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The Effects of an Information Delivery Modality on Psychology of E-learning Students

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***Abstract*—**Does a communication modality matter in delivering e-learning information? With the recent growth of broadcasting systems, media technologies and e-learning contents, various systems with different communication modalities have been introduced. In accordance with these trends, this study examines the effects of the information delivery modality on psychology of students. Findings from an experiment indicated that the delivering information which includes a video modality elicited higher degrees of credibility, quality, representativeness of content, and perceived suitability for delivering information than those of auditory information. However, there is no difference between content liking and attitude. The Implications of the findings and the limitations are discussed.

***Keywords*—**Communication modality; e-learning; multimodality; students.

I. Introduction

THE development of broadcasting and communication technologies made it possible to introduce various broadcast media such as radio and television [1, 2]. Users are able to receive information using one or two modalities. For example, users can receive auditory type information via a FM radio. As another example, televisions use two ways, auditory and visual modalities, for transferring information. These days, by increasing the demand of a large electronic display board, people receive visual information via large visual displays. It means that people can receive new data through one or more ways. However, only few studies focused on the effects of modalities on psychology of receivers [3, 4]. So, do information delivery modalities have different impacts on users? That is, can the information delivery modality be an important factor impacting the psychology of students?

Some previous research has indicated that different delivery modalities affect the psychology of people in specific situations. Chen and Fu conducted two experiments to analyze the effects of the multimodality on learning performance and judgment of learning. The findings from their research, the multimodal information did not have any impacts on learning performance and judgment of learning [5]. On the other hand, Smeets and Barnes-Holmes found that auditory-visual tasks were more efficient than only-visual tasks in children's learning [6]. Also, Lee and his colleagues indicated that multimodal feedback with auditory signs can enhance the performance of older adults in using touch screens [7].

Also, findings of previous studies indicated that the effects of an information delivery modality were not uniformly working [8]. It means that the effects of the information delivery modality are crucially impacted by other factors such as environments or situations. In this study, we aim to investigate how information delivery modalities affect people's psychological aspects when they meet information by raising the following research question:

RQ: In controlling for information and time-period, what is the relationship between the information delivery modality (IV) and content perceptions, attitudes toward e-learning session and perceived suitability for delivering information (DVs)?

II. Method

A. Study Design

A between-subject experiment was conducted with three conditions (information delivery modality: Auditory vs. Visual vs. Auditory-Visual).

B. Participants

60 undergraduate and graduate students were recruited from a large private university in South Korea. The age of the students ranged from 19 to 32 (M=24.11, SD=2.22). Half of the participants were male (see Table 1).

C. Apparatus

A 19-inch television and comfortable headphones (Fig. 1) were prepared in a soundproof laboratory. In order to avoid other effects of the exterior appearance, the logos and other exterior features were masked.

D. Stimulus Material

For selecting a suitable and neutral stimulus material, 10 respondents participated in a pretest. Initially, the experimenters selected six e-learning videos in open-accessed class videos of a large private university in Seoul, South Korea [9] (Fig. 2, 3 and 4). All respondents were instructed to see six videos and answer a 7-point Likert scale questionnaire for evaluating the level of neutral-ness. Based on the result of the pre-test, this study chose an e-learning video which was evaluated by the respondents as indicating the most neutral content (3.9 on a 7-point). Also, it was displayed via the prepared television in the laboratory. In the auditory condition, the auditory function of the television was on, and the visual

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TABLE I
PARTICIPANTS' INFORMATION

Category	Group	Number	%
Age	19-22	17	28.3%
	23-26	20	33.3%
	27-30	14	23.3%
	30-32	9	15.0%
Student	Undergraduate	41	68.3%
	Graduate	19	31.7%
Sex	Female	30	50.0%
	Male	30	50.0%
Previous exposure to online education	1 course	32	53.3%
	2-4 courses	19	31.7%
	4-6 courses	4	6.7%
	Over 6 courses	5	8.3%

function of the television was off. In the visual condition, we used subtitles for dialogue of the video. The content was identical to that of the audio of e-learning video.

Fig. 1 A 19-inch television and headphone using in this study

E. Procedure

Upon arrival at the prepared laboratory, the participants were randomly assigned to one of the three conditions. The participants in the visual condition were instructed to see an e-learning video for five minutes on a television. In the auditory condition, the participants were asked to listen for 5 minutes by headphones connected with the television (Of course, there was no picture on the screen). In the auditory-visual condition, participants were instructed to see the video on a television and listen by headphones for five minutes.

After the time for watching and listening was over, all participants were asked to answer questionnaire items including degrees of content perceptions, attitudes toward e-learning contents, and perceived suitability for delivering information. Then, all participants were thanked and received about 3 USD.

Fig. 2 A main home-page of open courseware systems in the university

F. Measurements

Six indexes were measured in this study. Four constructs composed of 16 items, content credibility (α = 0.87), liking (α = 0.79), quality (α = 0.91), and representativeness (α = 0.81) of the content perceptions, were adapted from studies of Sundar and his colleagues [8, 10]. Attitude toward e-learning contents (α = 0.84) was an index composed of three items previously used by a study of Park and his colleagues [11, 12, 13, 14, 15]. Perceived suitability for delivering information (α = 0.84) was an index of three items adapted by a study of Haslam and Ryan [16]. The participants answered all items by marking on a 7-point Likert scale (1="strongly disagree" ~ 7="strongly agree").

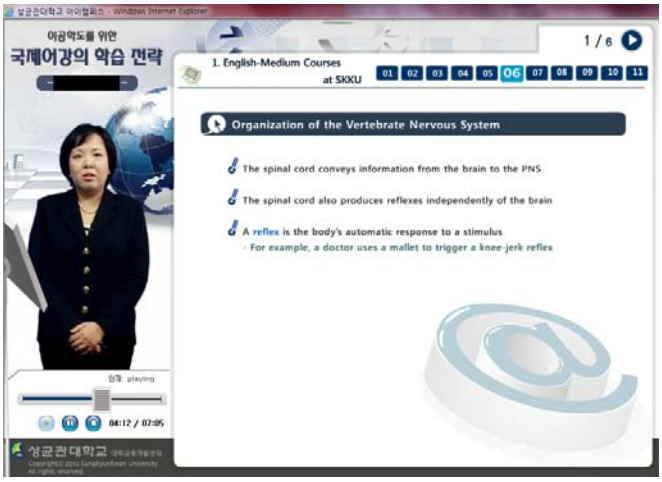

Fig. 3 A screen shot of online classes in open courseware systems of the university

III. RESULTS

A multivariate t-test was conducted to investigate the effects of information delivery on the content perceptions, attitudes toward e-learning contents and perceived suitability for delivering information. The results from the t-test indicated that the students in the auditory-visual (M=5.44, SD=0.97) and visual (M=5.55, SD=0.86) conditions reported significantly higher degrees of content credibility than those in the auditory condition (M=4.12, SD=0.45), $F(2, 57)=19.996$, $p<0.001$. Also,

the modality conditions found that the students in the auditory-visual condition (M=5.93, SD=0.63) reported a higher degree of content quality than those in the auditory (M=4.00, SD=1.30) and visual conditions (M=5.05, SD=1.10), F(2, 57)=17.103, p<0.001. The students in the visual condition (M=6.11, SD=0.74) indicated significantly a higher degree of content representativeness than those in the auditory-visual (M=5.38, SD=0.98) and auditory conditions (M=4.06, SD=0.64), F(2,57)=33.983. In addition, the students in the auditory condition (M=3.94, SD=0.50) reported a lower degree of perceived suitability for delivering information than those in the auditory-visual (M=5.45, SD=0.73) and visual conditions (M=5.34, SD=0.76), F(2, 57)=31.307. However, the communication modality did not have notable effects on attitude (p=0.93) and content liking (p=0.53) (Figure 5).

Fig. 4 One of the six videos using in this study

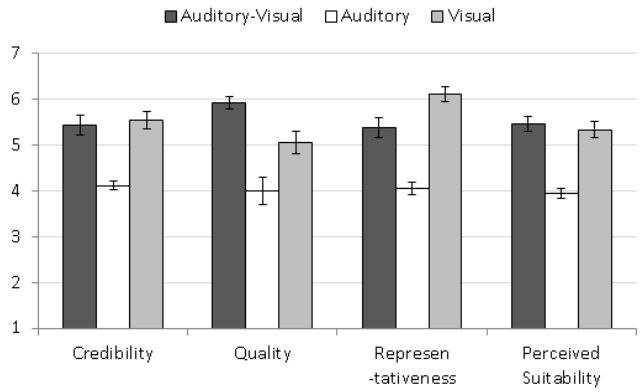

Fig. 5 Means and standard errors of dependent variables

IV. Discussion and Conclusion

As shown in the results, communication modalities differently affect the psychology of students in e-learning contents. This study found that the effects of the visual-typed information delivery led to higher satisfaction than those of the auditory-typed information delivery. The types of the information delivery affected content credibility, quality, representativeness and perceived suitability of the students. However, the communication modality in delivering information did not affect students' attitude and content liking. It means that perceived quality and credibility were affected by communication modalities, while content preference and attitude may be affected by other potential factors. In future research, we will conduct new experiments with more than one material in order to eliminate content-specific effects. Also, we will add other variables to test students' comprehension of the content.

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