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Study on the Possibility of Cartoon Character Images Utilization in Mobile App for Foreign Language Learning : Focusing on Cartoon Character Images as Text-Learning Aids

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Abstract– In this study we analyzed the influence of cartoon character still images and motion images as text-learning aids in mobile app for foreign language learning. After setting the text learning group as a control group, a group that receives still images for the text learning and a group that receives motion images for the text learning are set as the experiment group. The analysis was conducted by collecting data from the participants in each group in terms of eye tracking during learning process, cognitive evaluation and follow-up questionnaires of learning. As a result, when the cartoon character motion images are utilized, there is an effect of concentrating the line of sight dispersed to the other areas than the learning information area at the time of learning. In addition, the users' interest in learning, increased and the perception of learning was significantly influenced.

1. Introduction

Recently, the rapid spread of smart phones with excellent information processing ability and the spread of various digital contents have increased the utilization of cartoon characters through mobile devices[1]. The cartoon character has the characteristic to stimulate users' emotions and to assist non-verbal communication through gestures and facial expressions. The characteristics of Cartoon characters are effective not only for learning motivation and compensation but also for transferring learning contents. While the use of cartoon characters in mobile learning apps has increased, there has been a lack of academic research on using cartoon characters in mobile learning apps.

The purpose of this study is to investigate the possibility of using cartoon characters as a means of understanding foreign language learning in mobile apps considering communication characteristics of cartoon characters. In other words, a case of providing cartoon character still images or motion images are compared with the case of text-learning only, to derive the possibility of cartoon characters as learning assisting means in mobile-learning apps.

2. Literature review

Multimedia learning is a study using various audiovisual materials and many studies have been done on it. Amael Arguel, Eric Jame(2009) studied the differences between a video and a photograph in learning impacts [2]. According to Rieber(1994), motion images are used to support learning using one of three functions: attention, content presentation, and practice. In addition, Park and Hopkins(1993) proposed five educational functions of motion images[3]. In this way, there are many previous researches that still images or motion images have a significant effect on learners. However, these studies are limited to traditional classroom learning or e-learning in fixed locations. Therefore, it is necessary to conduct studies that are based on mobile learning, which is becoming a learning platform due to recent technological development and social change.

Meanwhile, according to the Moreno's CATLM, the cartoon character image has an emotional feature rather than the instructional visual material[4]. In other words, the use of cartoon characters in the learning contents can lead to a deeper learning to the learners through emotional relationship with the characters. This is an important clue to link the learning of the strengths of the cartoon character images.

Eye Tracker is an effective tool for visual analysis of user's cognitive process in multimedia learning by recording and analyzing user's gaze tracking. Fang-Ying Yang analyzed how users' eye tracking changes according to the composition of presentations using various multimedia data. Mayer used Eye Tracker to analyze the impact of using physical learning aids on user perception [5-6].

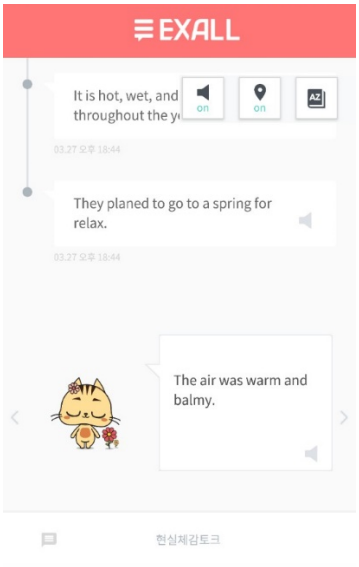
3. Experiment

In this study, a group that learns only text by using mobile app for foreign language learning is used as a control group. We will compare and analyze the learning process, learning result, and subjective evaluation by using the group that learns the text with the cartoon character still

images and the group which learns the text and the cartoon character motion images. The learners ' eye movements during the experiment will be recorded and analyzed with the eye tracker. And learning cognitive evaluation and follow-up questionnaire are conducted after the learning derived. The mobile learning app, 'EXALL', will be modified and used for experiments, and the cartoon character images used in experimental group experiments are images expressing the meaning of the text learning.

3.1. Materials and participants

The main function of 'EXALL' is to output English sentences based on various situational awareness information of users to naturally learn English in a daily life. At this time, in original 'EXALL' UI contains English sentences as well as cartoon character motion images. The UI of 'EXALL' consists of cartoon character area, and real-time sentence text area at the bottom, and a history area that can be used to view previously sentences in the center and upper part [Fig.1]. Users can switch learning sentences to new sentences through swipe gestures.

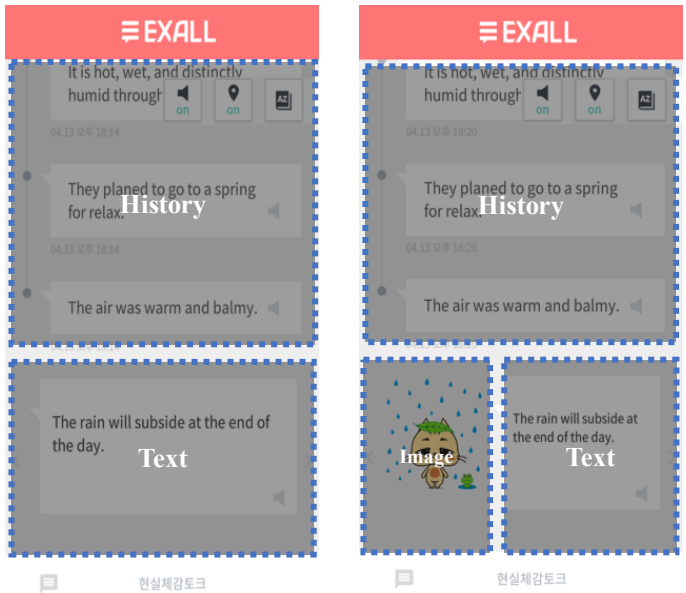


[Fig.1] Reality-aware English Learning App 'EXALL'

For the purpose of this experiment, English sentences from 'EXALL' extracted the sentences of intermediate difficulty from the 'CORPUS' which is often used as an English training and correction teaching model in educational institutions to maintain a certain level of English. The subject of the sentence is composed of 10 sentences related to environment, 10 sentences related to situation, and 10 sentences related to a person and limited various situations to 30 sentences.

Participants are limited to those who have a foreign language proficiency (TOEIC 550-650 points) that matches the excerpted English sentence (medium / advanced: Academic words, off list ratio is 10% or more) of 20's who are familiar with using smartphone apps. Experimental groups are divided by: 1. Learning by text only (Group A) 2. Learning by text and cartoon character still images (Group B) 3. Learning by text and cartoon character motion images (Group).

A, B, C groups are provided learning contents through the modified interface as shown in [Fig.2]



(a) UI and analysis area for Group A

(b) UI and analysis area for Group B, C

[Fig. 2] Are Segment for Eye Tracking Analysis by Experiment Group

3.2. Method and Results

3.2.1. User's Eye Movement

Tobii Pro Glasses 2 was used among the Eye Tracker products to acquire and analyze the user's eye movements. After the experiment, the user 's eye-tracking image recorded through the device is analyzed by the AOI (Area of Interest) analysis tool in Tobii Analyzer. The criteria for analyzing the user's eye movements are based on the area in [Fig. 2].

[Table 1] shows the results of the users' eye tracking data collected through Tobii Pro Glasses 2 using the AOI (Area of Interest) analysis tool in Tobii Analyzer. The results of the analysis are as follows: First, in group A, which received only texts for learning, it spent more time and gazed more often in the previous sentence texts in history area than real-time sentence texts. Second, in the case of group B, which is provided with the cartoon character still images and the text, the result is distributed in three areas relatively. Third, in the case of the group C, which receives both the cartoon character motion images and the text, the results are distributed in three areas as in the case of the group B, but a little more focused on the cartoon character motion images.

[Table 1] Average Value of Eye Tracker Analysis by Experimental Group

(a) Results of Visit Duration and Visit Count

Experimental Group	Area of Eye Movement	Visit Duration	Visit Count
Group A	Real-time Sentence	0.14	4.3
	History Sentence	1.26	5
Group B	Character Still Image	0.02	1
	Real-time Sentence	0.05	1.5
	History Sentence	0.04	2
Group C	Character Motion Image	0.12	2.5
	Real-time Sentence	0.03	1
	History Sentence	0.01	2.3

(b) Fixation Duration 및 Fixation Count 결과

Experimental Group	Area of Eye Movement	Fixation Duration	Fixation Count
Group A	Real-time Sentence	0.10	4
	History Sentence	0.41	20.5
Group B	Character Still Image	0.02	1
	Real-time Sentence	0.05	2.5
	History Sentence	0.04	2
Group C	Character Motion Image	0.12	6
	Real-time Sentence	0.03	1.3
	History Sentence	0.1	5.3

3.2.2. Learning Cognitive Evaluation

The learning cognitive assessment proceeds by the Cloze test. It is a way to make a blank word in a sentence learned by a participant and to select an answer from multiple choices. Mayer use this method to evaluate how much the user has learned after learning in multimedia context [7]. Evaluation is done by online test through mobile devices as the similar context as learning. The evaluation paper consists of 15 randomly selected from the 30 sentences learned by the subject. The total score is 15 points.

[Table 2] shows the results of learning cognition per experiment group. The results of learning cognitive evaluation revealed that Group B, which learned through text and cartoon character still images, received the highest score on average. Also, the average score is revealed in the order of the group C, which is learned with the cartoon character motion images, and the group A, which learns only with the text.

[Table 2] Results of Learning Cognitive Evaluation per Experimental Group

	Group A	Group B	Group C
Average of Results	11.6	14	12.3

3.2.3 Follow-up questionnaire

The follow-up questionnaire is conducted in online surveys through mobile devices in a similar way to the learning process and learning cognitive evaluation. First, the participant inputs the given experiment code and then evaluates on 5 points scales how much of the learning content type given to him or herself is helpful to learn, easy to learn and interested in learning. After the evaluation, a participant would be asked to evaluate the expectation of the other two types of learning satisfaction. All questions are rated on a 5-point scale.

The results of the follow-up questionnaire by experimental groups are shown in [Table 3]. Some notable points from the results of the questionnaire were as follows: First, the learning satisfaction and the expected learning satisfaction of the cartoon character motion images were high. In addition, the satisfaction and the expected satisfaction with the text alone were significantly lower than the other groups.

[Table 3] The follow-up Questionnaire per Experiment Group

		Helpfulness	Difficulty	Interest
Group A	Text	2.6	3	3.3
	Still Image	2.3	2.3	2
	Motion Image	1.6	2	1.3
Group B	Text	4	3.3	4.3
	Still Image	3	2	2.6
	Motion Image	1.6	1.6	1.3
Group C	Text	4	3.3	4.6
	Still Image	3	3	2.3
	Motion Image	1.6	2	1.6

4. Discussion

In this study, we compare the learning complementary effect of the cartoon character still image or moving image in the mobile learning app with the text learning only. As a result, using cartoon character images of both still and motion images positively affects cognition, and learning satisfaction. Especially, when the cartoon character motion images are utilized, it is possible to concentrate the eyes on the learning contents that can be dispersed into the other area.

The number of samples in the study is 3 in total, 9 in total, so there is a limit to represent all mobile learners. However, this study is expected to be the basis of advanced research on the use of cartoon characters in mobile learning.

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