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Synchronous learning best practices: An action research study

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ABSTRACT

Low cost and significant advances in technology now allow instructors to create their own virtual learning environments. Creating social interactions within a virtual space that emulates the physical classroom remains challenging. While students are familiar with virtual worlds and video meetings, they are inexperienced as virtual learners. Over a nine year period we applied iterative cycles of action research through numerous large classes to systematically uncover attributes of success when executing synchronous learning in distributed environments. Findings show technology is not the source of problems; rather, difficulties emerge from human behaviors and their interactions with system features. We conclude with practical takeaway guidelines for video conferencing and immersive virtual environments and a model of nexus of control that elaborates software and classroom management attributes that can lead to successful execution.

"A towel, [The Hitchhiker's Guide to the Galaxy] says, is about the most massively useful thing an interstellar hitchhiker can have." Douglas Adams, The Hitchhiker's Guide to the Galaxy

1. Introduction

Students have grown accustomed to using video meeting tools and accumulating guild achievements in Massively Multiplayer Online Role-Playing Games (MMORPGs). Hit video games, emphasizing 3D immersive environments, along with teamwork and long-term planning, regularly outsell top Hollywood blockbusters (Thorsen, 2007). The expensive and limited point to point video meeting systems installed in many schools suddenly seem out of touch with learners accustomed to controlling their own virtual environments.

Highly motivated teachers looking to create virtual learning environments frequently face institutional difficulties. Classrooms typically embed asynchronous technologies that emphasize a one-way model of lecture and material delivery that already lag behind the on-demand Internet (Molenda & Bichelmeyer, 2005). Advances in the technologies of video, audio, and Internet connectivity mean online teaching is a low cost and highly viable possibility. Yet, the critical synchronous aspects of an in-class experience remain difficult to implement.

Students, while skilled at watching video on demand, opening video meetings, and playing immersive virtual games, lack experience in formal synchronous learning (Cole, 2009). Rather than focus on the mechanics of technology, we attempt to surface influential aspects of classroom management when executing Synchronous Learning in Distributed Environments (SLIDE).[1]

In this paper, we report a nine year action research study on the attributes that help and hinder SLIDE across the technologies of Video Conferencing (VC) and Immersive Virtual Environments (IVE). With these attributes, instructors undertaking SLIDE will be better prepared to achieve desired pedagogical goals as well as knowing what to demand from institutional initiatives. Our multi-year study executed SLIDE classes without dependence on organizational infrastructure, technicians, or expensive commercial entities. Key attributes of success,

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[1] SLIDE (synchronous learning in distributed environments); SLIDE VC (synchronous learning in distributed environments using video conferencing); SLIDE IVE (synchronous learning in distributed environments using immersive virtual environments).

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however, are often counter intuitive and non-technological. Like a towel in Douglas Adam's book, this paper presents a valuable and simple tool (nexus of control) teachers can use to better plan and execute SLIDE classes successfully.

2. Literature review

2.1. Computer-supported learning

Extant research emphasizes use of asynchronous interactive tools that leverage the Internet (Goodyear, 2005) and increase level of inquiry and meta-cognition (Lipponen, Rahikainen, Lallimo, & Hakkarainen, 2003). The text-heavy expository approaches that are common in schools, such as WebCT and Blackboard, are limited by emphasis on asynchronous interaction. Students' use of video meeting tools and virtual reality simulations indicate the opportunity and challenge to evolve social interactions into synchronous learning interactions. There is an emerging consensus that distributing learning tools brings positive results (Warschauer & Kern, 2000). Specifically, students' value highly integrated computer-mediated conferencing (Goodyear, Jones, Asensio, Hodgson, & Steeples, 2005). Critically, integrating student directed online computer use relieves issues of traditional classrooms (e.g., class size) that hamper the practice of key behaviors (Warden, 2000). Simply making technology available to teachers and students, however, does not automatically translate to self-directed learning (Sieber, 2005). Synchronous online classes must be well managed in both motivating students to participate and fitting with teacher goals and capabilities. We next explore two implementations of SLIDE.

2.2. Video conferencing (VC)

Students report VC as useful and exciting (Wong & Fauverge, 1999) since, even with limited video, communication levels increase (Wang, 2006). Much computer mediated communication is hindered by the absence of oral and visual interaction (Wang, 2004a). Video conferencing holds the ability to convey body language while also encouraging students to create their own learning environment (Wang, 2004b). Institutional support systems are critical to sustain successful distance education programs, yet most institutions do not supply this support (Wolf, 2006). Instead, teachers struggle to work around standardized tools, such as Blackboard/WebCT that lack fit for specific class needs and SLIDE in general. Research on synchronous video, for SLIDE, is lacking in the literature.

2.3. Immersive virtual environments (IVE)

Virtual environments in education feature largely in applications involving science topics (Mikropoulos & Natsis, 2011). Presence is important to learning in such environments (Chen, Warden, Tai, & Chen, 2011), where role playing can transfer to improved achievement (Echeverría et al., 2011). Second Life, a commercial MMORPG, is a virtual world where residents as avatars interact with each other and attracts researchers for its possibilities as a virtual education environment (De Lucia, Francese, Passero, & Tortora, 2009; Herold, 2010; Jamaludin, Chee, & Ho, 2009; Tang, Lan, & Chang, 2012).

These examples reveal the educational possibilities in a virtual world, but the commercial nature of Second Life (and competitors), along with its pre-existing social milieu, is problematic. Boellstorff (2008) points out that SL is a rich environment full of social interaction and unpredictable offensive material (much like real life). Parties at nightclubs and bars are the most popular activity in Second Life (Harris, Bailenson, Nielsen, & Yee, 2009). Second Life allows a sex subculture esthetic to flourish due to the extensive avatar customization capabilities—mostly using props and toys (Bardzell & Bardzell, 2006, p. 27; Brookey & Cannon, 2009). Teachers and administrators could be held legally responsible for introducing students to such offensive material (Bugeja, 2008, p. 18):

> *To complicate matters, administrators may not even realize that their professors, departments, or colleges have agreed to . . . a company's terms of service . . . purchases could result in personal or institutional liability with few, if any, processes in place to resolve legal or ethical complaints.*

Non-commercial, i.e., open source, solutions exist (Open Wonderland in the current study) that allow teachers to create IVEs purposefully matching pedagogical goals while avoiding any legal complications.

3. Method

3.1. Action research

Action research emphasizes participation by the researcher, drawing on a long tradition of anthropological and sociological research practices (Berg & Lune, 2011). Action researchers are highly involved in research issues over long periods of time (Eden & Huxham, 1996) in ways that allow them to attempt improved cycles of action and reflection with rigorous research documentation. Action research should have implications beyond the immediate project; in other words the results generally inform the research frame as well as solving an immediate problem (Baskerville & Wood-Harper, 1998).

Action research's emphasis on intervention requires a cyclical process of stages, moving from diagnosing the research topic, planning and taking action, evaluating outcomes, and finally applying findings to theory building that then feeds back into a new diagnoses (Baskerville & Wood-Harper, 1996). In the current research, we chose Street and Meister's (2004) action research stages of Description (action planning and action taking), Commentary (evaluating), and Theory Building (specifying learning and diagnosing), which then leads to another cycle (see Fig. 1).

3.2. Research process

From 2004 to 2012, we guided a total of 3630 students through implementations of SLIDE classes. The first undertaking for this study executed synchronous video across five business colleges located in Singapore, the United Kingdom, and Taiwan. Course topics included