Chapter 91

Time Factor Assessment in Game-Based Learning:
Time Perspective and Time-on-Task as Individual Differences between Players

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ABSTRACT

From primary school levels to lifelong learning, the use of games for educational purposes has been an increasing focus of interest for instructional designers, teachers, and researchers. One of the factors that can be assessed in Game-Based Learning (GBL) is the time factor. In this chapter, time is considered as the time used by players (time-on-task) and as psychological time perceived by students (time perspective). Time Perspective (TP) is a cognitive aspect of players, defined as the manner in which individuals divide time into past, present, and future. This variable can be considered as an individual difference; players with a temporal perspective focused on the future may play games differently than students oriented to the past or present. This chapter aims to study how Serious Games (SG) can help in assessing time-on-task by learners and time perspective. After a theoretical review of these aspects, a case study of MetaVals is presented as an example of time assessment in SG. This game was designed by ESADE's learning innovation team and monitors player times for individual and collaborative phases of the game. The results focus on the key aspects for assessing time in the class use of GBL and offer designers and teachers a reliable instrument for better personalising and implementing of SG tasks in the context of time.

INTRODUCTION

In educational contexts, the time factor is an implicit perspective that some approaches have tried to make explicit by defining typologies of academic time. The time factor and quality of time are important aspects for understanding learning activities (Barberà, Gros & Kirschner, 2012; Romero, 2010), and especially in active learning methodologies such as Game Based Learning

(GBL), where students have a central role in the development of the game and the regulation of their time-on-task. The allocated time for a game activity set by the instructional designers also represents an important factor that must be taken into account, especially regarding student performances, when integrating games in the curriculum and, in particular, when designing how and what aspects should be assessed in learning activities.

GBL can be defined as a computer-based learning methodology intended for educational purposes that supports student-centred learning in a significant way (Sica, Delli Veneri, & Miglino, 2011). Also called Serious Games (SG), this methodology is designed to help learners achieve a balance between fun and educational value (Zyda, 2005; Klopfer, Osterweil & Salen, 2009). In particular, following Connolly and colleagues (2012) there is a need to pay attention to psychological and pedagogical aspects of SGs. As a computer-based methodology, one of the aspects highlighted as an important factor in GBL is time (Gee, 2009). Time has also been highlighted as an important factor in computer-based learning methodologies (Barbera, Gros & Kirschner, 2012). Therefore, in this chapter we will focus on how to assess time in GBL, in particular, we will present a case study of SG MetaVals to help us understand the new needs that GBL creates for practitioners and SG designers when compared to non-game-based learning methodologies relating to time. With the aim of giving a wide perspective to the assessment of the time factor in learning, we will focus on engagement time (defined as time-on-task; Fisher et al., 1980; Romero, 2011), as an objective measure of time in a learning task; as well as studying the assessment of time as a subjective or psychological variable such as the Time Perspective (TP) of students (Zimbardo & Boyd, 1999).

The main aim of this chapter is to understand how student time can be assessed during the different stages of an SG learning activity: the preparation phase before the start of the game; the SG playing activity; and the subsequent analysis of the SG activity. Moreover, we give tips on how instructional designers and teachers can help learners regulate their time when playing SG. To achieve this objective, we focus on how two factors impact on learning in the GBL methodology: 1) time-on-task as the objective time students spend in a GBL activity or task; and 2) student time perspective (TP) as the psychological time each player contributes. Figure 1 shows an overview of the typological assessment of time according to the various stages of SG activity addressed in this chapter.

TIME ASSESSMENT IN GBL

Time in learning has been mostly studied as a factor related to academic achievement. Following Carroll (1963), students can learn optimally when the time they spend learning is the time required by the task in relation to the current stage of development, ability, and knowledge of each learner. The time invested in learning by students is nevertheless framed by their personal and social temporal constrictions, time constrictions in their learning institutions (institutional time), and the time constrictions introduced by teachers (time allocated to learning the task). The time a student decides to invest in learning has been related to student engagement and motivation (Lewis, 2007; Wagner, Schober & Spiel, 2008). Focusing on computer-based learning in general and on GBL in particular, time could be a key factor in assessment, due to the fact that SG can promote a more active role for students, and the amount of time they spend in these activities could be related to an improved learning rate (Cooley & Lohnes, 1976; Lewis, 2007). From a metacognitive standpoint, Metcalfe (2002) claims that existing results in computer-based methodologies seem to sustain the idea that these methodologies could help learners manage time while learning. Furthermore, learners' TP (Zimbardo & Boyd, 1999) have also been

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