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The Game-based Learning Activity Integrating Board Game and Mobile Online Searching Tasks for History Learning

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Abstract: The study designed a game-based learning (GBL) activity "Historical Battleship," which adopted an educational board game "Voyage with Taiwan" and mobile devices with online searching tasks to support student's history learning. Students' perceived GBL learning process at different playing stage and their flow experience were probed. The findings showed that students at the stage using board game with mobile device for online searching had more perceived attention, cognitive engagement, discussion within group, and usefulness of history learning, compared with the stage using the board game only. Moreover, students also had high flow experience when playing this board game combined with mobile devices.

Keywords: board game, mobile devices, flow, history learning

1. Introduction

With the development of teaching and instruction, research on GBL has gradually gained more and more attention. Traditional history learning tends to be one-way lecture by teacher and knowledge recitation by students. The use of GBL in history learning may contribute to students' motivation in their further analysis in history knowledge and their follow-up exploration. Board game becomes increasingly popular in education because of its being low-budget and environment friendly; meanwhile, it may enhance interpersonal interaction and social knowledge construction in classroom. Well-designed board games have the potential to motivate students and include an element of competition and surprise (Royse, & Newton, 2007). Furthermore, board games can improve players' interpersonal intelligence (e.g. communicative and interactive skill) and promote active learning through interaction with other players (Richardson & Birge, 1995). On the other hand, Flipped-classroom pedagogy has become popular. It offers students a preview activity for self-directed learning, followed by the higher-level cognitive discussions led by the teacher. However, how to promote students' self-learning motivation may be a problem for flipped-classroom implementation (Du, et al., 2014; Mason et al., 2013). To improve self-learning motivation, the "mini-flipped GBL" model was proposed (Hou, Chou, & Chen, 2014). Mini-flipped GBL helped design GBL activities for 5-20 minutes that integrated learner autonomy and cognitive evaluation, which promoted students' learning motivation and helped their learning effective. This included the use of board game or GBL supported by technology.

So far, empirical research focusing on the GBL that integrates board games, mobile learning, and online searching tasks is scarce. "Voyage with Taiwan" is an educational board game, and it is a work of industry-university cooperative project between *NTUST MEG research group* (http://www.ntustmeg.net) and *TwoPlus Studio*. This board game was designed according to Taiwan historical education curriculum guideline, cognitive theories, scaffolding strategies, and social interaction theories. The cards for this board game had two sides. The front of the cards showed the name of historical events in Taiwan, and the back of the card showed the date and story of the events. The GBL activity, "Historical

Battleship," was designed with this board game in the study. The players were divided to groups for competitions. Each group had ten minutes. For the first 9 minutes (the first stage), players needed to build many historical battleships by discussing and arranging the order of cards without reading the back of the cards. They could use mobile devices in the last minute (the second stage) to search for information and change the order of the cards. The scores were calculated based on the players' card arrangements in the end. The study aims to explore students' flow experience in this activity to understand how much they were involved in it. Moreover, students' perceived learning processes at the two stages are compared to understand the influence of mobile devices on students' perceived learning process.

Figure 1 Students discussed and arranged the historical events cards chronologically

2. Method

The participants for this study were 74 students (including 41 males and 33 females) from 9th grade classes in one high school in Taoyuan city. All participants had not played this board game before. The students of one class were first divided into six groups randomly. After the game instructions were provided, the participants were given ten minute to accomplish the game task. After the activity, they completed a questionnaire that measured their perceived learning process and the flow scale for games. The current study developed four perceived learning process indicators for students to measure at the two stages. These indicators were *attention, cognitive engagement, discussion within group and usefulness of history learning*. The students gave scores from one to five based on the degree of the indicators above at the two stages. The Flow Scale for Games was developed by Kiili (2006), which divided flow state into nine sub-dimensions. The questionnaire was a five-point Likert type scale in which numbers from five to one were assigned to responses that ranged from agree to disagree, respectively. The Cronbach's α value for the scale was 0.93.

3. Results and Discussions

The average and the standard deviation of participants' perceived learning process scores are illustrated in Table 1.

Table 1. Perceived learning process scores of the participants

Perceived learning process	Initiate Game Playing Stage M (SD)	Mobile Devices Intervention Stage M (SD)	*t*
Attention	3.41 (1.281)	3.80 (1.135)	-2.776*
Cognitive Engagement	2.88 (1.170)	3.43 (1.304)	-2.907*
Discussion within Groups	3.68 (1.336)	4.08 (1.070)	-2.722*
Usefulness of History Learning	3.45 (1.240)	3.74 (1.159)	-2.191*

*$p<0.05$

The table shows with the comparison of the students' perceived learning process at the initial game playing stage and mobile devices intervention stage. The results suggested that students at the mobile devices intervention stage had relatively more attention (M=3.80, SD=1.135), cognitive engagement (M=3.43, SD=1.304), discussion within group (M=4.08, SD=1.070), and usefulness of history learning (M=3.74, SD=1.159) than initial game playing stage, and the difference was statistically significant. To evaluate students' level of engagement, the students demonstrated flow scores higher than three (median of a five-point Likert-type scale) across all dimensions. (As shown in Table2)

Table 2 The mean and standard deviation of flow state scores

Flow Dimensions	M	SD
Challenge	3.85	0.81
Goal	4.06	0.74
Feedback	3.73	0.80
Control	3.77	0.92
Playability	3.47	0.76
Concentration	3.84	0.77
Time distortion	3.87	1.06
Autotelic experience	3.85	0.84
Loss of self-consciousness	3.09	0.99

4. Conclusion

According to the preliminary findings in the study, students were highly involved in the learning activity with the help of "Historical Battleship." At the second stage when mobile devices were included for online searching, students had higher perceived cognitive engagement, cohesion with group, sense of competition between group, personal attention, usefulness of history learning, and discussion within group. This finding showed the potential in using GBL that integrated board games and mobile devices for flipped classrooms. Future research can record and analyze students' learning process to investigate their behavioral patterns using sequential analysis (e.g. Hou, 2015).

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