Intercultural Communication Research Based on CVR: An Empirical Study of Chinese Users of CVR About Japanese Shrine Culture

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Abstract. Previous studies have shown that CVR can promote users' knowledge acquisition, meaning understanding and emotional experience. This study demonstrates the feasibility and advantages of CVR in intercultural communication through empirical research. A virtual reality video about Japanese shrine culture was produced by shooting and editing, and a Chinese user was selected for a controlled experiment. It turns out that CVR can create an immersive cultural environment for users in intercultural communication and bring a good cultural experience, but it also has some shortcomings that need to be continuously improved through technical means.

Keywords: CVR · Intercultural communication · Japanese shrine culture

1 Introduction

CVR (Cinematic Virtual Reality) is a broad term that could be considered to include a growing range of concepts, from passive 360° videos to interactive narrative videos that allow the viewer to affect the story [1]. With the continuous development of CVR, its technical effects are quickly noticed by other industries and applied to different fields such as education, medical care and media. CVR is applied to intercultural communication and the research results are still relatively few. But the research results in other fields provide support for its feasibility study, which mainly reflected in three aspects: knowledge acquisition, meaning understanding and emotional experience. These three dimensions are also the three aspects of user satisfaction in the process of intercultural communication. This study verifies its communication effect through empirical research, and study its problems in the process of communication.

1.1 Knowledge Acquisition

Users could acquire knowledge from text annotations, pictures and sounds through watching video. Both CVR and ordinary video can present this there factors, but the effects are different. Alan Cheng et al. found that VR technology can take advantage of culturally relevant physical interactions to enhance language learning [2]. Passig et al. found that personal experience in the VR environment can promote parents' awareness

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of children with dyslexia [3]. This way of acquiring knowledge is to achieve visual representation of cognition through experience.

At the same time, the 3D technology is considered to be able to enhance users' attention and memory. Terlutter et al. found that 3D movies can significantly enhance attention and memory of prominent brands compared with traditional movie [4]. Cognitive theory believes that human cognition is limited. Therefore, when users are exposed to 3D video, limited information processing capabilities will be shunted. In this case, it may cause users to pay more attention to the key information and ignore non-key information.

1.2 Meaning Understanding

In traditional cognitive theory, Craik believes that meaning understanding is more difficult than sensory and surface feature analysis [5]. Therefore, in the process of CVR communication, reaching the user's meaning understanding is more profound than knowledge learning. Sato et al. found that watching 360-degree video can effectively improve students' reflective ability and strengthen students' understanding of related learning [6].

In addition to deepening the understanding of knowledge, the significance of understanding is also reflected in the improvement of their own learning skills. In the field of skills training, especially in the field of medical training, CVR is widely used. Through research, Yoganathan found that when training medical stuff on knotting skills, medical stuff who learned through CVR scored higher in the final evaluation of knotting techniques than those who learned through traditional 2D video [7]. CVR can provide users with a more comprehensive perspective and face-to-face teaching style, and promote users' self-think after acquiring knowledge, thus showing better learning results.

1.3 Emotional Experience

Compared with traditional video, the three-dimensional panoramic effect highly restores the real effect, and users can obtain a stronger sense of immersion and experience, which is particularly effective in emotional experience. CVR can induce users to generate more intense emotional experience and physiological reflection than traditional video [8]. Keen believes that empathy can be used for rhetorical purposes and to reinforce the user's pre-existing emotions [9]. Therefore, CVR can also enhance users' emotions by arousing their empathy based on emotional experience.

On the one hand, this emotional experience of CVR is used for the treatment of many emotional comforts. On the other hand, it promotes communication and understanding among different groups. By allowing Aboriginal people to experience the social and emotional experiences of new immigrants, Passig found that VR can promote aboriginal's understanding of new immigrants and enhance their social awareness [10]. This is actually a way of intercultural communication approach that achieves mutual understanding by simulating the lifestyle and emotional experiences of different cultural groups.

2 Method and Implementation

The participants were divided into two groups, the experimental group and the control group. Each participant in the experimental group watched a CVR of 3 min and 52 s. Each participant in the control group watched a normal video of 3 min and 21 s. The CVR material and the clip are all completed by the researcher. The ordinary video is found from the YouTube and has the same core content with CVR. Then the predictive tests and interviews were conducted, and a questionnaire model was designed based on the results. According to the dimensions of the questionnaire model, a specific evaluation questionnaire was designed and a control experiment was conducted.

2.1 Preliminary Preparation

Both the CVR and the normal video screens are a day of worship scenes of the Fudatenjin Shrine in Tokyo, Japan. The specific content is the worship process and the culture of Shichi-Go-San Festival.

Use the insta360one camera to shoot CVR footage. The video pixel is 3840 * 1920. Using the method of flat angle shooting from different directions and fixed and moving shots.

Based on the narrative order of the visiting shrine, the CVR used Adobe Premiere for editing. The narrative is arranged by interspersing individual short videos in a long shot. In addition, visual guidance symbols has been added to help users to focus on key information. Firstly, use text annotation to add subtitle prompts next to important information points. Secondly, using graphic annotation, such as arrow which points to other angles to ask users to rotate picture (Fig. 1).

Fig. 1. Graphic annotation in CVR

2.2 Evaluation Process

Through the pre-test experiments conducted by 4 volunteers, the editing and post-production of CVR was improved. Then through 21 interviews, the questionnaire dimensions and theoretical models were determined after the trial. The integration model based on the UTAUT model and the 4C theory is established through research.

UTAUT (Unified Theory of Acceptance and Use of Technology) has four core dimensions: effort expectancy, performance expectations, social impact and facilitating conditions.

4C marketing theory is based on consumer demand and have four basic elements of the marketing mix: customer, cost, convenience, and communication.

2.2.1 Pre-test Experiment

Four volunteers conducted pre-test experiments, watching the video of the experimental group and the video of the control group, and answering the questionnaire. According to the opinions of the volunteers, researcher optimized editing and added visual guidance and background sounds.

On the other hand, the dimension of the questionnaire has been improved. First, the economic factor is added, that is, whether the cost will affect the user's willingness to use CVR for cultural exchange. Second, the description of the problem in the questionnaire is changed more specifically.

2.2.2 Hypothesis

Two assumptions are made through pre-test feedback.

H1: The application of CVR in the intercultural communication field is better than ordinary video, that is, participants who watch CVR have higher performance expectations and effort expectancy than those who watch ordinary video.
H2: Convenient conditions and perceived cost are important factors for the acceptability of CVR.

2.2.3 Interview Feedback

Through the interviews with 21 volunteers on the problem, it is found that most users have certain expectations for CVR, and CVR is superior to ordinary video in intercultural communication. This is mainly reflected in the degree of information presentation and the advantage of new technology.

Compared with ordinary video, CVR is richer in information presentation. So users can selectively receive information according to their own needs. At the same time, the rich information can deepen the impression of the subject. The most important is the three-dimensional space created by the panorama, which enables users to grasp the information based on the spatial level, making it more intuitive and more acceptable.

CVR is more advanced than ordinary video. User's interest can be enhanced by using new technology to generate the points of interest and memory points for the content. Visual impact and immersive feelings make the spread of culture more direct and arouse more emotional resonance. In particular, it was found that users between the ages of 20 and 60 are more interested in and more receptive to CVR. A male user of age 80 showed a negative attitude when watching CVR.

For the immersion of CVR, most users think that it is related to CVR's own resolution, editing mode, picture stability and lens speed. A 22-year-old male user suggested that "a long-lens can be used" to avoid the picture jumping caused by the clip.

For visual guidance symbols, users generally agree that they do not affect immersion, but feedback on the degree of guidance is mixed. Some users think that visual guidance symbols should be added to highlight key content. However, some users believe that it does not have to be too much because the user's interest points are

different. Compared with the degree of guidance, the annotations and explanations should be added.

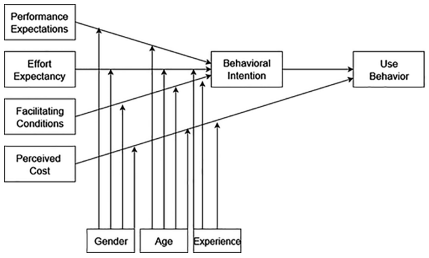
2.2.4 Questionnaire Model

The research object is the feasibility of CVR in intercultural communication, which is to measure the acceptance of CVR in intercultural communication. Therefore, it involves not only the user's acceptance of new technologies, but also whether CVR has value in the market. Therefore, based on the UTAUT model, 4C theoretical elements are added to the core dimension and appropriate modifications are made according to the requirements. Finally, a user acceptance evaluation model for CVR application to intercultural communication is established.

The core variables of the integrated UTAUT and 4C theoretical models are defined as follows:

- Performance expectation: after users experience CVR, it is considered to play a role in intercultural communication.
- Effort expectation: how much effort is required to obtain a better experience when the users experience CVR.
- Facilitating conditions: the convenience of the channel will affect the user's willingness, behavior and satisfaction.
- Perceived cost: the cost perceived by the user before the experience, and the cost will also affect the willingness and behavior.

According to the integrated UTAUT and 4C theoretical model, four basic elements are used as the evaluation dimension (Fig. 2). The specific indicators are shown in the Fig. 2.



Evaluation dimension	Specific indicators	
Performance expectation	Perceived usefulness	Knowledge
		Comprehension
		Immersive
Effort expectation	Perceived ease of use	Ease of use of technology
		Accessibility of information
Facilitating conditions	Channel accessibility	
Perceived cost	Time costs	Time of willingness to spend
	Product value	Use value
		Willingness to pay

Fig. 2. Integrate UTAUT and 4C theoretical models and evaluation dimension

2.2.5 Experiment

The experiment was divided into experimental group and control group, and each group had 20 participants. In experimental group, there were 14 women (70%) and 6 men. The average age is 27.5 years old. In control group, there were 15 women (75%) and 5 men. The average age is 27 years old. Each person can only watch the video once and answer the questionnaire within 15 min. The questionnaire includes two aspects of answering questions and evaluation.

2.2.6 Data Collection and Analysis

A total of 40 questionnaires were collected. From the results of the answer, the accuracy of the knowledge is higher in control group than the experimental group. But the correctness rate of the experimental group is higher. In the knowledge problem, the correct rate of the experimental group is 66.25%. The correct rate of the control group is 76%. In the comprehension question, the correct rate of the experimental group is 87.5%. The correct rate of the control group is 65%. From the perspective of objective answering effects, ordinary video is better at transmitting knowledge information, while CVR is better at transmitting conceptual information (Fig. 4).

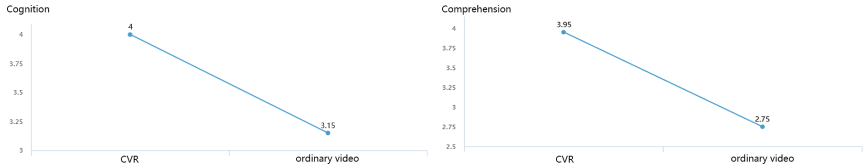


Fig. 3. Perceived usefulness of video: cognition and comprehension

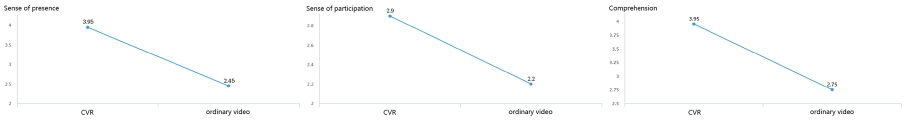


Fig. 4. Perceived usefulness to video: immersion

When users watch CVR, the perceived usefulness is significantly greater than that when they watch ordinary video. The members of experimental group felt that self-cognition level and understanding degree after the experiment was higher than that of the members of the control group (Fig. 3). Although after the objective evaluation, the accuracy of the answer to the understanding level is different but not very large, but for the user's own perception, the feeling of acquisition through CVR is more intense. The members of the experimental group were more immersed in it than those of the control group, and the sense of presence, participation and movement were far greater. It can be seen that in the intercultural communication of CVR, users have higher performance expectations.

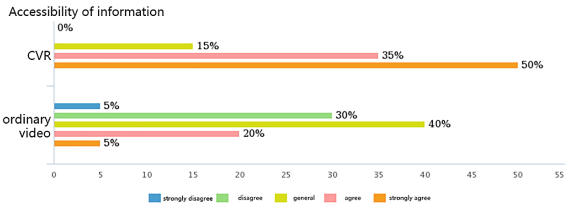


Fig. 5. Perceived ease of use: ease of access to information

Since the average age of users is 27.25 years old, younger and more technically acceptable, the difference in technical operation difficulty between CVR and ordinary video does not cause any trouble to users. In the terms of information acquisition, the experimental group is obviously easier to obtain the information of their own needs than the control group (Fig. 5), especially in the aspects of detail presentation, CVR has stronger information capacity in the process of communication to present more specific and richer information. Overall, users watch CVR whose effort expectation in the intercultural communication process are expected to be higher.

67.5% of users think that CVR is not easy to obtain, and 90% of users think that the ease of access will affect the intention to use. Convenient conditions are one of the obstacles that prevent users from receiving intercultural information when using CVR.

After questionnaires, it was found that 25% of users can spend less than 5 min on CVR, and 55% of users can spend more than 5 min on CVR. Others think that the time they accept on CVR depends on the content. 82.5% of users believe that CVR can promote cultural understanding and communication if it is valuable. If CVR is applied to intercultural communication and is more mature, 75% of users are willing to pay for it. In intercultural communication, time cost and economic cost are important factors affecting the acceptance of CVR, but when the development is relatively mature, most users have the willingness to pay.

3 Conclusion and Discussion

Through experiments, interviews and questionnaires, the different effects after users using CVR and ordinary video were compared. It is found that the application of CVR in intercultural communication is feasible and has academic significance and application value.

3.1 Conclusion

Combined with the experimental results and the interview contents, the paper discusses the communication effect and influencing factors of CVR's application in intercultural communication. It is considered that CVR has several characteristics compared with ordinary video.

3.1.1 Creating a Cultural Environment

CVR can create a cultural environment for users, which is reflected in both space and atmosphere. In the physical space, CVR can fully display the spatial layout, architectural features, cultural rituals, and character activities, making the user's sense of time and space stronger. In interviews, some users mentioned that "the map is formed in the mind", and this three-dimensional sense of space spreads the spatial layout knowledge that is difficult to transmit in ordinary video. CVR can express the physical space and the cultural factors through the panoramic stereo. The combination of these elements forms the cultural environment which in turn forms the cultural atmosphere. This atmosphere also helps users understand the cultural environment. Due to the technical characteristics of VR technology, users can be immersed in it and experience

the cultural environment of other cultures. Through the data, we can understand that when users experience CVR, their awareness, comprehension and immersion are higher than ordinary video. In fact, in the cultural environment created by CVR, users actually gain the recognition and understanding of other cultures.

3.1.2 Create a Cultural Experience

CVR creates a cultural experience for users, which is embodied in the event experience and emotional experience. The participation of users watching CVR is far higher than that obtained by watching ordinary videos. We can experience different cultural rituals such as drawing, worship, etc. through the immersive effects in CVR. In this process, users will develop awareness and understanding of culture.

In previous studies, it was found that CVR has the effect of empathy. In a panoramic environment, user's feelings and emotions are more complicated. This research has also proved this point. In CVR, users' emotions are more intense than that of ordinary videos, that is, they can feel the happiness or serious emotions of people around them. In the cultural experience, this empathy effect deepens the user's experience and has a very important positive impact on the user's understanding of the culture. In the interview, some users mentioned their feelings and atmosphere, which they felt helped him understand the cultural connotations of the Japanese shrine and the festival.

3.1.3 Need Technical Means to Avoid Deficiencies

Use visual guidance. Due to the panoramic effect, CVR can provide a lot of information, but also cause information redundancy. Everyone who conducts interviews feels that there is a sense of excess information, and proper visual guidance can help users focus on key information. This visual guidance can be used to express key information from the main perspective, or by graphical means such as arrows. Through the interviews, it is found that this kind of annotation does not arouse the users' antipathy, and does not weaken its immersion. However, in the process of use, it is necessary to cooperate with the explanatory text labeling, especially the fit of time and direction is very important.

The speed is slowing down. In the process of video shooting and editing, you need to pay attention to the rhythm, because CVR is a panoramic effect in each frame, that is, each frame is rich in information much larger than ordinary video. If the rhythm is too fast, it will cause the user's dizziness, and the user will spend more energy to eliminate the vertigo, instead of understanding or memorizing the content.

3.2 Research Value

This study confirms the feasibility of CVR in intercultural communication, which can promote user's cultural cognition and understanding more than ordinary video. As CVR technology brings strong immersion to users, when applied to intercultural communication, it can fully display the characteristics of space architecture, character activities and cultural festivals, thus rendering a cultural atmosphere. In human civilization, basic emotions are always common. The empathy effect brought by CVR can also promote mutual understanding and communication among different cultures through basic emotional perception.

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