Computers in Human Behavior 77 (2017) 95–109

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Full length article

Examining the learning effects of live streaming video game instruction over Twitch

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ARTICLE INFO

Article history:
Received 27 December 2016
Received in revised form
29 June 2017
Accepted 21 August 2017
Available online 22 August 2017

Keywords:
Online learning
Twitch.tv
Learner-learner interaction
Cognitive load theory
Worked-example effect

ABSTRACT

Technology facilitates advances in learning and drives learning paradigms. One recent innovation is Twitch™, an online streaming platform often used for video game tutorials but also enables amateur online instruction (Hamilton, Garretson, & Kerne, 2014)). Twitch represents a unique learning paradigm that is not perfectly represented in previous technologies because of its "ground-up" evolution and the opportunity for novice instructors to educate mass audiences in real-time over the Internet while enabling interaction between teachers and learners and among learners. The purpose of this research is to empirically examine the efficacy of Twitch as a learning platform by manipulating each of the key characteristics of Twitch and to understand the conditions in which novice instructors may be beneficial. Drawing from Cognitive Load Theory, we demonstrate the worked-example effect in the Twitch environment by manipulating teacher-learner-learner interactions, live versus recorded streaming, and expert-versus novice-based instruction. Based on a laboratory experiment involving 350 participants, we found that learning performance under novice instructors was at least as good as that of experts. However, an exploratory analysis of learner personalities revealed that extroverts benefit only when learner-learner interaction is enabled. Surprisingly, those who are highly agreeable and less neurotic benefited more from novice instructors.

1. Introduction

Advances in technology have enabled valuable new forms of learning—particularly the ability to facilitate online distance learning (Moore & Kearsley, 2011). Discussion boards and chat rooms allow real-time teacher-learner and learner-learner interactions (Vrasidas & McIsaac, 1999). Traditional YouTube™ and similar platforms allow asynchronous video-based instruction (Duffy, 2007; Moran, Seaman, & Tinti-Kane, 2011) that has been effective for learning—particularly in medical contexts (Azer, 2012) and other procedural memory contexts (Lee & Lehto, 2013) where the curriculum includes motor skills and procedures.

More recently, live-streaming platforms—such as Adobe Connect™, GoToMeeting™, and WebEx™—have become very popular. These technologies are very interesting as learning platforms because of two key capabilities which are known to improve learning in certain contexts: 1) real-time interaction between and among the teacher and learners (Bradley & Lomicka, 2000) and 2) video-based instruction (Duffy, 2007; Moran et al., 2011).

Put in academic terms, these technologies allow large scale distance-based implementations of the *worked-example effect* (Sweller & Cooper, 1985). In other contexts the same phenomenon has been called "vicarious experience" (Achterkamp, Hermens, & Vollenbroek-Hutten, 2016). Teaching by example is one of the most effective techniques for reducing the cognitive load required for early stage learning (Kirschner, Sweller, & Clark, 2006). Implementing worked-example based learning over distances (often referred to as "computer-mediated communication") is not new (Duffy, 2007; Gaudiosi, 2012; Kay, 2012; Shane, Stevens, Harenski, & Kiehl, 2008); however, although prior technologies such as YouTube allow massive scale knowledge dissemination, until recently they have not allow the real-time interactions of live-streaming. To this end, when face-to-face interaction is not possible, other multimedia like videoconferencing have been able to provide a more interactive environment than video alone (Shephard, 2003). Yet, videoconferencing has not been historically

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http://dx.doi.org/10.1016/j.chb.2017.08.029