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The Use of Virtual Reality Learning Materials in Nursing Seminar and Its Possibility

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Abstract

This research aims to develop VR learning materials using smart phones, propose to use it in Nursing Seminar which prepares a variety of situations, and look into the possibility of effective learning methods. We filmed the seminar of Livelihood Support Skills on Home Care Nursing in June 2016 in which 54 third-year students, teachers, and nurses attended with a 360-degree camera and a wearable camera. We conducted a self-administered questionnaire survey of 134 students in a nursing college. They were asked to fill out 10 question items (five-point Likert scales for each item) on the use of VR learning materials and learning effects. A t-test was conducted to compare men and women's self-evaluation of learning effects. Pearson's correlation coefficient was also used to compute the correlation between question items for examining the content of learning effects. Results showed that on the learning effects of VR learning materials the average score of nine questions was over 4.0 and Cronbach's alpha was 0.828, showing high internal consistency. It showed that except for the question 8, which asked about whether a subject knows how to use VR learning materials, respondents tended to answer questions positively. VR learning materials helped students to learn their own skills objectively and repeatedly from a holistic view by realizing actual situations through watching videos. In this study we examined the evaluation of learning effects of VR learning materials from learners' subjective answers. In further study, we need to measure them in a more objective way for improving them.

Introduction

Several studies are being conducted on helping disabled persons with spinal damage to improve their physical functions by using virtual reality (VR) for brain wave training [1]. Therefore, the application of VR is expected to increase with time.

To teach mainstream exercises to nurses, simulators and simulated patients are used. However, simulators are expensive, and they require substantial efforts to develop familiarity with operating methods and to create machine settings to match each disease. Training using simulated patients is time consuming with reference to preparation, and the quality of training is affected by the ability of the simulated patient to act. Thus, both these existing methods pose difficulties with reference to the instructor's ability to reflect

and instruct [2]. Further, Yamamoto et al. [3] emphasized that these methods merely involve trial and error efforts to provide fair learning opportunities.

The present study aimed to develop VR learning material using smartphones, proposed to use it in a Nursing Seminar on being prepared for a variety of situations, and examined its effectiveness. Thus, we attempted to develop learning methods that enable students to acquire skills directly connected to clinical practice.

Method

Creation of VR teaching material

Using a 360-degree camera and a wearable camera, we filmed the seminar on Livelihood Support Skills on Home Care Nursing in June 2016, which was attended by 54 third-year students, teachers, and nurses.

After recording, the video was processed such that the images edited for smartphones could be viewed more three-dimensionally from a binocular disparity in the side-by-side system composed of two lenses and partitions.

Learning using VR material

We conducted a self-administered questionnaire survey of 134 students in a nursing college. They were asked to fill out 10 items on a five-point Likert scale, pertaining to the use of VR learning materials and learning effects.

Method of analysis

A t-test was conducted to compare men and women's self-evaluation of learning effects. The Pearson's correlation coefficient was also used to compute the correlation between the learning effects. For all analyses, the statistical software SPSS Ver.22.0 for Windows was used.

Ethical considerations

According to the objective, we provided the students with oral and written information about the study, and those who provided consent were treated as subjects. The images were edited such that individuals could not identify the visual teaching materials created by the VR of the nursing exercise. The students were also explained that their responses would be anonymous, that their participation was

voluntarily, and that their participation would not be related in any way to their grades.

Results of the analysis

The learning effect of the VR teaching material

Results showed that the average score on the nine questions on the learning effects of the VR materials was over 4.0 on excluding Q 8, "I do not understand the use and operation of VR." The response to this item was reverse scored such that a higher score represented "someone who understands the use and operation of VR" (Table 1). Furthermore, the Cronbach's alpha of the questionnaire was 0.828, showing high internal consistency.

The ratios of those in the positive group, defined by a score of 5 or 4 points in the Likert scale were as follows: 91.8% for Q1, 94.8% for Q2, 93.3% for Q3, 96.3% for Q4, 92.5% for Q5, 94% for Q6, 90.3% for Q7, 26.1% for Q8, 86.6% for Q9, and 96.3% for Q10.

	Questions	Positive Number of people α	Mean	SD
Q1.	Aaide from regular visual learning materials, exercises, and simulations, i anticipate the following kind of	123(91.8)	4.57	.770
Q2.	In future, I would like to utilize it if the contents are improved	127(94.8)	4.71	.560
Q3.	Using VR, I could learn the overlooked scenarios from a different viewpoint	125(93.3)	4.59	.616
Q4.	VR allows us to observe not just the target, but also the enviornment surrounding the target	129(96.3)	4.65	.552
Q5.	VR allows to us think about the support necessary for nursing in the context of learning	124(92.5)	4.54	.633
Q6.	VR provides a sense being on site	126(94)	4.69	.630
Q7.	I can understand the benefits of using VR	121(90.3)	4.46	.668
Q8.	I do not understand the use and oeration of VR	35(26.1)	3.44	1.295
Q9.	I can actively engage with VR teaching materials	116(86.6)	4.35	.843
Q10.	A teaching material, VR co-operate for blind	129(96.3)	4.62	.559

N=134

Table. 1 Awareness of Learning Effects of VR Materials

Comparison of perceived learning effects between men and women

The mean scores on the learning effect were compared between men and women using the t-test (Table 2). For this, differences in the distribution of the data for men and women were first examined using the F-test. Then the Student's t-test was used if equal variances could be assumed, while the Welch's t-test was used where equal variances could not be assumed.

Compared to women, men had significantly higher mean scores for "Q1. Aside from regular visual learning materials, exercises, and simulations, I anticipate the following kind of teaching materials with VR" ($p<.01$), "Q2. In future, I would like to utilize it if the contents are improved" ($p=.036$), "I do not understand the use and operation of VR" ($p=.008$) and "Q10. As teaching material, VR can compensate for blind spots" ($p=.030$).

	Men (n=35)		Women(n=99)		P
		SD		SD	
Q1.	4.89	0.40	4.46	0.84	.00
Q2.	4.86	0.43	4.66	0.59	.04
Q3.	4.60	0.60	4.59	0.62	.91
Q4.	4.69	0.47	4.64	0.58	.65
Q5.	4.57	0.61	4.54	0.64	.77
Q6.	4.74	0.44	4.67	0.69	.54
Q7.	4.57	0.61	4.42	0.69	.26
Q8.	3.06	1.41	2.38	1.21	.01
Q9.	4.49	0.66	4.30	0.90	.27
Q10.	4.77	0.43	4.57	0.59	.03

N=134

Table 2 Comparison of mean scores and inter-gender comparison of scores on awareness of learning from VR teaching materials

Correlations among items concerning the learning effect of VR teaching materials

The Pearson's correlation coefficient was calculated to examine correlations among questionnaire items. Overall, a strong positive correlation was observed between "Q1. Aside from regular visual learning materials, exercises and simulations, I anticipate the" following kind of teaching materials with VR", "Q2. In future, I would like to utilize it if the contents are improved," and "Q7. I understand the benefits of using VR."

Additionally, there was a strong positive correlation between "Q3. Using VR, I can learn the overlooked scenarios from a different viewpoint" and "Q4. VR allows us to observe not just the target, but also the environment surrounding the target" (Table 3).

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Q1	1.000									
Q2	.040	1.000								
Q3	.070	.656**	1.000							
Q4	.161	.410**	.475**	1.000						
Q5	.138	.385**	.458**	.629**	1.000					
Q6	.116	.458**	.505**	.522**	.463**	1.000				
Q7	.160	.449**	.513**	.504**	.434**	.370**	1.000			
Q8	.128	.544**	.677**	.500**	.463**	.590**	.407**	1.000		
Q9	.133	.394**	.444**	.494**	.504**	.487**	.406**	.616**	1.000	
Q10	.173*	.415**	.406**	.385**	.401**	.439**	.373**	.413**	.523**	1.000

Note 1) *: p<0.5, **: p<0.1%

Table 3 Correlation among questionnaire items

Discussion

The present findings showed that, except for Q8, which asked about whether a subject knows how to use VR learning materials, respondents tended to answer questions positively. Next, as compared to women, men had more expectations from lectures and exercises using VR teaching material, and had greater awareness for the learning effects of the active use of VR teaching material. On the other hand, with respect to Q8, more men responded, "I understand" than women did. Based on these results, it is anticipated that more learners will start considering the application of this teaching material as they become more proficient in using VR teaching material.

With regards to the results presented in Table 3, a strong association was observed between questions that evaluated the learning effect of VR (Q1, Q2, and Q7). In other words, use of the VR material in the present study may have improved the participants' understanding of the utility of VR teaching materials and it enabled them to actively evaluate its application.

Additionally, there was a strong correlation between questions that evaluated the specific merits of VR (Q3 and Q4). This may be because the use of VR teaching materials in this study may have compensated for the shortcomings of traditional methods, which would have increased the participants' awareness of the disadvantages of traditional methods that they would otherwise overlooked, and the significance of new teaching materials, especially with reference to technical training.

Results or expected effects

VR teaching materials allow the learner to move and feel the environment around the patient and the situation of treatment that they wish to project while looking at the patient, who is on the bed and in agony. By visualizing him/herself in the actual situation, the learner can experience an environment resembling the site of nursing. The present study found that VR learning materials helped students to learn skills objectively and repeatedly from a holistic point of view, by experiencing the actual situations depicted in the videos. Furthermore, participants who understood how to use VR were able to think of applications for the VR teaching materials by themselves. These results suggest that, regardless of the learners' proficiency with using VR, it is important to first help them try and operating it.

Future challenges

In this study, we examined the learning effects of VR learning materials based on learners' subjective answers. In future studies we need to assess the same more objectively. The sample employed in the present study was quite small; therefore, in order to generalize these results, it is important to expand the target base. Through further research, we hope to explore ways to introduce VR teaching materials into more effective learning processes.

Conflict of Interest Statement

The authors declare no competing interests.

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