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Effectiveness of Interactivity in a Web-based Simulation Game on Foreign Language Vocabulary Learning

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Abstract

Research conducted on the potential and effectiveness of simulations and video games for learning purposes in educational settings has proliferated in the past few decades. Yet the research specifically examined the effectiveness of simulation games for second/foreign language learning remains scarce. This experimental study investigated the effect of interactivity in a web-based simulation game on Asian EFL learners' vocabulary learning in an immediate post treatment test and retention in a two-week delayed posttest. The study also examined the effect of interactivity on induced cognitive load. The factor "interactivity" is manipulated at two levels, i.e. game (interactive) vs. game replay (non-interactive). Participants were comprised of one hundred undergraduate students (N=100) enrolled in a rural university of technology in southern Taiwan. Students were first matched based on their game experiences, demographic information and English ability and then randomly assigned to either the gameplay or game replay condition. Results indicated that interactivity induced from multi-players is conducive to germane cognitive load and significantly enhanced vocabulary recall. Additionally, language proficiency was confirmed to be a factor that mediated the amount of mental effort EFL gamers invested in a web-based English simulation game.

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Keywords: technology; vocabulary; simulation game; EFL

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1. Introduction

Web-based video/simulation games have become a mainstream of leisure life worldwide for the past two decades thanks to the advancement of information technology. The increasing popularity of computer gaming has been made possible through multiplicity platform development, varying social contexts, and the expanded functionality of games (Bryce & Rutter 2003). A rough estimation by Screen Digest/ELSPA in 2000 has indicated that people under 30 are major consumers of computer games, which resulted in approximately $3.5 billion of business profit in leisure software industry (Bryce & Rutter, 2003). In a more recent survey, the Entertainment Software Association (2008) reported that 65 percent of all Americans play video games, as cited in Reed and Kuwada (2010). The proliferation of computer games used for leisure purposes also has resulted in a revisit of topics, among educational researchers, related to "edutainment" video games, i.e. commercially developed games adapted or modified for educational purposes. Research conducted on the potential use and effectiveness of simulations and video games for learning purposes have heavily drawn on human cognition or information processing theories due to the interactive and multimodal features in most computer-based games. Interactivity, in its widest sense, refers to the level and quality of "communication between an individual player and the digital gaming system through different forms of activities" (p. 692, Ritterfeld, Shen, Wang, Nocera, & Wong, 2009). Interactivity is one aspect of instruction that can affect how knowledge is learned (Moreno & Mayer, 2005). Instructional activities that involve high level of interactivity help students to activate their prior knowledge in long-term memory and integrate it with to-be-learned information so that meaningful learning can take place (Moreno & Mayer, 2005; Wittrock, & Marks, 1978). In other words, interactivity, determined the "…quality, effectiveness, and engagement of human-computer communications" (Sims, 1997, p. 158).

2. Literature Review-Games on second language acquisition research

Utilizing games designed for the mass market, Ranalli (2008) investigating the effect of supplementary materials to enhance the game-based learning, on university-level ESL learners' recall of vocabulary. The supplementary were especially designed based on the criteria for CALL task appropriateness proposed by Chapelle (2001). The results indicated that a structured simulation does contribute to vocabulary learning when it was enhanced with supplementary materials as were designed in the study. deHaan, Reed and Kuwada (2010) conducted another study to investigate the effect of different level of interactivity inherent in a gaming environment on second language vocabulary recall. The results indicated that the players and the watchers invested equal mental efforts in the game; however, the players have recalled significantly less vocabulary than the watchers. The researcher concluded that the extraneous cognitive load induced by the interactivity of the game has hindered recall of the vocabulary from the players. The watchers, on the other hand, were able to benefit from the game-play without having to physically interact with/ or play the game. The researchers concluded that interactivity in multimedia language learning that was not conducive to germane cognitive load would actually hinder learning.

3. Method

Web-based video/simulations games have attracted attention of professionals from a variety of disciplines since its emergence in the 1950s and research has shown that students prefer to learn in an environment in which digital educational games are used comparing to traditional lessons (Yip & Kwan, 2006). Research conducted by second language researchers on potentials of these innovative media on second/foreign language learning was considerably limited. Given that most favorable, if not conclusively positive, findings reported by most studies in disciplines other than second/foreign language acquisition, the values and potential usefulness of web-based video/simulation games in second/foreign language learning warrant investigation. Additionally, previous studies have suggested that physical interactivity would facilitate mental effort and induce different levels of cognitive load to affect language acquisition (dehann, 2005 b; deHann, 2010; Pellouchoud et al., 1999; Brett, 2001). However, whether the same finding can be generalized to web-based simulation games deserves further exploration given the popularity and easy access of such games nowadays.