

# Introducing the Game Context: A Representation For the Motivational Aspects in Education

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## ABSTRACT

From a student's perspective, a learning task has three major facets: the knowledge it is concerned with, the type of learning activity and the aspects of the task that motivate the student. A mismatch can occur between these properties of a learning task and their counterparts in the capacity of a student. Optimizing this for every individual student is difficult for a teacher that designs a course for the collective. The learning analytics community tries to assist teachers by providing them with systems that can optimize this on an individual level. Ideally, such a system would optimize all three major facets of a learning task, by finding a good balance in the amount of new knowledge, by choosing the optimal learning activity and keeping the student fully motivated and engaged during the assignment. Ample work has been done on systems that personalize learning tasks in terms of the knowledge and in recent years there has also been a focus on personalizing the type of learning activity. However, little work has been done on the optimization of the third quantity in such systems.

Engagement is a complex notion which is usually very subjective in its nature. Although many physiological and psychological explanations and formalizations exist, these definitions fail to be usable in context-aware recommender systems. We propose a novel representation of the motivating aspects of a learning task, called the game context, based on the fields of gamification and reverse game theory. A game context consists of a set of actors, a set of game mechanics and a set of predetermined rewards functions. For a learning task, the set of actors represents the students involved and the game mechanics and reward function represent the motivating aspects. For each student, the game context has a certain effectiveness in triggering engagement.

In this paper we propose to use the game context representation in applications such as computer-assisted course

building and intelligent curriculum. We also present a proof of concept implementation of a system that uses the game context and evaluate its use in a bachelor course.

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