Designing a Virtual Reality Game for Religious Culture Guided Tour by Combining Voice Guided Scaffolding and Situated Learning Mechanism

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Abstract: The study developed an online virtual reality educational game, "*Temple Keeper Training Day Camp"*, integrating an online virtual reality game, voice guiding and situated learning mechanism. The learners play the role of the temple keeper trainee and have to utilize the knowledge of the religious cultural customs and also the history of the city where the temple located to help and fulfill all the tasks from the pilgrims. We investigated learner's learning performance, flow status and game acceptance. The results revealed that their learning performance had been significantly improved, indicating that the game did effectively improve the learner's knowledge about the temple customs and history of the city. Also, the high flow status and game acceptance both showed the learners had an enjoyable and fruitful learning experience.
Keywords: Virtual Reality Game, religious culture, voice guided tour, scaffolding, situated learning

1. Introduction

Culture heritage preservation not only has gain worldwide attention but also faces great challenge, especially intangible cultural heritage (UNESCO 2003). Assisting different generations to understand conventional customs and traditions deeply and to avoid these important cultures being simplified and disappeared is necessary (Chang, 2008). Virtual reality technologies with user-friendly interface and high level of immersion for the participants increase and stimulate the interests of the users (Schouten, van den Hooff, & Feldberg, 2010), and convey context and the experience of the intangible cultural heritage (Selmanović et al., 2020). Digital game-based learning is considered to effectively arouse learner's interest and learning motivation (Clark et al., 2016), and flow (Sun et al., 2017). Therefore, this study expects a learning method that combines a virtual reality game, voice guiding and situated learning mechanism to improve learner's interest and motivation and gradually enhance the learners' knowledge of religious culture of the temples in Taiwan. Thus, our research team developed a virtual reality game, "*Temple Keeper Training Day Camp*" (Figure 1 and 2) by *ThingLink*, a spherical video-based virtual reality platform. A story was applied in the game as situated learning to facilitate the learners to participate in this activity. An old Temple Keeper was the trainer representing audio scaffolding to pass on the knowledge in the temple. The learners as Temple Keeper Trainee and had to utilize the knowledge they learned during the game and fulfill all the tasks from the pilgrims. Once the learners entered a scene, they heard the audio guiding from the trainer telling the fun facts of the temple as guided scaffolding to simulate the situated learning context. The learners had to explore by clicking the interactive buttons and fulfill the tasks from the pilgrims. The tasks were about the religious cultural customs of the temple and also the history of the city where the temple located. The learners will receive a 3-level certificate in the end of the game according to their performance: The Rookie, the Potential and the Qualified Keeper.

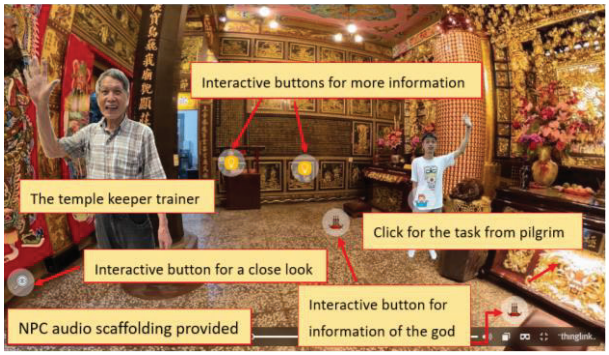

Figure 1. Interactive buttons for exploring

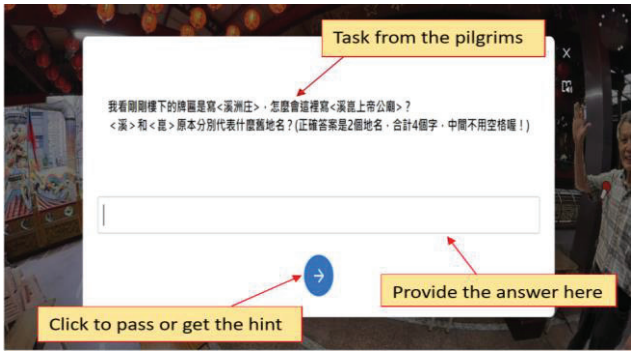

Figure 2. Task to be solved from the pilgrims

2. Method

The purpose of this study is to evaluate students' learning performance, flow and game acceptance toward this educational game. Participants in this study were 18 adults, age from 20 to 59, in Taiwan (7 males, 11 females). Half of them had never been to this temple or in the same religion. All the participants joined the game with a personal computer or tablet at home. The researchers had the same questions of the pre-test and post-test with different order of questions to avoid memory effect. There were 14 questions about the knowledge of religious culture of temples in Taiwan, and 6 questions about the history of the city where the temple located. We evaluated the learners' flow status by Kilis's flow scale (2006), which was translated and revised by Hou, & Li (2014). The flow scale includes 2 dimensions, namely the flow antecedent and flow experience. All scales were scored on a five-point Likert scale. The reliability of the flow questionnaire (Cronbach's alpha=0.953) showed high internal consistency. Also, we adapted Davis's (1989) technology acceptance model to explore the learners' perceived usefulness and perceived ease of use toward the game and the reliability of it was 0.886 (Cronbach's α=0.886). The procedure of the study was as follow: Pre-test for 10 minutes, game for 60 minutes and post-test, flow and game acceptance questionnaires for 20 minutes.

3. Results and Discussions

For learning performance, a Wilcoxon signed rank test was used to compare the results of learning performance between the pre-test and post-test. The results showed that the score for the post-test was significantly higher than pre-test (Z=-3.523, p<0.001) (see Table 1), and it suggested that learners' knowledge of religious culture had been better improved through the game. For the flow status, a one-sample Wilcoxon Test was performed, the overall flow score (M=4.26), flow antecedent sub-dimension (M=4.40), and flow experience sub-dimension (M=4.30) were all significantly above the median of the scale (the median in a five-point scale =3) (*Z*=3.724, *p*<.000) (see Table 2). The results indicated that learners were deeply involved in the game. For game acceptance, a one-sample Wilcoxon signed rank Test was conducted, the overall game acceptance score (M=4.58), perceived usefulness (M=4.75), and perceived ease of use (M=4.35) were significantly higher than median (the median in a five–point scale=3) (Z=3.750, p<.000) (see table 2), and it suggested that learners have highly accepted the technology game design and they didn't have trouble accessing the game. In other words, this game was easy to be familiarized with and also helped the learners explore and learn by themselves.

Table 1. *The Mean and Standard Deviation of Learning Performance*

	M	SD	Z
pre-test	54.44	17.73	-3.523***
post-test	79.44	10.13	

*p <0.05，**p <0.01，***p <0.001

Table 2. *Flow and Game Acceptance Descriptive Statistical Analysis*

Dimension	***M***	***SD***	***Z***	***p***

Overall Flow	4.26	0.58	3.724***	0.000
Flow Antecedent	4.40	0.65	3.683***	0.000
Challenge-skill balance	4.28	0.77	3.455***	0.001
Goals of an activity	4.33	0.64	3.654***	0.000
Unambiguous Feedback	4.25	0.83	3.454***	0.001
Sense of Control	4.36	0.76	3.475***	0.001
Action-awareness Merging	3.83	0.86	2.981**	0.003
Flow Experience	4.30	0.54	3.725***	0.000
Concentration	4.40	0.65	3.652***	0.000
Time distortion	3.83	0.79	3.114**	0.002
Autotelic experience	4.49	0.50	3.748***	0.000
Loss of self-consciousness	4.19	0.75	3.530***	0.000
Overall Acceptance	4.58	0.51	3.750***	0.000
Perceived Usefulness	4.75	0.44	3.857***	0.000
Perceived Ease-of-use	4.35	0.75	3.579***	0.000

*p <0.05 · **p <0.01 · ***p <0.001

4. Conclusion

The study developed an online educational game, "*Temple Keeper Training Day Camp"*, integrating online virtual reality, voice guiding and situated learning mechanism, to enhance learners' knowledge of religious culture of temples in Taiwan and the history of the city. The results showed the game did assist the knowledge of temples and the city. Also, the high flow status indicated high engagement and enjoyment during the game, and as for high game acceptance, it suggested this game was easy for learners to manipulate and did facilitate learning. It indicated a virtual reality game integrated with voice guiding scaffolding and situated learning mechanism can be an effective way in promoting learners' performance. Future study would compare the effectiveness among different ages, genders and religions.

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