Chapter 15
Assessing Engagement in Serious Educational Games:
The Development of the Student Engaged Learning in a Technology Rich Interactive Classroom (SELTIC)

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ABSTRACT

The critical nature of engaging students in authentic learning tasks is not a new concept, but as 21st century technologies become more pervasive in K-20 settings, it is emerging as a significant indicator of learning. This chapter will ground itself in cognition and learning theory, describe the creation and psychometrics of an engagement observation protocol, and provide practical examples of implementation of the SELTIC.

INTRODUCTION

In a 2008 edited book, Annetta, et.al. designated a sub-category of Serious Games. The term Serious Educational Games came to pass as the category of Serious Games that are created for educational purposes. One could argue that all Serious Games are educational in nature but this book focused on K-12 educational settings and thus Serious Educational Games (SEG) were those games for K-12 teachers and students. One important

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justification for integrating SEGs into the educational environment is that these environments are innate to many K-12 students. However the school -educational environment- is void of the digital tools and thus the common interactions the students have with technology. The lack of availability of digital tools creates a digital void which is formed due to the discrepancy between the in school digital tool availability and out of school digital tool availability. Thus, there is a need to fill the void found in these educational environments during school hours. A long understood common indicator of all learning environments has been the notion of students being engaged in the content and spending more time on task. As SEGs begin to become more commonplace during school hours, a need for a valid, reliable protocol to assess student engagement in a technology rich classroom also becomes more critical. Although there are many teacher centered observation protocols in the literature, there are no valid and reliable instruments currently focusing on students using technology; especially SEGs.

Educational games cover a wide variety of game models to include console-based games, computer based games, simulations, first-person and third person games. Serious Educational Games by contrast are a specific genus within the educational game community. Serious Educational Games are characterized by their immersive nature and authentic problem-based teaching mode. In addition, SEGs foster a critical thinking components combined with open-world, architecture and game play. This creates a more realistic and authentic experiences for the game player and differentiates them from other modes of educational games and warrants a separate category.

Operationally, student engagement can be defined as a sense of belonging, level of teacher supportiveness, presence of good friends, engagement in academic progress, fair and effective disciple in, participation in school activities (Libbey, 2004). Understanding and agreeing that engagement is a prerequisite to learning, there is also a distinction between superficial, or procedural, engagement and substantive, or cognitive, engagement. It is only through the latter that learning actually occurs (McLaughlin, et al., 2005). Examples of cognitive engagement are the use of self-regulated learning processes which showing a high level of sophistication in the students' engagement level (Mandinach, 2004). Meaning that students shift cognitive load and vary engagement levels due to the feedback responses found in the game.

The literature regarding student engagement is well beyond the aim and scope of this chapter. Instead we will focus only on the intersection of educational games and student engagement with the understanding that this instrument –SELTIC rubric - can possibly be used with all computer-based educational activities.

The degree to which a student learns and personally develops in any educational program is directly proportional to the quality and quantity of student involvement (e.g. Heath, Herman, Lugo, Reeves, Vetter, & Ward, 2005). *Flow Theory* has been used to examine student engagement (Jones, 1998; Shernoff, Csikszentmihalyi, Schneider, and Shernoff, 2003). The cognitive state of *Flow* is the highest level of engagement one can reach. Shernoff concluded that high school students experienced increased engagement and often reached *Flow* when the challenge of the task and their own skills were high and in balance. Indications of *Flow* can be evidenced by complete cognitive immersion in a task to a point where outside distracters are not a factor during learning and connection processes which are occurring in the working memory (Grow,1996).

The more problem-based an educational activity, the higher the engagement (Ahlfeldt, Mehta, and Sellnow, 2005). When we make the problem a competition, the motivational to succeed and thus the engagement in the content increases. Although some educators argue against competition on the basis that structural completion (institutionalized) created mutually exclusive goal attainment resulting in the degradation of