Supporting the design of learning games for formal learning: models and tools

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Abstract

In this paper, we present a set of tools that we have experimented and proposed in order to reduce the gap between the "intentions" of teachers-designers and the actual activities that are proposed to learners. We particularly focus on learning game design. We insist on the pedagogical creativity, and on a phase of negotiation during which a team of designers are gathered to propose ideas about the "global sketching" of an original solution to deploy, adapted to the target. They have also to clarify their intentions in terms of audience's characterization, didactical features, game mechanisms, etc. This paper presents the results of an experiment with ScenLRPG, a tool intended to foster collaboration during the design phase of GBL scenarios. Based on a specific graphic formalism, ScenLRPG allows groups of designers to describe scenario elements so as to justify and negotiate their design choices.

Problems

Although Game-based learning (GBL) and digital learning games have been promoted and encouraged in recent years for formal learning, practitioners still find it difficult to integrate this approach and tools in their current teaching practice [ProActive 2010].

The problems we aim to address in our research work are how are (1) designing learning scenarios including game mechanisms and digital tools, (2) articulating the learning objectives of the curriculum with game activities and game mechanisms and (3) supporting the collaborative and multidisciplinary design of a serious game by educational/pedagogical engineer, teachers/trainers, computer scientists, didacticians and teachers.

Moreover we have identified specific needs to support the design of learning games for formal learning. Need of: a common language to support the collaborative and multidisciplinary design of a serious game, support mechanisms in the design and creativity (design patterns…) and in the adoption of game base learning for formal learning, integrating game mechanisms and collaborative learning in broader scenarios, design the scenario with authoring tools, reusing and sharing the scenarios produced.

In response to the problems identified, we propose a set of models, methods and tools tangible or digital, enabling practitioners to develop innovative training solutions in terms of interaction and effective in terms of learning. Our approach encourages a multidisciplinary approach and is based closely with the views of practitioners.

State of the art

The theoretical foundations that respond to the problem are in two main areas: first the study of the mechanisms favoring the motivation of the learner and second the study of the processes supporting the structuring of the activity for the pedagogical designer. In the first area, the motivation leading a learner to engage and remain engaged in a learning system using the game can be found in Caillois [Caillois 1961] in the field of games theory, and in more recent work on video game and the integration of games in learning (theory of flow [Kiili 2005], self-determination [Malone & Lepper 1987], gamification [Priebatsch, 2010]).

In the second area, a critical analysis of recent work in the field of learning design is based on the one hand on the progress made in the field of intentions-driven design [Emin et al., 2009], and on the other hand on the work on creativity in the instructional design activity [Decortis & Laurentis 2009].

Our proposals are based on these two theoretical foundations.

Proposals: models

First, the study on the motivation mechanisms allows us to define a set of seven main game principles [Mariais 2012] to be taken into account by practitioners in the design. The second area of study allows us to propose a model for structuring the design process: ISIS model (Intentions, Strategies, interactional Situations) [Emin et al., 2009] that allows first to clarify the intentions that the designer wants to achieve as part of a specific context of the project and second to organize the design into three overlapping phases: the sketch, the detailed design and operationalization. At the sketch level, it seems particularly important to provide high-level primitives allowing the designer to explore different tracks without worrying about technical solutions and precise resources used. Priority is to be given to the choice of teaching strategies and interaction situations favoring the acquisition of knowledge or competencies. These choices are made, ensuring they are consistent with the intentions of the designer, especially with the game principles implemented. Special emphasis is also focused on strategies for capitalization and reuse.

Models implementation in authoring tools

The previous models were implemented in authoring tools specifically dedicated to the design of role-playing game for training. The various tools available have a common feature of being based on a "visual language" allowing the spatial arrangement of concepts. We present the primitives of this language and their implementation in both types of tools we have developed: a "card game for the design" and an "authoring software".

Experimentation of the models and tools proposed

Various experimentations of the models and tools proposed were conducted in 2011. After explaining how the targeted users (the designers) have been involved in the development of our tools, we present the results of experiments conducted with different audiences: pedagogical designers of training services, pedagogical engineers in e-learning companies, researchers in the field of game based learning.

Lessons learned and perspectives

Finally, we will conclude by the lessons learned and the perspectives opened by our work. We first consider the need to provide designers "hybrid" environments to combine creativity and efficiency. This can include hybridization based on the alternation of phases of creative design, carried out collectively and face-to-face, with periods of consolidation, more individual, may be conducted asynchronously by the designers.

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