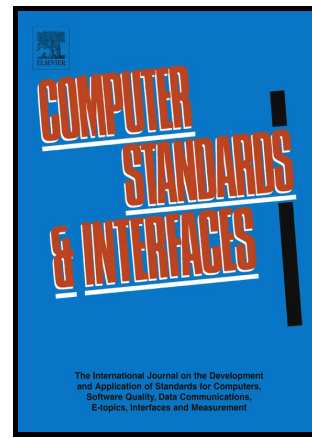


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Applying standards to systematize learning analytics in serious games

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Abstract

Learning Analytics is an emerging field focused on analyzing learners' interactions with educational content. One of the key open issues in learning analytics is the standardization of the data collected. This is a particularly challenging issue in serious games, which generate a diverse range of data. This paper reviews the current state of learning analytics, data standards and serious games, studying how serious games are tracking the interactions from their players and the metrics that can be distilled from them. Based on this review, we propose an interaction model that establishes a basis for applying Learning Analytics into serious games. This paper then analyzes the current standards and specifications used in the field. Finally, it presents an implementation of the model with one of the most promising specifications: Experience API (xAPI). The Experience API relies on Communities of Practice developing profiles that cover different use cases in specific domains. This paper presents the Serious Games xAPI Profile: a profile developed to align with the most common use cases in the serious games domain. The profile is applied to a case study (a demo game), which explores the technical practicalities of standardizing data acquisition in serious games. In summary, the paper presents a new interaction model to track serious games and their implementation with the xAPI specification.

Keywords: serious games, learning analytics, standards, xAPI

1. Introduction

A serious game is a video game designed with a purpose other than pure entertainment [1]. Serious games have been proven to be effective educational tools in many domains, such as mathematics, physics, engineering, medicine, economics, history and literature [2]–[5]. The methods used to measure their effectiveness vary from study to study (some standard guidelines are starting to arise [6]). However, a large number of serious games research studies primarily depend on data from surveys and questionnaires [7].

Meanwhile, data-driven approaches that rely on collecting and analyzing data from learners' on-line activity are a current trend in the e-learning community. Disciplines such as Learning Analytics (LA) [8] and Educational Data Mining (EDM) [9] are studying the way learners perform online activities within Virtual Learning Environments (VLE). Their main goal is to better understand educational processes to find ways to improve them and assure an accurate assessment of the student. LA applications vary from identifying students at risk of failing a course [10] to recommending additional educational materials for those students who might need them [11]. As the number of LA applications increases, there is a growing interest in which educational standards can be used to share and exploit data, easing the collaboration between LA tools and VLEs.

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