.0	0.1	2.6	**
	38	Print document	2.9	0.4	3.0	0.0	1.9	+
	39	Print previews	2.9	0.4	3.0	0.0	1.6	
	40	Print	3.0	0.3	3.0	0.0	1.0	
	41	Past up of letter	2.8	0.5	3.0	0.0	2.6	**
	42	Count text characters	2.6	0.6	2.8	0.5	2.6	*
Excel	43	Launch Excel	3.0	0.3	3.0	0.0	1.0	
	44	Role of windows in Excel	2.7	0.6	2.9	0.3	2.8	**
	45	Make a table	2.9	0.4	3.0	0.2	2.0	*
	46	Save a table	2.9	0.4	3.0	0.2	2.2	*
	47	Open a saved table	2.8	0.5	2.9	0.2	1.8	+
	48	Arithmetic operation	2.5	0.6	2.8	0.4	4.2	***
	49	Copy a formula	2.5	0.6	2.9	0.4	4.2	***
	50	Edit a table	2.6	0.6	2.9	0.3	3.7	***
	51	Width change of rows and colomns	2.7	0.6	2.9	0.3	2.5	*
	52	Centering	2.8	0.5	3.0	0.0	2.4	*
	53	Change the number of digits	2.5	0.6	2.9	0.4	4.2	***
	54	Draw a ruled line	2.7	0.6	2.9	0.3	3.2	**
	55	Designate print range	2.7	0.6	2.9	0.4	2.7	**
	56	Print preview	2.8	0.5	3.0	0.2	2.2	*
	57	Print	2.9	0.4	3.0	0.0	2.1	*
	58	Make a graph	2.7	0.6	2.8	0.4	1.2	
	59	Editia graph	2.7	0.6	2.8	0.4	1.8	+
	60	Function	2.4	0.6	2.7	0.5	2.9	**

*** p<.001, ** p<.01, * p<.05, + p<.1

3. Conclusion

Students were instructed to create slides about storytelling of contents related to their self-understanding and self-analysis for their career decision, using PowerPoint to strengthen computer literacy. This article described the practice method and measured literacy for computer functions before and after the course. Results were reported herein.

Literacy in functions of PowerPoint was lower than that in either Word or Excel before the course. However, through practice, literacy in functions of PowerPoint was enhanced significantly. Students reported that they had learned to use PowerPoint as they had Word and Excel, which suggests that the functions that are necessary for a presentation were more useful after the practice than before the practice. When making slides, reports, and evaluation sheets during the creation of storytelling, students were instructed to produce a work so that it might be well understood by everyone, which seems to have enhanced effectiveness. Our future plans include analysis of results obtained from an attitude survey to clarify differences in the effects anticipated from three themes in storytelling.

Acknowledgements

The author appreciates the support of the Grant-in-Aid for Scientific Research, foundation study (C22500949) provided by the Ministry of Education, Culture, Sports, Science and Technology, Japan for this research.

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