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Assessing Learning Associated with Videogames

Although computer technology capabilities have grown exponentially since the 1960s, to date this new century's gaming research about learning has largely replicated findings of the last half of the 20th century: For the average student to meaningfully understand and apply learning situated within game simulations and virtual worlds requires that those games serve as but one component of well-designed instruction (Coleman, Livingston, Fennessey, Edwards, & Kidder, 1973; River City Project, 2005; Squire, 2002; Squire, Barnett, Grant, & Higginbotham, 2004). COTF developed theoretical description of how to enhance inspiration in 2005. The model contained the dimensions of self-efficacy, identity, mental models and flow as components of a model of systemic inspiration growth (MoSIG, see Figure 1). MoSIG was designed as a general model for enhancing a learner's ability to effect productive life choices across learning contexts. Therefore, it is rewarding but not surprising that gaming scholars have identified these four components as important for studying gaming environments:

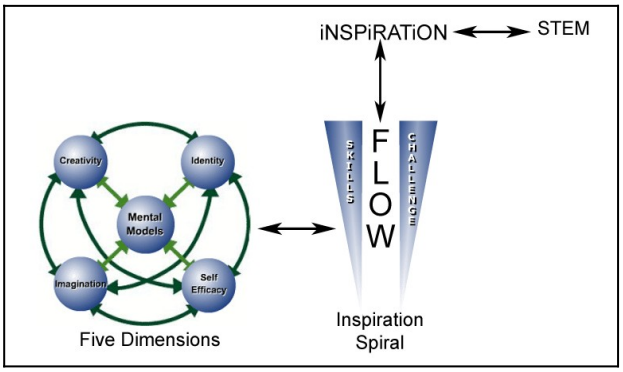

Figure 1. Model of Systemic Inspiration Growth (MoSIG)

1. ***Flow***—Today's gaming scholars, developers, and theorists have identified flow as an essential component of computer games (Asgari, 2005; Chen, 2006; Jones, 1998, December; Kirriemuir & McFarlane, 2004; Prensky, 2001; Sweetser & Wyeth, 2005). Successful games are designed to enhance players' perception of flow. Flow is defined as an individual's optimal level of skills and challenges (see, for example, Csikszentmihalyi, 1990; Csikszentmihalyi & Larson, 1980, 1987; Csikszentmihalyi & Schneider, 2000). The Futurelab[1] Report 8 on games and learning advised "we should understand the deep structures of the game play experience that contribute to 'flow' and build these into environments designed to support learning" (Kirriemuir & McFarlane, 2004, p. 5).

2. ***Identity—***According to game scholars (e.g., Fine, 1983; Gee, 2005), successful games enhance players' sense of identity through learner construction of a self-image from interaction with game-related actors and social networks. This effect follows from identity theory (Gee, 2001) and self-efficacy observation learning theory (Bandura, 1997).

3. ***Self-efficacy***—An individual's self-perception of ability to succeed at a task is self-efficacy (Bandura, 1997). The Learning Federation R & D Roadmaps (2003) set self-efficacy as a research metric to be developed and measured in gaming environments because it is essential to learner success in STEM achievement and career preparation. Self-efficacy is a qualitative and quantitative outcome in the River City Project—an NSF funded, multi-year project conducted by Chris Dede and his students at Harvard (Dede,

[1]

Clarke, Ketelhut, Nelson, & Bowman, 2005; Ketelhut, 2005; River City Project, 2005) to study the design features of multi-user virtual learning environments (MVLE). In alignment with the bi-directional relationship between identity and self-efficacy modeled within COTF's MoSIG (see Figure 1), Dede's team has found ". . . that the students *identities* are shaped in positive ways toward engagement and [self-]efficacy in science" through the MVLE (River City Project, 2005).

4. ***Mental Models***—Mental models are internal understandings formed by an individual. A learner's mental models of a targeted science, technology, engineering, and mathematics (STEM) domain is understanding of the domain concepts and procedures, how they are related, and how to apply them (Bransford, Brown, & Cocking, 2000; Gentner, 1983; Gilbert & Boulter, 2000; The Learning Federation Project, 2003). Game developers recognize that learning within games is the development of a mental model (e.g., Wright, 2004).

We propose to conduct pilot studies to investigate learning in association with games. We will test methods of embedding learning (such as mental models/content, flow, self-efficacy, identity and career) assessment within game prototypes.

References