Choy, D. et al. (Eds.) (2013). Work-in-Progress Poster Proceedings of the 21st International Conference on Computers in Education. Indonesia: Asia-Pacific Society for Computers in Education

The Development of a Role-Playing Game for History Instruction and the Evaluation of Flow State and Learning Performance

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Abstract: This study developed a historical educational game- *Romance at Dadaocheng*©, combining a love story with a role-playing problem-solving plot. This game used authentic geographical space as the scene and adopted historical knowledge as problem-solving hints in the game exploration to enhance learners' knowledge of Taiwan's historical monument Dadaocheng. Through an empirical evaluation, this study preliminarily explored learners' flow in this game and used pre-and post-tests to understand their learning effectiveness. The results indicated that learners have a certain degree of flow during the game; also, this game helps them learn the historical knowledge of Dadaocheng and its geographical location.

Keywords: game-based learning, role-playing, flow, learning effectiveness

1. Introduction

Game-based learning can provide opportunities for repeated practices and trials under a challenging situation. In traditional instruction, the instructional content of history is mostly memorized declarative knowledge; thus, parts of the learners easily lose their learning motivation. However, the instructional game plans strategies, builds up hypotheses about the questions, and allows learners to try and solve problems continuously. Comparing to memorized instruction, learners will have higher-level thinking and they can understand the historical questions in the game situation (Dondlinger, 2007). Therefore, their learning effectiveness may be improved. Our research team, NTUST MEG, developed a historical instructional game- *Romance at Dadaocheng*©, combining a love story with a role-playing problem-solving plot. This game used authentic geographical space as the scene and adopted historical knowledge as problem-solving hints in the game mechanism to enhance learners' knowledge of Taiwan's historical monument Dadaocheng. This game adopted situated learning (Brown et al., 1989) as the learning strategy. The story and space of the game were designed based on the authentic photos of Dadaocheng, the knowledge of historical backgrounds, and the real geographical environment to provide problem-solving tasks for players (to resolve the mystery of the heroine's birth). In addition, this game adopted role-playing instructional method (Shaftel & Shaftel, 1967) to make learners become a leading character in the game, which helps arouse learners' empathy for the virtual role he plays. Learners can control and manipulate the role to involve them in the game situation, and make a survey of hints and have an adventure. This game combined a romantic plot, problem-solving process, and the tasks of fight as the background of the story to enhance players' learning motivation. All scenes of the buildings in the game were painted based on the photos of the authentic scenes; also, regarding the geographical location, this game referred to the real distribution of the famous buildings to show the appearance of the geographical environment with the real proportion and position (as shown in Figure 1). Therefore, all of these will make learners to feel they are virtually there, which helps their cognition of the geographical environment in this area. Furthermore, the historical backgrounds and the corresponding

scenes of the geographical environment are involved in the character interaction and the hints of the plot in this game, which will promote learners to make a judgment on the accuracy of the related knowledge of history and geography during the searching process, and further strengthen learners' cognitive processes (as shown in Figure 2). Learners have to choose the right answer to get the right feedback and then the continuous plot will go ahead.

Figure 1 The exploration scenes built up from the authentic space and location

Figure 2 Character interaction, dialogue, and feedback in the game

In addition to developing this game, the objective of this study aimed to analyze learners' flow in the experiment of the game to understand learner's engagement in this game. Also, the pre-and post-tests were adopted to assess their learning effectiveness.

2. Method

There were 40 participants (including 20 males and 20 females), coming from a university in northern Taiwan, in this study. To analyze the learners' flow, this study adopted the flow scale of Kiili(2006) to measure. The Chinese edition was translated and revised by the scholars Hou et al (Hou & Chou, 2012). This questionnaire included 23 items using a five-point Likert scale with two dimensions: flow antecedents and flow experience. After analyzing the samples' data, the whole reliability was 0.92 (Cronbach's α=0.92). This study used the same questions in pre- and post-tests, and the questions were set by a geographical expert. The content of the questions was about the knowledge of history and geographical location related to the place, Dadaocheng. There were totally 20 items. The procedures of this study were a 10-minute pre-test, a 10-minute introduction of the game and basic operation, 60-minute game time for students, and a 30-minute post-test and flow questionnaire.

3. Results and Discussions

In terms of the learning effectiveness, this study divided the items into history and geographical questions. This study conducted a paired-samples *t* test on the pre-and post-test scores. As shown in Table 1, the results indicated that after game-based learning, students' knowledge of history (t=15.52, p=.000) and knowledge related to geographical location (t=4.62, p=.000) were significantly improved.

Table 1 Paired-Samples t Test

	posttest(n=40)		pretest(n=40)		
Outcome	M	SD	M	SD	t
History score post-test - pre-test	12.58	1.32	6.55	2.28	15.52***
Geography score post-test - pre-test	2.58	1.11	1.75	1.03	4.62***

***p<0.001

As for the flow distribution, as shown in Table 2, the average of each dimension was above 3.00 (the median was 3.00). Among these values, the four dimensions flow antecedents, goals of an activity, control, action-awareness merging, and loss of self-consciousness were highly above 4.00. The dimension with the highest average was loss of self-consciousness (M=4.24). Consequently, this game has the elements to arouse learner's flow experience as a whole.

Table 2 The mean and standard deviation of flow questionnaire

Factor	M	SD
flow antecedents	4.06	0.62
challenge-skills balance	3.96	0.87
goals of an activity	4.11	0.75
unambiguous feedback	3.91	0.74
Control	4.18	0.78
action-awareness merging	4.13	0.76
flow experience	3.82	0.64
concentration	3.85	0.75
the transformation of time	3.68	0.79
autotelic experience	3.66	0.77
loss of self-consciousness	4.24	0.80

4. Conclusions

This study designed and developed a historical educational game- *Romance at Dadaocheng*©. Through a preliminarily empirical evaluation, the results indicated that this game is beneficial to students' history and geography learning. In terms of flow, the averages of all dimensions were above the median, indicating that the content of this game can arouse learners' engagement to a certain degree, which also reflects that a game with the game mechanisms of role-playing and fighting will satisfy learner's needs for the game elements more (Prensky, 2007). The dimension, loss of self-consciousness, has a higher flow average, resulting probably from that while playing the game, learners need to understand the hints provided by the stories which will deplete their cognitive resources (Killi, 2006), so that they concentrate on playing the game but not involve their cognitive resources in the things irrelevant to the game. We suggested that future studies analyze learners' behavioral patterns in a game and also explore learner's technology acceptance. Besides, a larger sample size in the experiment is suggested to explore the effect of this game on learning completely.

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