Serious Games meets Adaptive Hypermedia: Integrating games into web-based e-learning systems.

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The use of games in education is becoming increasingly popular, as it can, in some cases, significantly improve learning outcomes over traditional methods (Knight et al., 2010). At the same time, a blended learning approach (Garrison and Vaughan, 2008), in which the use of games is combined with other technologies and classroom-based education is becoming increasingly popular.

Many institutions have adopted a Learning Management System, an on-line system for managing digital learning material, where the course contents get uploaded and where students can log in, explore the course contents, take tests or engage in learning activities. While LMSs are useful for distance education only courses, they are increasingly regularly used in conjunction with traditional classroom-based courses in a blended approach.

A significant volume of research has been conducted into e-learning and a number of standards have emerged. However, games differ from traditional digital media such as texts, in that they often bundle multiple learning objectives into a package coupled with game play mechanics and dynamics and as a result the integration of games into e-learning standards and into systems such as LMSs mostly limited to linking, leaving the job of blending them into the curriculum up to the teacher.

Learning analytics (Ferguson, 2012) is a new emerging trend. For educational games this means that the difficulty, environment, amount of guidance via non player characters etc can be adapted to the learner's knowledge and learning style. It also means that data mining can be used to establish, what learners really do in these games, and the course in general and whether there is a pattern that successful students have in common. This could then be used to improve the game, and the course as a whole.

Advances we have made recently include re-use and re-purposing tools for educational games (Protopsaltis et al., 2011), integration of educational game authoring tools and adaptive hypermedia authoring tools (Hendrix et al., 2013) and direct integrations between games and LMSs via a JavaScript library and XML messages (Dunwell et al., 2011). However a standard is clearly required.

Some educational games take a different approach altogether. For example the European-funded Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Services (MASELTOV) project seeks to provide both practical tools and learning services via mobile devices. The learning services include an educational game. However unlike many other educational games it is not part of a formal curriculum. Therefore instead of integrating it into an LMS, it is distributed as a few to play game via the Google Play store (https://play.google.com/). A lose integration with other services, for example allowing users to gain points that can be spent on upgrades in game, is achieved via web-services. Deployment in this way has the potential to reach large and gather data about audiences, such as play times, locations and which areas of the game are proving problematic as well as which other (MASELTOV) sources the user uses. The play store allows updating of games, so it is possible to respond to results of data analysis with improved versions of the game.

Acknowledgements

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