

Game Mastering in Collaborative Serious Games: A Novel Approach for Instructor Support in Multiplayer Serious Games

Viktor Wendel, Technische Universität Darmstadt, Darmstadt, Germany

Stefan Krepp, Technische Universität Darmstadt, Darmstadt, Germany

Michael Oliver Gutjahr, Technische Universität Darmstadt, Darmstadt, Germany

Stefan Göbel, Technische Universität Darmstadt, Darmstadt, Germany

Ralf Steinmetz, Technische Universität Darmstadt, Darmstadt, Germany

ABSTRACT

In collaborative learning scenarios, the role of the instructor is vital. This aspect directly carries over to the concept of collaborative multiplayer Serious Games, where a group of players is learning together using a Serious Game. In this paper, the authors propose a novel approach for integration and support of instructors in collaborative multiplayer Serious Game scenarios. Their approach considers instructor tasks and responsibilities. It defines an interface for 3D action adventure-like games, defining relevant game information and adaptation access. It further includes a Game Mastering framework for orchestrating and adapting such games at runtime via an instructor. The concept was implemented on top of an existing Serious Game (Escape from Wilson Island) and evaluated in a user-centric study with $N=40$ participants (age $m=23.39$; $SD=3.05$). Results show that an instructor using our framework in a collaborative learning scenario can positively influence players' game experience ($p<.05$) and success towards the intended goals, as well as recognize and counteract problems at runtime.

Keywords: *Adaptation, Collaborative Learning, Game Mastering, Serious Games*

MOTIVATION

The role of the instructor in collaborative learning scenarios has been discussed and researched profoundly (Haake, Schwabe & Messner, 2004), (Hämäläinen & Oksanen, 2012), (Olivares, 2007), (Sandford & Williamson, 2005). It is agreed that the role of the instructor in collaborative learning scenarios is vital due to the various tasks like preparation of the setting, observation, moderation, coaching, adaptation, and others.

DOI: 10.4018/IJGBL.2015100103

It has been suggested by Gee (2005) and Prensky (2003) to combine the features of collaborative learning with the promising opportunities that arise from using games in a learning scenario. As instructors are traditionally a part of collaborative learning scenarios with many obligations and responsibilities in the process, there is a need to integrate them into the game-based collaborative learning process in a way such that they are able to fulfill those obligations and responsibilities.

In terms of difficulty adaptation, the presence of an instructor in a game-based collaborative learning scenario can have additional advantages. They can dynamically perform difficulty adaptations which is usually much better than using a predefined difficulty level which is then fixed for the whole game. A predefined difficulty might later turn out to be too easy or too difficult requiring a restart of the game. Even compared to an automatic dynamic difficulty adaptation during runtime, a human instructor might be able to better adapt the game difficulty as a human is usually better able to recognize game situation, problems and obstacles. This is because a human can better interpret human behavior and draw conclusions from it in contrast to a computer algorithm. This statement, however, is only valid if the human instructor has the necessary means to observe and adapt the game according to his /her professional understanding. Therefore, the instructor needs to be able to get detailed information about the game and to influence/adapt it in sound ways. This is not possible in a traditional classroom scenario where students play a game and the instructor can 'look over their shoulders' and/or give orders and hints.

It is, however, necessary to examine the role of the instructor in a game-based collaborative learning scenario. Orchestrating a session of digital game-based collaborative learning bestows additional challenges onto the instructor. The instructor needs to orchestrate the process in the dimensions of learning, gaming, and interaction.

Hence, the problem to be addressed is how to support an instructor in a game-based collaborative learning scenario such that the instructor is able to orchestrate the learning session according to his/her professional opinion as he/she would do in a traditional setting. A major challenge here is presenting relevant information to the instructor as well as providing meaningful adaptation options with foreseeable effects on the players and the game.

In this work, we focus on a scenario of small collaborative learning groups where all the learners are in close proximity to each other (i.e. same room) and able to freely communicate with each other. This scenario applies to working groups in class as well as to corporate training groups. Groups consist of three to six learners/players and a teacher or trainer which we refer to as 'instructor' or, in context of orchestrating the game, as the 'Game Master' (GM). The learners might know other team members prior to the learning session or might meet for the first time. The learning/training goal can be either learning certain content in a playful way, or training of collaboration soft skills (e.g. communication, teamwork, etc.).

Our main contribution is a concept for supporting instructors in orchestrating digital collaborative multiplayer Serious Games (CMSGs). In more detail, we derive requirements from literature for this type of games in order to design an interface to access vital game information and available possibilities for adaptation. We further conceptualize a framework for orchestrating CMSGs ('Game Mastering'). The concept describes how information can be extracted from the game and be processed in a meaningful way such that it can be presented to the instructor soundly. The concept further describes how the instructor can influence and adapt the game in terms of difficulty, game pace, understanding both the game and the learning content, and countering problems in teamwork and collaboration.

We implemented our concept as an extension to the existing Serious Game *Escape From Wilson Island (EFWI)*, which is a 3D CMSG focusing on soft skills like teamwork, collaboration, and communication. A user study ($N=40$) has been performed in order to evaluate our concept in

21 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/article/game-mastering-in-collaborative-serious-games/134063

Related Content

NAUK.si: Using Learning Blocks to Prepare E-Content for Teaching Mathematics

M. Lokar, P. Lukšič and B. Horvat (2012). *Teaching Mathematics Online: Emergent Technologies and Methodologies* (pp. 307-326).

www.irma-international.org/chapter/nauk-using-learning-blocks-prepare/57945

A Computer-Based Game that Promotes Mathematics Learning More than a Conventional Approach

Bruce M. McLaren, Deanne M. Adams, Richard E. Mayer and Jodi Forlizzi (2017). *International Journal of Game-Based Learning* (pp. 36-56).

www.irma-international.org/article/a-computer-based-game-that-promotes-mathematics-learning-more-than-a-conventional-approach/171667

The Mobile Learning Network: Getting Serious about Games Technologies for Learning

Rebecca Petley, Guy Parker and Jill Attewell (2011). *International Journal of Game-Based Learning* (pp. 37-48).

www.irma-international.org/article/mobile-learning-network/60133

Do the Philosophical Foundations of Online Learning Disadvantage Non-Western Students?

David Catterick (2007). *Globalized E-Learning Cultural Challenges* (pp. 116-129).

www.irma-international.org/chapter/philosophical-foundations-online-learning-disadvantage/19297

Mitigation of Cognitive Bias with a Serious Game: Two Experiments Testing Feedback Timing and Source

Norah E. Dunbar, Matthew L. Jensen, Claude H. Miller, Elena Bessarabova, Yu-Hao Lee, Scott N. Wilson, Javier Elizondo, Bradley J. Adame, Joseph Valacich, Sara Straub, Judee K. Burgoon, Brianna Lane, Cameron W. Piercy, David Wilson, Shawn King, Cindy Vincent and Ryan M. Schuetzler (2017). *International Journal of Game-Based Learning* (pp. 86-100).

www.irma-international.org/article/mitigation-of-cognitive-bias-with-a-serious-game/188613