Formative Evaluation of Virtual Reality Materials for Inducing Cultural Awareness

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ABSTRACT

In Japan, which is moving toward a multicultural society, the nursing profession is required to have intercultural ability to recognize the diverse characteristics of the target and practice nursing. In order to acquire intercultural competence, it is important to be aware of and acknowledge differences from one's own, that is, to adopt an attitude approach that promotes cultural awareness. Therefore, the purpose of this research is to develop VR teaching materials that allow Japanese people to experience the anxiety and difficulties that foreigners feel when visiting Japanese hospitals in the first person. First, the gap between foreign patients and Japanese medical staff was extracted through literature examination. Second, we set learning goals and created a rubric. Third, the content prototype was created. Finally, the developers evaluated the usability and the learning results by ICE rubric. As a result, it was confirmed that the prototype of the content can sensory experience the difficulty and anxiety of not knowing the language. However, it was pointed out that they could not understand what was happening in each scene, or even think about the other's culture or their own preconceived notions. Therefore, the content was completed by adding guidance for viewing, explanations for each scene, summaries of statements, and a quiz for retrospectives.

Keywords: VR teaching materials, Cultural awareness, Formation evaluation, ICE rubric

INTRODUCTION

In Japan, the foreign population is 2.747 million (2.2% of the total population), an increase of 835,000 (an increase of 43.6% from 2015 and an annual average increase of 7.51%) compared to 2015. Of these, 667,000 (27.8% of the total) were from China, followed by 375,000 (15.6%) from South Korea and North Korea, and 321,000 (13.4%) from Vietnam.

In fact, Japan has problems with foreign residents such as lack of communication, isolation in the region, and lack of communication of rules. As a result of the inability to understand the language, patients may wait until they become seriously ill to seek medical treatment, resulting in longer treatment periods and higher medical costs. In the worst case scenario, they may

die because it is too late, even though the disease can be treated with early detection. On the other hand, the nurse said, "Since communication is difficult, I don't want to go when the nurse's call rings." It has been reported that it creates barriers for such foreign patients (Futami, 2020)

The intercultural competence required of nurses here is seen as a path of effort to acquire the ability to engage effectively with clients while respecting their culture, and is seen as a continuous process. Including the constituent concepts of "cultural awareness," "cultural knowledge," "cultural skills," "cultural contact" and "cultural desire" (Campinha-Bacate, 2002) This intercultural competence development takes an attitude, knowledge and technical approach. First of all, it is important to be aware of cultural differences, that is, cultural awareness, and it is necessary to have a detailed perspective of the daily life of the target person and the family in nursing care (Ono, 2011). However, the development of intercultural competencies in the current education of nurses in-service is a low priority, and support for the development of intercultural competencies can be said to be an urgent task.

METHODS

Objectives

We aim to develop VR teaching materials that allow Japanese people to experience in the first person the anxiety and difficulty that foreigners feel when visiting a Japanese hospital.

Content Development Procedure

The content was prototyped through three phases. Finally, the formation evaluation was performed among four developers.

In the first step, the gap between the foreign patient and the Japanese medical staff was extracted through literature examination. Gap was caused by a lack of communication, preconceived notions, and a sense of incompetence.

In the second step, we set four learning goals and created an ICE rubric. A rubric is an evaluation index in a matrix format consisting of evaluation criteria (vertical axis) and aspects of learning (horizontal axis). An evaluation index based on the ICE model for learning aspects (horizontal axis) is called ICE-Rubric; in the ICE model, learning is composed of three qualitatively different aspects: I (Ideas), C (Connections), and E (Extensions).

In the third step, a content prototype was developed. Three 360-degree videos of the scenes were shot at the hospital. It also embedded a video of a French actor playing a paramedic speaking to a patient. This replicates the situation in which Japanese people visit foreign hospitals.

In the fourth step, we performed alpha testing among developers to complete the content. Four developers watched the prototype and evaluated the usability and learning outcomes by the ICE rubric.

This study was approved by the research ethics committee at the Faculty of Health Care and Nursing, Juntendo University (Approval Number: 2021-67).

RESULTS AND DISCUSSION

Gap Between Foreign Patients and Japanese Medical Professionals

Research Design is a literature study. Documentation on the difficulties and problems of foreign patients visiting Japanese medical facilities was analyzed. The codes in the text were extracted and treated as data. The codes were divided into the patient's position and the medical provider's position. In addition, difficult situations such as reception, examination, treatment and measures, hospitalization, and business procedures (including payment) were reconstructed for each situation. After that, we compared the difficulties on the patient side and on the medical staff side for each scene, and extracted the differences in thoughts as eight Gaps. Already reported in AHFE2020 (Nozaki, 2020).

It was suggested that behind this was a lack of communication (inability to communicate), a preconception (superficial understanding, characterization), and a sense of incompetence (indifference, turning a blind eye).

Learning Objectives and Rubric

Four learning objectives were set to overcome these three factors.

① Try to keep an open mind
② Try to accept someone as they are
③ Think about the other person's culture and customs, and think about the reasons for their words and actions
④ Be aware of your own prejudices, discrimination and assumptions

The evaluation criteria for the vertical axis in the ICE rubric are based on the perspectives that we want the students to acquire. In this case, four learning objectives were listed. On the horizontal axis were three levels of learning achievement based on the ICE model. The ICE rubric was systematized and developed by three nursing education experts.

(see Appendix Table 1)

Creating Content Prototypes

We set up a case of a female student visiting a hospital for abdominal pain during a trip to France. She is diagnosed with appendicitis, undergoes emergency surgery, and is hospitalized for a few days. It consists of outpatient procedures, examinations and scenes of inpatient life. A 360 panoramic video recreates the outpatient and ward environment of the hospital. Pop-ups show doctors, nurses and clerks spoken to by French actors in each scene. The storyline was guided by arrows to indicate the direction of travel.

Modifications Based on Formative Evaluation Among Developers

The degree of attainment of the learning goals by this teaching material was answered according to the rubric. They also asked freely about learning and impressions, effectiveness (ease of learning), efficiency, satisfaction, and opinions and improvements.
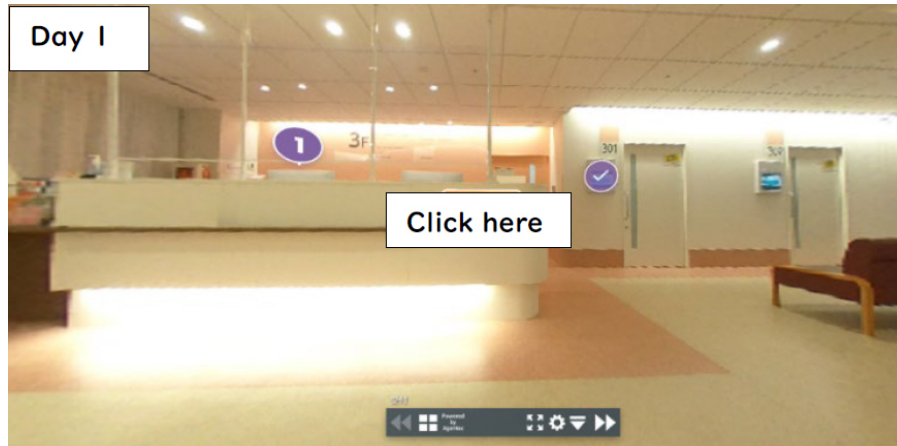
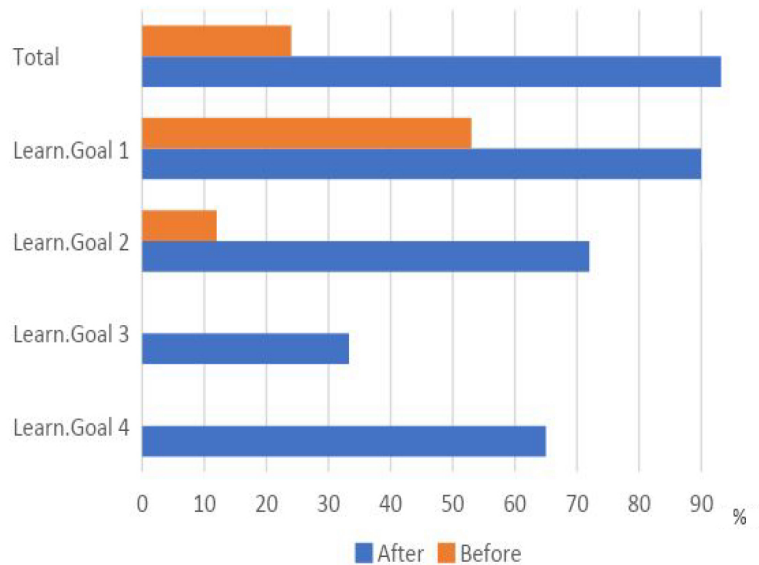**Figure 1**: A scene from the finished content.

Figure 2: Achievement of learning objectives.

In the light of the above, practical measures for improvement have been considered. As the first guidance, the rubric was presented as a learning goal to explain the purpose and usage of this material. Added guidance for viewing, such as clicking on a number to reveal additional information. The situation description of each scene, such as the display of the passage of time, was added. The presentation in French was followed by a summary in Japanese. Learning was directed to a review questionnaire to complete the content.

Revised Evaluation

The evaluation points before and after modifications were compared among developers.

In terms of attainment of learning objectives, improvement was confirmed in all four learning goals.

In particular, the learning goal (1) "to keep an open mind" tended to be more attainable.

On the other hand, the learning goal (3) "to think about the other person's culture and customs and to think about the reasons for his or her words and actions" tended to be difficult to deepen.

Achievement of learning objectives is shown in Figure 2.

When asked on a 5-point satisfaction scale about the course materials, the score increased slightly from 3.6 before the revision to 3.7 after the revision.

This content was a heuristic awareness-raising textbook, and no questions were set. Therefore, it was suggested that it was difficult to obtain the effect of thinking about culture and customs by simply watching the teaching materials. It was suggested that it was necessary to create a mechanism to deepen understanding, such as setting questions to raise questions and working in groups before and after viewing content.

CONCLUSION

As an attitude approach to promoting cultural awareness, we developed VR content that allows Japanese people to experience the anxiety and difficulty they feel when visiting a foreign hospital in the first person. Furthermore, it was suggested that it should be enriched as a teaching material.

ACKNOWLEDGMENT

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APPENDIX

Table 1. Learning goals and rubric.

Learning goal	I {Basic knowledge} (Knowledge and skills)	C [Connection] (ability to think, judgment, and expression)	E (Application) (Attitude to engage in learning on a proactive basis)
①Try to keep an open mind	□To try to see how someone reacts □You can notice that foreign patients are confused	□I can think of people who are worried because they don't know the procedure. □Can be considered to be troubled by not being able to communicate the main complaint □I can think that I have trouble reading documents and materials in Japanese.	□Try to make eye contact □Try to talk to someone with a smile □Trying to speak to her/him in easy Japanese □Try to use body language □Try to have a conversation with a translator
②Try to accept someone as they are	□You can realize what you're trying to tell (and try to figure out what you're trying to say from the other person's point of view)	□Trying to figure out if it's "Can't say" or "No(Nothing)". □Trying to figure out if they don't understand our explanation or if they can't express what they want to say.	□Try to comprehend what one wants to say by including non-verbal information □Put oneself in the other person's shoes and try to accept the truth
③Think about the other person's culture and customs, and think about the reasons for what they say and do	□You can notice differences from your habits and common sense	□It is possible to think that the factors (religion, kinship, cultural values, political, economic, educational, technical) that a person has in the background of his or her words and actions may influence □Can think about how much experience one has in living in Japan	□Interested in learning about the culture and customs behind it and trying to understand the reasons for words and actions □Trying to find a way to reconcile the need to limit one's life with what one values □Try to identify with the other person, including the culture and customs behind it
④Be aware of your own prejudices, discrimination and assumptions	□Be aware of your own stereotypes, discrimination and assumptions	□Understand that prejudice, discrimination and assumptions affect the way you judge □Be aware of your own prejudices, discrimination, assumptions and characteristics	□Try to treat others without being influenced by one's own preconceptions, discrimination and assumptions