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Utilizing Augmented Reality for Creative Writing Educational Contents and Story-retelling

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Abstract

Today, although the importance of creative writing is emphasized in our society as 'where dreams are sold and commercialized,' creative writing and oral storytelling are regarded as challenging tasks for children. Therefore, elementary education should be the starting point to help children to have a systematic understanding of literature with a voluntary and independent attitude, to express their emotions and thoughts creatively, and to systematically produce the story based on the structure and development of the story. In this context, the purpose of this study is to provide precise directions for contents development, which allows children to actively understand the story structure elements and recreate stories. The research questions focus on how we can develop creative writing educational contents using story-retelling and the effectiveness of the contents. The effectiveness of the developed contents was verified through pilot tests among grade 3-4 elementary students. Results show that the contents successfully played a role as an interesting tool for creative writing, and provided a framework for creative writing allowing participants to have a better understanding on story structure and elements, and the experience of creating a story on their own. In conclusion, the effectiveness of the educational contents to learners was verified.

Keywords*: We Story-retelling, Creative education, Augmented reality, Interaction, Non-linear structure, Story structure*

1. Introduction

Story-retelling is a method of story and information communication, and it is a concept which has been constantly discussed in the education field of North America and the United States.

Retelling as a teaching method refers to the ability to recompose a new story based on one's understanding of an existing story and deliver it to a 3rd audience [1]. However, for children accustomed to passively accepting what experts have already created, writing a creative story or story telling could be an extremely challenging task without the help of experts. For these reasons, the importance of creative writing education using story-retelling, which allows students to reinterpret existing stories and recreate characters and stories based on different perspectives, can be further emphasized in developing imagination and creativity.

Therefore, this study aims to incorporate various functions such as assisting children to proactively and naturally understand the story structural elements, and recreate a new story combining different components using augmented reality, which accelerates learning and has a nonlinear structure allowing various interactions. The purpose of this study is to provide precise directions for the development of creative writing educational contents in digital device for children.

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2. Research Question and Methods

The research questions derived based on the significance and purposes of the study are as follow:

1. How can we develop creative writing educational contents using 'story-retelling' method?

1-1. What are the story structure and structural elements of creative writing educational contents using story-retelling?

1-2. How does the nonlinear structure of story-retelling creative writing's contents formed?

1-3. What are the procedures for story-retelling contents' development?

2. How effective is 'story-retelling' aspect in creative writing educational content using 'story-retelling'?

2-1. What does the learner evaluation indicate?

2-2. What does the expert evaluation indicate?

Based on the research question, the study elaborates on literature review; derives story structural elements and matrix; conducts research on contents development and research group; analyzes and verifies effectiveness; and provides future suggestions for application. In detail, the study was conducted based on the following research procedures.

First, the research aimed to analyze and clarify the key elements of creative writing educational contents regarding 'story-retelling.' Prior to exploration of the research questions, it has been understood that the story structure is an internalized grammatical expression of the readers responding to the actions of the main character, and a typical story structure that assists children's understanding and reminiscence.

Second, the story structure and structural elements of the 'story-retelling' aspect in creative writing educational contents were stipulated [2] and the matrix was deducted. The story was mainly composed of content elements such as background, theme, structure and conclusion [3]. The story structure of the contents was found by dividing "Around the World in 80 Day", the original work of the contents, into background and anecdote, and by classifying the characters based on Propp's 'morphology of the folktale' [4].

Third, the form and structure of the creative writing educational contents were constructed as a nonlinear grid tree structure in order to maximize learner's active participation and interaction. The contents reflected the importance of education and learning based on the phasic characteristics of children's cognitive development stages, and recognized the necessity of providing guidance. Moreover, the contents allow learners to recreate stories by constructing the form and structure of contents through the non-linear grid or tree structure.

Fourth, along with verification of the scenario, flow chart and technical realization of object recognition, development of creative writing educational contents was proceed in the order of planning, designing, and producing.

Fifth, effectiveness assessment was hold to confirm that the educational contents developed in this study have a positive impact on the learners by allowing them to easily and proactively understand the story structure and elements, which are the basis of story-retelling.

Table 1. Evaluation Indicators of Measurement Tool For Effectiveness Assessment

▶ Research Subject: Seven 3rd grade students and thirteen 4th grade students; In total 20 participants

▶ Research Methods: Five-point Likert Scale / evaluation through observation and self-evaluation

Indicators	Respondent	Evaluation Methods	Learning Tool		Measurement Tool
			Book	Contents	
When using books and contents	Observer	Evaluation Method	Alice's Adventures in Wonderland [5]	Around the World in 80 Days	Reconstructed Zimmer's [6] observation evaluation items
After using books and contents	Research Subject	Self-evaluation	Alice's Adventures in Wonderland [5]	Around the World in 80 Days	Kim's Self-evaluation table [7]

Sixth, as for the expert evaluation, experts with 10~20 years of field experience carried out the evaluation after trial. This part was conducted with contents creativity assessment and in-depth interview.

3. Development of the Story Creative Writing Contents

3.1. The Story Structure

Story structure matrix of the creative writing educational contents is as follows.

Table 2. Story Structure Matrix of 'Around the World in 80 Days'

Stein & Glenn 'Story Structure'		'Around the World in 80 Days'	Propp 'Morphology of the Folktale'
Background	Time	Wednesday Evening of October 2, 1872	
	Place	A Club in London	
	Characters	Fogg, who lives by the clock	Hero
		Stubborn Detective Fix	Enemy
		Loyal Passepartout	Helper
		Lovely Aouda	Anima
Anecdote	Beginning (Event)	Fogg claims that it is possible to travel around the world in 80 days, and makes a bet with fellow club members offering half his fortune.	Problem Occurrence ↓ Contract
	Internal Reaction (Emotional reaction of	With confidence Fogg carefully plans the travel route and itinerary.	↓ Action (Test) ↓

	the hero)		Action ↓ Solution ↓
	Attempt (Action to solve the problem)	Fogg uses various routes (means of transportation) to win the bet.	
	Results (Results of action)	Arrived 5 minutes late than the promised time. Fogg goes to the church to get married with Aouda, but realizes that he was not late and eventually arrives at the club on time.	
	Reaction (Reaction to Results)	Fogg wins the bet and marries Aouda.	Reward /Punishment

3.2. The Structure of Interface

The structure of the creative writing educational contents in this research was made to help children voluntarily and actively understand the elements of stories, and recreate new stories in an easy and entertaining way. The contents include combination of story-retellings in which learners can create various stories based on different choices at each stage of the story and narrative story-retelling. This allows learners to select the illustrations, imagine the episodes, and narrate the story.

On the other hand, the story-retelling process in this research has been organized to allow learners to freely create their stories without any constraints, by limiting the information provided related to the original story.

Story-retelling's combination was structured to have the same beginning and end as the original story, and designed to create various stories (at least 30 different stories) based on the different choices made throughout the story process. The creative writing process maximized the sense of reality and immersion through augmented reality and allowed learners to repeatedly experience story-retelling on a voluntary basis.

Next, narrative story-retelling is the stage that appears after combination story-retelling, where learners can sufficiently experience creative writing. Also, compared to combination story-retelling, in which the episodes are fixed, narrative story-retelling requires more imagination, creativity and writing skills as learners autonomously have to select the illustrations for different scenes, imagine the episode and narrate the story. They can make a story of their own through recreation.

3.3. Structural Elements of the Contents

Figure 1. Board, 4 Miniatures, Smart Device

3.4. Technology Realization

To build contents of augmented reality technology, Vufoira augmented reality technology from Qualcomm was used in Unity3D engine. Interactive process was form by combining the 2D image recognition technology and object recognition technology, in which users can perceive the situation and make decisions that can change the database results.

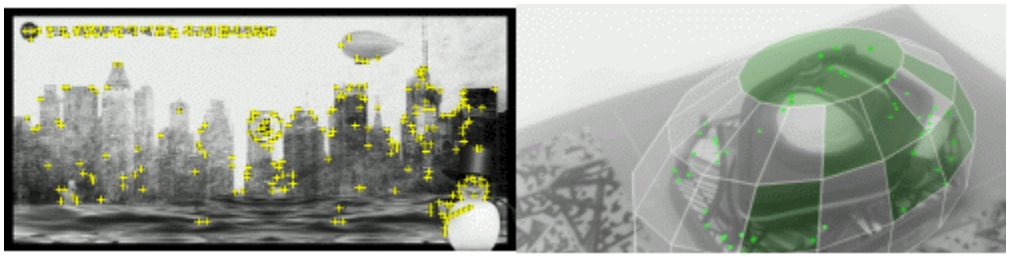

Figure 2. The Process of Image and Object Recognition

In case of board, the image was registered in target manager and the feature points were checked to make the image identified easily. In the case of object, the object data file can be extracted using scanner application and 3D image recognition technique. The extracted file was combined in Unity3d engine and combined with 3D contents through tracking script. On this basis, users can video-shoot the board and object with a webcam to make the program tracks the board and image to deliver the value in real time.

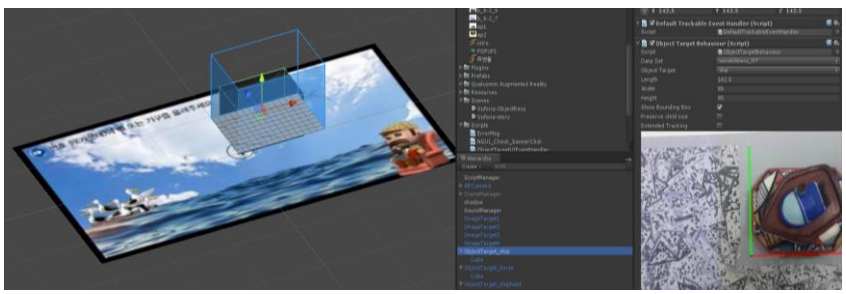

Figure 3. Screen of Engine Combining Image Recognition and Object Recognition

The board was named “image” recognition and controlled in Database A. The object was named “3D Object” and controlled in Database B. The value of A and B is saved in real time, and different final values are generated based on the decisions of users.

3.5. Flow Chart

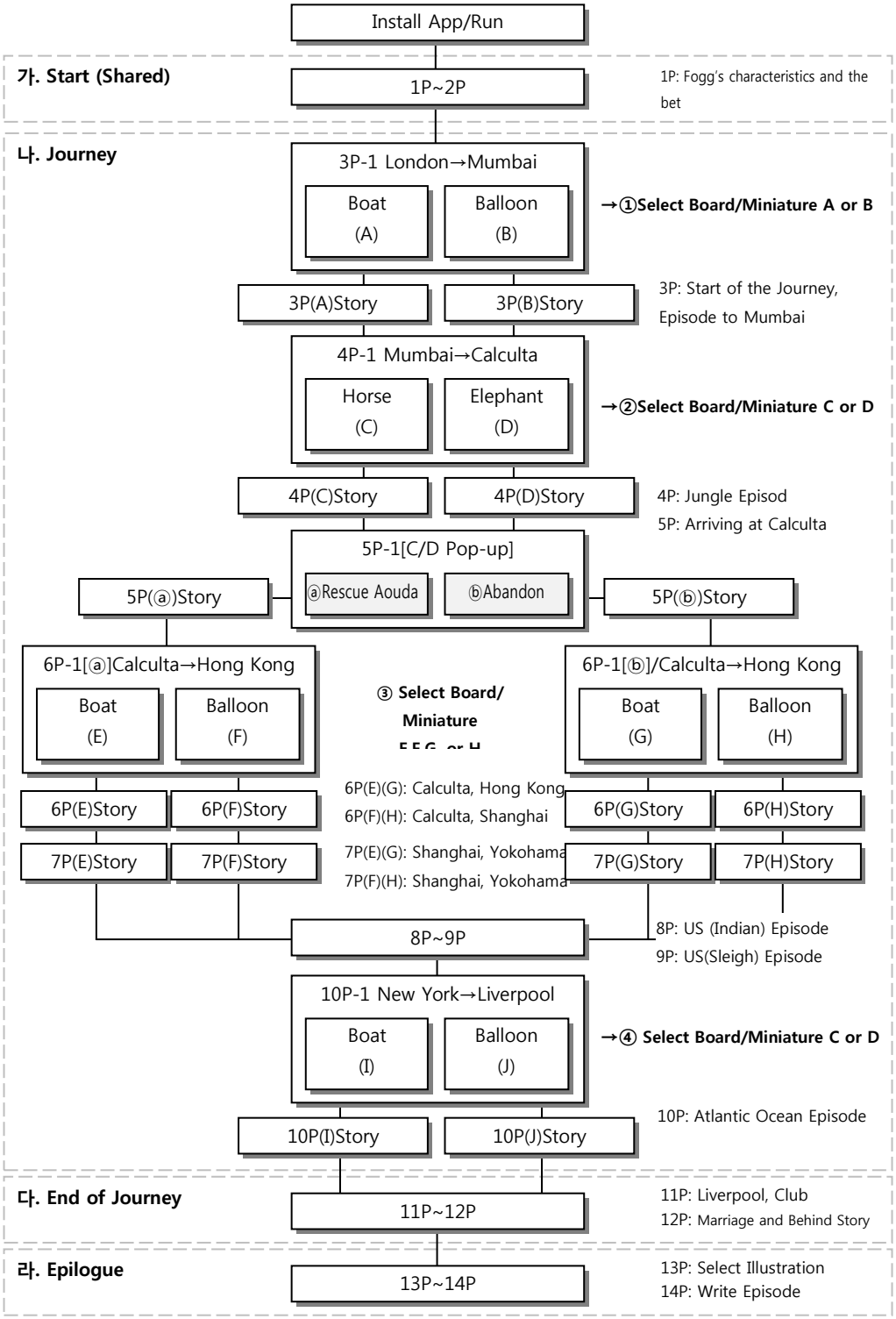

Figure 4. Flow Chart

4. Evaluation and Results Analysis

4.1. Methods of Effectiveness Assessment

Based on observation, the learning attitude of learners while reading the comparison-learning tool (book) was assessed. Then, using 4 miniatures, 1 board, and tablet PC (software installed), the attitude of learners engaging in creative writing was assessed with the same method. In order to make the assessment more objective, Zimmer's observation evaluation items were used and supplemented with additional items to assess the behavior of children participating in a game or movement task. The assessment measures 6 items: endurance, self-motivation, concentration, level of interest, perception and vitality.

For self-evaluation, the research participants experienced the book comparative learning tool and the creative writing educational contents in a consecutive order. Then, to verify the effectiveness of the study, the factors for learning attitudes and learning activities were examined.

4.2. Result Analysis 1:Observation Evaluation

Table 3. Comparative Evaluation of Learning Tools Based on Observation

Evaluation Factor	Item	Sex	Mean
Level of Interest	The participant show high levels of interest.	Book	2.65
		Contents	4.65
Self-motivation	It increases self-motivation.	Book	2.60
		Contents	4.50
Concentration (Immersion)	The participant concentrates on the learning tool.	Book	1.70
		Contents	4.50
Endurance	The participant shows endurance through the learning process.	Book	2.60
		Contents	4.25
Perception	The participant has a good understanding of the contents.	Book	2.50
		Contents	3.70
Vitality	The participant performed actively and voluntarily.	Book	2.65
		Contents	4.80

For each factor, the mean was calculated with the sum of scores divided by response frequency. The comparative learning tool (book) showed a mean of 2.65. On the other hand, the creative writing educational contents showed a mean of 4.40, which shows a significant difference compared to the other. The results of the observation evaluation indicate that the creative writing educational contents had more positives results in areas of level of interest, self-motivation, concentration, endurance, perception and vitality than the conventional learning tool (book).

4.3. Result Analysis 2: Self-evaluation (Level of Satisfaction)

For satisfaction assessment, Cronbach's α was used as the reliability coefficient to verify the reliability of each questionnaire item. The result was above 0.7 (Learning attitude factor .7589/ learning activity factor .7435), showing a reliable level.

Table 4. Statistical Analysis of Satisfaction Assessment, and Factors of Learning Attitudes and Learning Activities

	N	Mean	Standard Deviation	Ranking
Learning Attitude Factor	20	3.98	.937	
Self-motivation	20	4.15	.933	2
Level of Interest	20	4.35	.745	1
Self-confidence	20	3.80	.834	4
Continuous Effort	20	3.75	.967	5
Concentration	20	3.90	.852	3
Learning Activity Factor	20	4.25	.788	
Performance	20	4.70	.470	1
Level of Understanding	20	4.40	.598	2
Divergent Thinking	20	4.05	.826	3
Total Level of Satisfaction	20	4.04	.928	

The total score was 4.04 out of 5, showing a high level of satisfaction and confirming that the study achieved valid positive results.

4.4. Expert Evaluation (Creativity Assessment and In-depth Interview)

For expert evaluation, one elementary school instructor and two authors of children's book carried out the evaluation. After individual trial of the contents, quantitative assessment (standard table verified with 'the multi-facet Rasch Model') and qualitative assessment were conducted. The creativity assessment is composed of 18 items, which can be categorized into 6 groups: originality of idea and content, richness of contents, uniqueness of the composition, organic structure, perspectives and individuality, and interest and persuasiveness. The result was 4.03 out of 5. The results confirmed that components for creativity were well applied and planned within the contents.

Table 5. Creativity Assessment of the Creative Writing Educational Contents

Assessment Criteria	Item	Mean	
Novelty of the Idea	The contents are new and fresh.	4.66	4.22
	The idea of the contents is original and surprising.	5	
	The contents (theme, subject) are unique and unconventional.	3	
The Richness of Contents	The contents (subject, case) are rich.	3.66	4.10
	The contents have a rich imagination.	4.33	

	The contents are diverse.	4.33	
Creativity of Structure	The contents structure is creative.	4.33	3.55
	The users are not constrained to a certain form.	2.33	
	The story unfolds based on a unique structure.	4	
Organic Structure	The story is connected with consistency to the main theme.	4	4.00
	New combinations of the story are created based on relevance.	4	
	The story is connected smoothly.	4	
Viewpoint and Individuality	The viewpoint towards story events is creative.	3.66	3.88
	The subject (object, event) was interpreted in a unique way.	3.66	
	The individuality of users can be observed.	4.33	
Interest and Persuasiveness	The contents were interesting and entertaining.	4.33	4.44
	The final contents were persuasive.	5	
	Expressions were interesting.	4	

The following are the results of expert in-depth interviews.

First, the study is significant in that the contents of this research helps learners enhance their thinking abilities and imagination, express their thoughts and engage in writing tasks without difficulty.

Second, the contents can accelerate creative writing activities as it helps learners to overcome negative preconceptions (such as ‘creative writing is painful’) by providing them the experience to recreate stories repeatedly through a natural process of story writing.

Third, the application of new technology (augmented reality) was assessed to be sufficient on its own to stimulate imagination of learners, enhance concentration and have an overall positive impact on creative writing activities.

As a comprehensive analysis of the in-depth interview with 3 experts, the creative writing educational contents was assessed to have a great advantage in promoting creative writing activities and enhancing creativity among students. Also, the contents were effective in enhancing imagination and thinking abilities of learners. For future studies and improvements, the study suggests: (1) to develop various contents based on level of difficulty considering the abilities and characteristics of different learning groups; (2) to increase the range of choices to have more diverse results; and (3) to make the learning tool more convenient (*e.g.* simplify the composition and minimize the overall size of tool).

5. Conclusion and Implications

In conclusion, the research findings can be summarized as follows:

First, the contents developed through this study can be an effective and interesting educational tool for creative writing activities. It provides learners the experience to create a story on their own, and enhances positive thinking and self-confidence.

Second, through story-retelling is based on a rich contextual background, learners could easily speculate and imagine scenes, and feel sympathy. Also, it enhances learner's imagination and creativity to create meaningful stories.

Third, the study found possibility in combining augmented reality with story-retelling, which can maximize the effectiveness of learning and have a overall positive effect on creating writing activities by increasing immersion and participation.

Fourth, by suggesting a nonlinear structured creative story writing educational contents, the study provides a framework for creative story writing with unlimited possibilities with interaction.

Fifth, the story-retelling contents, which have a 'creative gap', can make learners to actively fill in the gap and learners can understand the principles of stories while enhancing their imagination through this process. Moreover, the study provides the directions for application development of the next generation.

Sixth, creative story writing is one of the basic desires of human beings to express, and the study provided the opportunities to confirm their desire and will towards creative writing. Therefore, key findings of the study imply that there should be more opportunities for creative writing provided through the education curriculum and it should be integrated into the curriculum in a systematic and hierarchical way.

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