Shih, JL. et al. (Eds.) (2023). Proceedings of the 31st International Conference on Computers in Education. Asia-Pacific Society for Computers in Education

A Preliminary Evaluation of Using Realistic Virtual Space in Designing Gamification Training Activities for Museum Interpreters

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Abstract: In the digital age, the job roles and skills required of modern museum professionals have changed significantly, and many museums have begun to apply digital technology to the training of museum professionals. In this study, we sought to address the shortcomings of traditional training methods by designing a museum gamification training activity to enable learners to develop their museum skills in a highly simulated virtual space. Preliminary results indicate that the gamification of the interpreter training was able to provide learners with flow and learning motivation and that the learners were highly receptive to the training activities and highly appreciated the use of the simulated virtual space to help them learn museum interpretation.

Keywords: digital gamification learning, educational game, interpreter training, situated learning

1. Introduction

In the digital age, digital transformation is now the key to the sustainable and innovative operation of a museum. In 2020, International Council of Museums(ICOM) states that museums need to rethink their new digital policies and expand their digital exhibition and education services. In terms of the training of interpretation, there are also many shortcomings that need to be improved. González et al. (2016) indicated that the training method led by a single instructor may result in a lack of interaction during the training process. The traditional classroom training method is also prone to problems such as reading from the book, lack of training in content planning, and insufficient manpower (Tasdemir et al., 2014; Nespeca et al., 2023). Tang and Mo (2022) even indicated that the lack of interaction in traditional classrooms is difficult to arouse learners' motivation, whereas virtual learning spaces with gamification could give them more opportunities to repeat operations and experiences, thus achieving in-depth and effective learning. *Gather Town* (https://www.gather.town) could be a potential digital platform. It could provide the virtual space designed by the instructor and allow learners to explore and learn independently (McClure & Williams, 2021).

As a consequence, we used *Gather Town* to simulate a marine science and technology museum in Keelung in Taiwan, to create a simulated museum virtual space (Figure 1), and designed as a museum gamification training activity where learners could move their characters around to explore and click on NPCs or exhibit display board to interact with them in the form of *Google Forms* (Figure 2). On entering the game, learners were first given a game mission by the trainer NPC. The learner has to follow the instructions and go to the virtual museum within the allotted time to look for the exhibit display board, use the clues on the boards to complete the explanation script, and at the same time, through the dialogue with the visitor NPC in the virtual museum, learn the details to pay attention to when explaining the interpretation. After completing a 300-word explanation script, learners will receive timely scoring and feedback from two professional museum docents to pass the interpreter training game levels and achieve the higher scores. In addition to increasing motivation, interactive game objects can be used repeatedly to improve interpreter skills, thus achieving the effect of learning transfer that is well-trained before the realistic training.

Figure 1. simulated museum virtual space

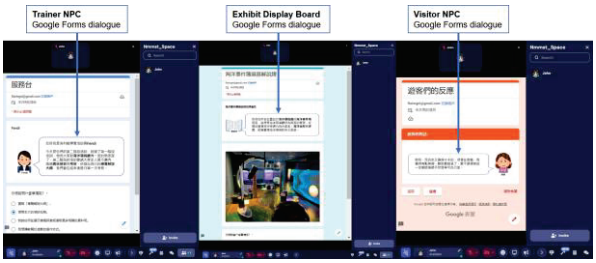

Figure 2. Interacting with Virtual NPCs

2. Method

The participants in this study were 11 college or graduate students (4 males and 7 females) in Taiwan. We applied the single group post-test design and the learning activity was conducted online. The Kiili Flow Scale (2006) translated and revised by Hou & Li (2014) was referred to in this study. The flow scale includes two dimensions: *Flow Antecedents* and *Flow Experience*. All scales were scored according to the Likert scale. The reliability of the flow questionnaire (Cronbach's alpha=0.836) indicated a high degree of internal consistency. In terms of the acceptance of the game by the learner, the technology acceptance scale proposed by Davis (1989) modified by this study was used, which included three dimensions: *Perceived Usefulness*, *Perceived Ease-of-use*, and *Game Design Elements*, and the Likert scale was used. The reliability of the game acceptance scale (Cronbach's alpha=0.723), which has credibility. In terms of the motivation of the learning by the learner, the learning motivation scale proposed by Pintrich (1991) modified by this study was used, which included three dimensions: *Intrinsic Goal Orientation*, *Extrinsic Goal Orientation*, and *Self-Efficacy for Learning and Performance*, and the Likert scale was used. The reliability of the learning motivation scale (Cronbach's alpha=0.910), which has credibility. Prior to the study, all participants were asked to sign an informed consent form. The learning activity had two phases, the first phase was to know the exhibition (120 minutes); the second phase was the museum gamification interpreter training, which included game explanation (10 minutes), game activities (120 minutes), and post-test questionnaire (20 minutes).

3. Results

In this study, the Wilcoxon signed-rank test was used to analyze learners' flow, acceptance, and learning motivation, the results shown as Table 1. The result revealed that the overall flow (M = 4.31) was significantly higher than the median (the median in a five-point scale = 3). This indicates that the overall gamification activity design mechanism enables the learner to clearly understand the game's objective of the activity and is proactively engaged in the game to complete tasks, achieving a high level of flow experience. The result revealed that the overall acceptance (M = 4.64) was significantly higher than the median. It indicates that the learner had a highly accepted acceptance of the game, not only easy to use, but also promoted the learners' learning in museum interpretation. The result revealed that the overall learning motivation (M = 4.16) was significantly higher than the median. This result represents that the museum gamification interpreter training activities are attractive to the learners and can promote the learners' motivation to learn museum interpreting skills.

Table 1. *Flow and Acceptance and Learning Motivation Descriptive Statistical Analysis*

Dimension	*M*	*SD*	*Z*	*p*
Overall Flow	4.31	0.37	2.940**	.003
Flow Antecedents	4.40	0.34	2.941**	.003
Flow Experience	4.23	0.43	2.937**	.003
Overall Acceptance	4.64	0.28	2.937**	.003
Perceived Usefulness	4.86	0.32	3.125**	.002
Perceived Ease-of-use	4.58	0.42	2.969**	.003

Game Design Elements	4.49	0.48	2.947**	.003
Overall Learning Motivation	4.16	0.58	2.937**	.003
Intrinsic Goal Orientation	4.06	0.66	2.805**	.005
Extrinsic Goal Orientation	4.04	0.74	2.673**	.008
Self-Efficacy for Learning and Performance	4.52	0.59	2.988**	.003

**$p < 0.01$

4. Conclusion

In this study, we used *Gather Town* to create a simulated virtual museum space from which we designed a museum gamification interpreter training activity. Providing learners with the freedom to explore the virtual museum space and complete the task of compiling interpreter script and enhancing their interpreter skills through interactions with training NPC, exhibit display board, and visitor NPC to improve the problem of low interactivity and lack of motivation in the existing interpreter training. Preliminary results indicate that the gamification of the interpreter training was able to provide learners with flow and learning motivation and that the learners were highly receptive to the training activities and highly appreciated the use of the simulated virtual space to help them learn museum interpretation. After the initial analysis of this study, this study will continue to explore the effect of the study on the learners compared to the control group (traditional training) by means of a quasi-experimental design.

Acknowledgements
This research was supported by the projects from the Ministry of Science and Technology, Republic of China, under contract number 110-2511-H-011 -004 -MY3, MOST-111-2410-H-011 -004 -MY3.

References

Carey, E., Hill, F., Devine, A., & Szűcs, D. (2017). The modified abbreviated math anxiety scale: A valid and reliable instrument for use with children. *Frontiers in psychology, 8*, 11.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

González-Davies, M., & Enríquez-Raído, V. (2016). Situated learning in translator and interpreter training: bridging research and good practice. *The Interpreter and Translator Trainer, 10*(1), 1-11.

Hou, H. T. & Li, M. C. (2014). Evaluating multiple aspects of a digital educational problem-solving-based adventure game, *Computers in human behavior, 30*, 29-38.

ICOM (2020). Report: Museums, museum professionals and COVID-19: follow-up survey. Retrieved from https://icom.museum/wp-content/uploads/2020/11/FINAL-EN_Follow-up-survey.pdf

Kiili, K. (2006). Evaluations of an experiential gaming model. *Human Technology: An Interdisciplinary Journal on Humans in ICT Environments*.

McClure, C. D., & Williams, P. N. (2021). Gather. town: An opportunity for self-paced learning in a synchronous, distance-learning environment. *Compass: Journal of Learning and Teaching, 14*(2), 1-19.

Nespeca, R., Quattrini, R., Ferretti, U., Giotopoulos, K., & Giannoukou, I. (2023). Digital transition strategies and training programs for digital curation of museum. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 48*, 1127-1134.

Pintrich, P. R. (1991). A manual for the use of the motivated strategies for learning questionnaire (MSLQ).

Tang, J. T., & Mo, D. (2022). The transactional distance in the space of the distance learning under post-pandemic: a case study of a middle school in Northern Taiwan using gather to build an online puzzle-solving activity. *Interactive Learning Environments*, 1-18.

Tasdemir, A., Kartal, T., & Ozdemir, A. M. (2014). Using science centers and museums for teacher training in Turkey. *The Asia-Pacific Education Researcher, 23*, 61-72.

Tokila, L. (2021). professional development in the digital era communication skills and competence training programmes for museum staff: the case of finland, paper presented in 2021 ICTOP annual conference. http://ictop.org/wp-content/uploads/2021/01/ICOM-ICTOP-Communication-Oriented-Museums-reduced-final.pdf